Standards and Recommended Practices

Approved SMPTE Recommended Practices

The Society's Executive Committee for Standards Approval approved two SMPTE Recommended Practices: RP 94-1989, Gain Determination of Front Projection Screens; and RP 75-1989, Specifications for Flutter Test Film for 35-mm Studio Audio Reproducers, Magnetic Type. These and other SMPTE Recommended Practices may be obtained from Society Headquarters for $3.00 each.

Proposed American National Standard

Published here for a trial period and public review is Proposed American National Standard for Motion-Picture Film Nomenclature for Studios and Processing Laboratories, SMPTE 56. The proposal, a revision of ANSI/SMPTE 56-1984, will be submitted to the Society's Executive Committee for Standards Approval if no adverse comments are received from publication. Comments should be addressed to Sherwin H. Becker prior to May 1, 1990.

Proposed SMPTE Recommended Practices

Three Proposed SMPTE Recommended Practices are published here for a trial period and public review: RP 156, Bar Code Labeling for Type D-1 Component and Type D-2 Composite Cassette Identification; RP 155, Audio Levels and Indicators for Digital Audio Records on Digital Television Tape Recorders; and RP 157, Key Signals. If no adverse comments are received prior to May 1, 1990, the proposals will be submitted to the Society's Executive Committee for Standards Approval. Copies are available from Society Headquarters for $3.00 each.

Reaffirmed SMPTE Recommended Practices

Three SMPTE Recommended Practices were reaffirmed by the Society's Executive Committee for Standards Approval: RP 6-1985, Recorded Carrier Frequencies and Pre-emphasis Characteristics for 2-in Quadruplex Video Magnetic Tape Recording for 525-Line/60-Field Television Systems; RP 47-1985, Electronic Method of Dropout Detection and Counting; and RP 132-1985, Storage of Edit Decision Lists on 8-in Flexible Diskette Media. All the practices were reaffirmed in 1989. These and other SMPTE Recommended Practices are available from Society Headquarters for $3.00 each.

— *Sherwin H. Becker, Director of Engineering*

SMPTE RECOMMENDED PRACTICE — RP 94–1989

Gain Determination of Front Projection Screens

Introduction

Screen gain is a ratio of the test luminance to the luminance of a lambert diffuser under the same viewing conditions. Screen gain usually varies, depending upon the angle of view, because of the laws of reflection and the nature of the screen surface. Thus, a maximum screen gain value can be misleading because it is an incomplete description.

1. *Scope*

This practice specifies a method for measurement of screen gain.

2. *Formula*

Screen gain is a ratio:

$$\text{Gain} = \frac{\text{Luminance of test screen}}{\text{Luminance of lambert diffuser}}$$

3. *Measurement*

3.1 The test screen shall be illuminated with projector light rays perpendicular to the screen surface. (See Appendix A5.)

3.2 The luminance of the screen sample shall be measured at 5-degree intervals. The measurements shall be in horizontal and vertical planes that pass through the perpendicular to the screen surface.

3.3 The maximum gain shall be labeled as such. Average useful gain shall be the gain seen by the audience under projection conditions. (See Appendix A1.)

3.4 In testing screens already installed in theaters, the methods specified in Secs. 3.1 and 3.2 may be altered to accept the existing projection angle and seating arrangement. (See Appendix A1.)

4. *Instruments*

4.1 The goniophotometer shall measure only the luminance of the perpendicularly illuminated area on the screen.

4.2 The photometer (see Sec. 4.1) shall have a spectral response of a standard observer with photopic vision. (See Appendix A6.)

4.3 A diffuse reference standard similar to a lambert diffuser, which reflects all incident light so that the luminance is the same regardless of the angle of view, shall be used and shall be specified with the screen gain. The standard could be MgO, $BaSO_4$, $MgCO_3$, standardized matte white cardboard or a matte white screen of calibrated reflectance.

Revision of RP 94-1980
Approved August 9, 1989

Appendix

(This Appendix is not part of the SMPTE Recommended Practice, but is included for information only.)

A1. In order to obtain a representative gain value for a theater, one might measure the center screen luminance from the center and sides of the middle row in the audience and average these values with the luminance measured from the center of the back and front rows.

A2. When a goniophotometer is used to measure luminance, the photometer may see all of the perpendicularly illuminated spot on the screen sample at all angles. Therefore, the luminance readings may have to be corrected by dividing by the cosine of the angle. If the photometer sees only the small center of the perpendicularly illuminated area, the correction is not required.

A3. Useful angles in locating good audience coverage for a gain screen are the angles which provide the necessary recommended screen luminance. (See American National Standard for Motion-Picture Film—Screen Luminance and Viewing Conditions—Indoor Theater Projection, ANSI/SMPTE 196M-1986.) In most cases, the angles would be limited to those which provide more than one-half the maximum gain. In some situations, curving the screen is necessary in order to utilize screens with gain factors over 1.1.

A4. Some subjective gain errors may occur because a typical theater audience has a mesopic eye response, determined by how long the viewer is in the theater, the ambient light, the subtended screen size, film subject matter, and the projector lumen output. Therefore, some observers may not agree with the numerically calculated gain.

A5. Retroflective screens, such as glass-beaded screens, reflect maximum gain back to the projector, regardless of projection angle.

A6. References to instrument spectral response and required theater illumination are listed in ANSI/SMPTE 196M-1986.

SMPTE RECOMMENDED PRACTICE — RP 75–1989

Specifications for Flutter Test Film for 35-mm Studio Audio Reproducers, Magnetic Type

1. *Scope*

This practice specifies a test film for determining the presence of flutter in 35-mm motion-picture studio magnetic audio reproducers operating at 96 perforations per second or approximately 90 ft (27 m) per minute for use with one-, three-, four-, and six-track audio systems.

2. *Test Film Signal*

2.1 Frequency. The audio record shall be an original recording which will reproduce at a frequency of 3150 Hz ± 25 Hz when the linear speed of the film is 96 perforations per second or approximately 90 ft (27 m) per minute (18 in or 46 cm per second).

2.2 Distortion. The total harmonic distortion of the recorded signal shall not exceed 0.2 percent.

2.3 Audio Record. The audio record shall be recorded so that it extends from one edge of the film to the other.

2.4 Recorded Level. The flutter test tone shall be not less than 6 dB down from the equivalent reference level of 1 kHz at 185 nanowebers per meter after correct equalization of 35 μs.

2.5 Flutter. The weighted peak flutter of the audio record shall not exceed ± 0.04 percent when measured in accordance with American National Standard Weighted Peak Flutter of Sound Recording and Reproducing Equipment, ANSI S4.3-1982.

2.6 Azimuth. The azimuth of the audio record shall be 90° ± 3′ to the reference edge of the film.

3. *Film Stock*

3.1 The film stock shall be full-coat, splice-free, safety type in compliance with American National Standard for Motion-Picture Film — Safety Film, ANSI/SMPTE 223M-1985.

3.1.1 Test films made on low-shrinkage, triacetate base shall be cut and perforated in accordance with long-pitch dimensions specified in American National Standard for Motion-Picture Film (35-mm)—Perforated KS, ANSI/SMPTE 139-1986.

3.1.2 Test films made on polyester base shall be perforated in accordance with short-pitch dimensions specified in ANSI/SMPTE 139-1986.

3.2 The film stock shall be conditioned for 10 days at 20°C ± 3°C (68°F ± 5.1°F) at a relative humidity of 50 ± 10 percent prior to recording.

3.3 The film shall be recorded and packaged within the temperature and humidity limits specified in 3.2. The recorded film shall be packaged in a metal can and sealed either with a low-moisture permeability plastic tape or a fabric tape having a moisture barrier.

4. *Identification*

Each test film shall be identified by a suitable identification marking.

5. *Calibration*

5.1 Flux. The short circuit flux on the test film shall be determined by means of the calibrated short-gap ferromagnetic core reproducer technique. This technique is described in American National Standard Method of Measuring Recorded Flux of Magnetic Sound Records at Medium Wavelengths, ANSI S4.6-1982.

5.2 Level. The signal level specified in 2.4 shall be measured with an rms voltmeter calibrated in decibels with an accuracy of ± 0.1 dB over the bandwidth 31.5 Hz to 16 kHz.

5.3 Method. The test film shall be calibrated on a reproducing head made in accordance with American National Standard Position, Dimensions and Reproducing Speed of Three 200-Mil Magnetic Sound Records on 35-mm and One Record on 17.5-mm Motion-Picture Film, ANSI PH22.86-1981.

NOTE: A test film made in accordance with this practice is available from the Society of Motion Picture and Television Engineers.

Revision of RP 75-1984
Approved August 9, 1989

Proposed American National Standard

for motion-picture film —

nomenclature for studios and processing laboratories

SMPTE 56

Revision of
ANSI/SMPTE 56-1984

1. General

1.1 *Motion Picture.* A series of images presented in rapid succession with objects represented in successive positions either unchanged or changed and producing, because of the persistence of vision, the optical effect of a continuous picture.

1.2 *Motion-Picture Film.* A thin flexible strip of plastic, complying with a dimensional standard as defined herein, whose use is specific to the process of manufacturing a motion picture.

Note: Motion-picture film, perforated or unperforated, is usually described by a name relating to or designating that part of the system for which it was designed, i.e., the terms color negative, release positive, separation master positive, audio recording, electronic video recording, etc.

1.2.1 *Raw Stock.* Raw stock is film which has not been exposed or processed.

1.2.2 *Film Base.* Film base is the plastic material upon which a photographic emulsion or other material may be coated.

Note: All film base manufactured in the United States for motion-picture use since 1952 has been safety base.

1.2.2.1 *Safety Base.* Safety base is the slow-burning film support used for motion-picture films which complies with ANSI/SMPTE 223M-1985.

1.3 *Magnetic Audio Film.* Magnetic audio film is a film base having film perforations along one or both edges and bearing a magnetic coating, either completely across the film or in stripes, the coating being capable of accepting and reproducing audio records.

Note: Unperforated materials usually are referred to as magnetic tape.

1.4 *Perforations.* Perforations are the regularly and accurately spaced holes that are punched throughout the length of motion-picture film. These holes are engaged by the teeth of various sprockets and pins by which the film is transported and positioned as it travels through cameras, processing machines, projectors, and other film-handling machinery.

1.4.1 *Perforation Pitch.* The perforation pitch is the distance from the bottom edge of one perforation to the bottom edge of the next perforation, measured along the length of the film.

Motion-picture film stock is perforated in two formats, short and long pitch. In general, motion-picture film with short perforation pitch is used for negative or intermediate images. Release print film is generally perforated with long pitch to minimize slippage when continuously printed over a sprocket in contact with a short-pitch negative film closer to the axis of the sprocket.

Note: Perforations are being identified currently by two-letter designations such as BH (Bell & Howell), KS (Kodak Standard), DH (Dubray-Howell), or CS (CinemaScope). A numeral, such as 1866, designates the pitch in ten thousandths of an inch. A designation, 1R, 2R, etc., used with films having 16-mm, 8-mm Type R or 8-mm Type S perforations, refers to the number of rows of perforations across the narrow dimension of the film.

1.4.2 *35-mm Perforation, BH-1866.* The 35-mm negative perforation has sharp corners, curved sides, a nominal width of 0.110 in (2.79 mm), a height of 0.073 in (1.85 mm), and a pitch of 0.1866 in (4.740 mm) (ANSI/SMPTE 93-1986).

1.4.3 *35-mm Perforation, BH-1870.* The 35-mm negative perforation has sharp corners, curved sides, a nominal width of 0.110 in (2.79 mm), a height of 0.073 in (1.85 mm), and a pitch of 0.1870 in (4.750 mm) (ANSI/SMPTE 93-1986).

1.4.4 *35-mm Perforation, KS-1866.* The 35-mm positive perforation is rectangular in shape with a width of 0.110 in (2.79 mm), a height of 0.078 in (1.98 mm), a fillet in each corner with a radius of 0.020 in (0.51 mm), and a pitch of 0.1866 in (4.740 mm) (ANSI/SMPTE 139-1986).

1.4.5 *35-mm Perforation, KS-1870.* The 35-mm positive perforation is rectangular in shape with a width of 0.110 in (2.79 mm), a height of 0.078 in (1.98 mm), a fillet in each corner with a radius of 0.020 in (0.51 mm), and a pitch of 0.1870 in (4.750 mm) (ANSI/SMPTE 139-1986).

1.4.6 *35-mm Perforation, DH-1870.* This perforation is rectangular in shape with a height of 0.073 in (1.85 mm), a width of 0.110 in (2.79 mm), a fillet in each corner with a radius of 0.013 in (0.33 mm), and a pitch of 0.1870 in (4.750 mm) (ANSI/SMPTE 237-1988).

1.4.7 *35-mm Perforation, CS-1870.* This perforation is rectangular in shape with a height of 0.073 in (1.85 mm), a width of 0.078 in (1.98 mm), a fillet in each corner with a radius of 0.013 in (0.33 mm), and a pitch of 0.1870 in (4.750 mm) (ANSI/SMPTE 102-1986). The outer edge of this perforation is at a different distance from the edge of the film than the other 35-mm film perforations listed above.

1.4.8 *65-mm Motion-Picture Film, KS-1866.* The 65-mm negative perforation is rectangular in shape with a width of 0.110 in (2.79 mm), a height of 0.078 in (1.98 mm), a fillet in each corner with a radius of 0.020 in (0.51 mm), and a pitch of 0.1866 in (4.740 mm) (ANSI/SMPTE 145-1988).

1.4.9 *65-mm Motion-Picture Film, KS-1870.* This 65-mm negative perforation is the same as for 65-mm motion-picture film, KS-1866, except for the perforation pitch (ANSI/SMPTE 145-1986).

1.4.10 *70-mm Motion-Picture Film Perforated 65-mm, KS-1870.* The 70-mm positive perforation is rectangular in shape with a width of 0.110 in (2.79 mm), a height of 0.078 in (1.98 mm), a fillet in each corner with a radius of 0.020 in (0.51 mm), and a pitch of 0.1870 in (4.750 mm). This film is intended to be printed from 65-mm motion-picture film, KS-1866, or from an optically enlarged 35-mm anamorphic negative image. The additional margin width is designed to accommodate magnetic audio records (ANSI/SMPTE 119-1988).

Note: This 70-mm film perforated 65-mm is used for motion pictures. It should be distinguished from two other types of perforated 70-mm film which are used for still pictures. These are described in ANSI PH1.10-1981.

1.4.11 *16-mm Perforation.* The 16-mm perforation is rectangular in shape with a height of 0.050 in (1.27 mm), a width of 0.072 in (1.83 mm), and a fillet in each corner with a radius of 0.010 in (0.25 mm). It is used on the following films:

1.4.11.1 *35-mm Motion-Picture Film Perforated 32-mm, 2R-2994.* This is a 35-mm film with 16-mm perforations so arranged that if 1½ mm are slit from each edge of the film and the film were slit down the middle, two 16-mm films would result, each having one row of perforations (ANSI/SMPTE 73-1987).

1.4.11.2 *35-mm Motion-Picture Film Perforated 32-mm, 2R-3000.* This is a 35-mm film with 16-mm perforations so arranged that when 1½ mm are slit from each edge of the film and the film is slit down the middle, two 16-mm films result, each with one row of perforations (ANSI/SMPTE 73-1987).

1.4.11.3 *35-mm Motion-Picture Film Perforated 16-mm, 3R-2994 (1-3-0).* This is a 35-mm film with 16-mm perforations (ANSI/SMPTE 171-1986).

Note: Numerals (e.g., 1-3-0) are added to the title of some standards to specify how the rows of perforations are placed on the film. The perforation rows are numbered starting at the reference edge. The reference edge is the edge nearest to that row of perforations which is retained in one of the 16-mm strips that may be generated by appropriate slitting of the parent 35-mm film. A row of perforations which is discarded is always given the number 0.

1.4.11.4 *35-mm Motion-Picture Film Perforated 16-mm, 3R-3000 (1-3-0).* This is a 35-mm film with 16-mm perforations so arranged that if 3 mm are slit from the selvage edge of the film and the film were slit down the middle, two 16-mm films would result, each having one row of perforations (ANSI/SMPTE 171-1986).

1.4.11.5 *16-mm Motion-Picture Film, 1R-2994.* This film is 16 mm in width, perforated along one edge only (ANSI/SMPTE 109-1986).

Note: The formats referred to as super 16 as well as regular 16 may be exposed on this film (ANSI/SMPTE 7-1988).

1.4.11.6 *16-mm Motion-Picture Film, 1R-3000.* This film is 16 mm in width, perforated along one edge only (ANSI/SMPTE 109-1986).

1.4.11.7 *16-mm Motion-Picture Film, 2R-2994.* This film is 16 mm in width, perforated along both edges (ANSI/SMPTE 110-1986).

1.4.11.8 *16-mm Motion-Picture Film, 2R-3000.* This film is 16 mm in width, perforated along both edges (ANSI/SMPTE 110-1986).

1.4.12 *8-mm Type R Perforation.* The 8-mm type R perforation is rectangular in shape with a height of 0.050 in (1.27 mm), a width of 0.072 in (1.83 mm), and a fillet in each corner with a radius of 0.010 in (0.25 mm). This perforation is identical to the 16-mm perforation described in 1.4.11 above but for 8-mm use has a pitch of 0.1500 or 0.1497 in (3.810 or 3.802 mm). It is used on the following films:

1.4.12.1 *35-mm Motion-Picture Film Perforated 8-mm Type R, 5R-1500.* This is a 35-mm film with 8-mm perforations so arranged that if 3 mm are slit from the selvage edge (identified by circular holes between perforations) and the film slit three times more, four 8-mm type R films would result, each having one row of perforations.

1.4.12.2 *35-mm Motion-Picture Film Perforated 8-mm Type R, 2R-1497.* This is a 35-mm film with 8-mm type R perforations along each edge.

1.4.12.3 *35-mm Motion-Picture Film Perforated 8-mm Type R, 4R-1500.* This is a 35-mm film with 8-mm perforations so arranged that when 1½ mm are slit from each edge and the film slit down the middle, two 16-mm films result which, when slit down the middle, produce four 8-mm type R films, each having one row of perforations.

1.4.12.4 *16-mm Motion-Picture Film Perforated 8-mm Type R, 2R-1500.* This is a film 16 mm in width which when slit down the middle results in two 8-mm type R films, each having one row of perforations (ANSI/SMPTE 239-1989).

1.4.13 *8-mm Type S Perforation.* The 8-mm type S perforation is rectangular in shape, with a height of 0.045 in (1.14 mm), a width of 0.036 in (0.91 mm), and a fillet in each corner with a radius of 0.005 in (0.13 mm). It is used in the following films:

1.4.13.1 *35-mm Motion-Picture Film Perforated 8-mm Type S, 2R-1664 (1-0).* This is a 35-mm film with 8-mm type S perforations on each edge (ANSI/SMPTE 169-1986).

1.4.13.2 *35-mm Motion-Picture Film Perforated 8-mm Type S, 5R-1667 (1-3-5-7-0).* This is a 35-mm film with 8-mm type S perforations so arranged that when 0.030 in (0.76 mm) is slit from one edge and 0.091 in (2.31 mm) is slit from the factory-marked selvage (discard) edge of the film and slit three more times, four 8-mm type S films would result, each having one row of perforations (ANSI/SMPTE 165-1988).

1.4.13.3 *16-mm Motion-Picture Film Perforated 8-mm Type S, 2R-1664 (1-4).* This is a 16-mm film with 8-mm type S perforations on each edge of the film (ANSI/SMPTE 168-1986).

1.4.13.4 *16-mm Motion-Picture Film Perforated 8-mm Type S, 2R-1667 (1-4).* This is a 16-mm film with 8-mm type S perforations on each edge of the film so arranged that when the film is slit down the middle, two 8-mm type S films result, each having one row of perforations (ANSI/SMPTE 168-1986).

1.4.13.5 *16-mm Motion-Picture Film Perforated 8-mm Type S, 2R-1664 (1-3).* (ANSI/SMPTE 151-1987).

1.4.13.6 *16-mm Motion-Picture Film Perforated 8-mm Type S, 2R-1667 (1-3).* This is a film 16 mm in width which when slit down the middle results in two 8-mm type S films (ANSI/SMPTE 151-1987).

1.4.13.7 *8-mm Motion-Picture Film Perforated 8-mm Type S, 1R-1664.* (ANSI/SMPTE 149-1988).

1.4.13.8 *8-mm Motion-Picture Film Perforated 8-mm Type S, 1R-1667.* This film is 8 mm in width with a single row of 8-mm type S perforations (ANSI/SMPTE 149-1988).

1.4.13.9 *35-mm Motion-Picture Film Perforated 35-mm and 8-mm Type S, KS 2R-1866/S8 3R-1664.* This is a 35-mm film with 35-mm perforations down each edge and three rows of 8-mm type S perforations arranged to produce three like 8-mm type S images.

1.4.13.10 *35-mm Motion-Picture Film Perforated 35-mm and 8-mm Type S, KS 2R-1870/S8 3R-1667.* This is a 35-mm film with 35-mm perforations down each edge and three rows of 8-mm type S perforations arranged so that when 0.218 in (5.54 mm) is slit from each edge and the remaining film slit twice more, three 8-mm type S films would result, each having one row of perforations.

1.5 *Photographic Emulsion.* A photographic emulsion consists of dispersions of light-sensitive materials in a colloidal medium, usually gelatin, carried as a thin layer on film base.

Note: Photographic materials are usually designated as negative or positive types according to their light sensitivity (speed), or usage; negative emulsions, in general, being more sensitive than positive emulsions.

1.5.1 *Black-and-White Film.* Black-and-white film carries an emulsion in which, after processing, brightness values of a scene are reproduced only in tones of the gray scale.

Note: Color prints may also be made on black-and-white film by such methods as iron toning, color development, or imbibition (dye transfer).

1.5.2 *Color Film.* Color film carries one or more emulsions in which, after processing, brightness values of a scene are reproduced in terms of color scales.

1.5.3 *Reversal Film.* A reversal film is one which, after chemical reversal processing, produces an image having a scale of brightness values directly corresponding to that of the original exposure. Chemical reversal includes first development, bleaching, and redevelopment.

1.5.4 *Direct Reversal Film.* A direct reversal film is one which, processed in a developer and fixing bath, produces an image having a scale of brightness values directly corresponding to that of the original exposure. In this case, reversal is due to the emulsion rather than to the use of a chemical reversal process subsequent to exposure.

1.6 *Image (Photographic).* An image is any photographically obtained likeness in a processed photosensitive material.

1.6.1 *Latent Image.* A latent image is the invisible image registered on a photographic emulsion due to the reaction produced in the emulsion by exposure to radiant energy.

Note: This image becomes visible after development.

1.6.2 *Picture Image.* A picture image is a photographically obtained likeness of any object on photographic material.

1.6.3 *Audio Image.* An audio image is a photographically obtained audio record.

1.6.4 *Negative Image.* A negative image is a photographic image in which the brightness scale is approximately inverted with respect to the brightness scale of the original subject. In color negatives, the hue scale is usually, but not necessarily, complementary to the hue scale of the original subject and the brightness scale is inverted.

1.6.5 *Positive Image.* A positive image is a photographic replica in which the tones of the gray scale or color values of the originally photographed subject are represented in their natural order.

1.6.6 *Black-and-White Image.* A black-and-white image is an image produced on a black-and-white film.

1.6.7 *Color Image.* A color image is an image produced on a color film.

1.6.8 *Anamorphic Image.* An anamorphic image is an image which has been produced by an optical system having different horizontal and vertical magnifications.

Note: Equal horizontal and vertical magnification is assumed unless the term anamorphic is applied specifically.

1.7 *Aspect Ratio.* Aspect ratio is the ratio of width to height of a projected picture image.

Note: This is the more common usage, although the term is also applied to photographic images and to camera, printer, and projector apertures.

1.8 *Synchronism.* Synchronism is the relation between the picture and audio with respect either to the physical location on the film or films or to the time at which corresponding picture and audio are seen and heard.

1.8.1 *Projection Synchronism.* Projection synchronism is the time relation between picture and corresponding audio in a projection print.

Note: The audio record on a projection print is, in most cases, in advance of the corresponding picture. The displacement is specified in picture frames in the following America National Standards:

Audio Record	Standard
70-mm Magnetic*	ANSI/SMPTE 185-1987
35-mm Photographic	ANSI PH22.40-1984
35-mm Magnetic*	ANSI/SMPTE 137-1988
16-mm Photographic	ANSI/SMPTE 41-1989
16-mm Magnetic	ANSI/SMPTE 112-1989
8-mm Type S Photographic	ANSI PH22.182-1978
8-mm Type S Magnetic	ANSI/SMPTE 164-1988

*In this case, the audio is behind the corresponding picture.

1.8.2 *Editorial Synchronism.* Editorial synchronism is the relationship between the picture and audio film during the editorial process.

Note: During the editorial process, the audio record and corresponding picture, whether on the same or separate films, are kept in alignment and not offset as for projection. Many composite release negatives are supplied in editorial synchronism.

1.8.3 *Camera Synchronism.* Camera synchronism is the relation between picture and audio record in a composite camera original.

Note: Camera synchronism is generally not the same as editorial synchronism. In 16-mm single systems, the two are normally in projection synchronism but this is not the case for most 35-mm single systems (i.e., where picture and audio are recorded on the same film).

1.9 *Exposure.* Exposure is the process of subjecting a photographic film to suitable intensity of radiant energy for a given time in such manner that it may produce a latent image on an emulsion.

Note: Exposure = intensity × time.

1.10 *Processing.* Processing is the generic term applied to the total operation necessary to produce a permanent visible image on exposed film.

1.10.1 *Development.* Development is that part of processing which makes visible the latent image of an exposed photographic emulsion.

1.10.2 *Fixing (Fixation).* Fixing (Fixation) is that part of processing which removes the residual sensitive silver salts from a developed film to render the developed image permanent.

Note: During the process of fixation, films are customarily treated to preserve and harden the developed image. Adequate washing or neutralizing treatment is necessary following fixation for image permanence.

1.10.3 *Bleaching.* Bleaching is that part of processing which converts a developed silver image into a soluble silver salt.

1.11 *Printing.* Printing is the operation of exposing raw stock by using the processed image of another film as the light modulator.

1.11.1 *Contact Printing.* Contact printing is that method of printing in which the raw stock is held in intimate contact with the film bearing the image to be copied. This printing is normally emulsion to emulsion.

1.11.1.1 *Step Contact Printing.* Step contact printing is that method of contact printing in which the film being copied and the raw stock are advanced intermittently frame by frame, being exposed to the printer light only when stationary.

1.11.1.2 *Continuous Contact Printing.* Continuous contact printing is that method of contact printing by which the light-modulating film and the raw stock move at the same constant speed past the printing aperture.

1.11.2 *Projection Printing (Optical Printing).* Projection printing (optical printing) is printing by projecting the image to be copied through an optical system onto the raw stock.

Note: The printed image with respect to the projected image may be identical, an enlargement or a reduction, or an anamorphic image; or additional anamorphosis may be added or removed.

1.11.2.1 *Step Projection Printing.* Step projection printing is that method of optical printing in which the film being copied and the raw stock are advanced intermittently frame by frame, being exposed to the printer light only when stationary.

1.11.2.2 *Continuous Projection Printing.* Continuous projection printing is that method of optical printing in which the light-modulating film and the raw stock move at a continuous rate at each end of the optical system. The film rate will be the same in 1:1 printing and will differ in reduction or enlargement processes.

1.11.3 *A and B Printing.* A and B printing is a method of making composite images, such as fades, dissolves, or effects, in a release printer without requiring a duplicating process.

Note: The name comes from the fact that the films are edited into two separate rolls called A and B rolls. The sequences of pictures originally in one roll are in synchronization with the opaque leader in the other roll. When the two are printed in a separate operation onto a single roll of raw stock, an opportunity is afforded for the introduction of effects and for eliminating visible splices on the screen.

1.11.4 *Double-Rank Printing.* Double-rank printing is a method of producing prints on a wide film, two at a time, so that both are on the parent film before slitting.

1.12 *Projection.* Projection is the presentation of an enlarged image of the film on a screen for visual review. In addition, the audio may be reproduced for aural review.

1.13 *Production.* Production is the general term used to describe the processes involved in making all the original material that is the basis for the finished motion picture.

1.14 *Editorial Process.* Editorial process is the term used to describe the combining, cutting, editing, and other preparation of material obtained from the original material to make the finished motion picture.

1.15 *Rerecording.* Rerecording is the electrical process of transferring audio records from one or more films, magnetic tapes, or discs to other films, tapes, or discs.

Note: Rerecording may be used to combine different audio records into a single record to adjust the frequency-response characteristic or to adjust the relative levels between different scenes and sequences.

1.16 *Release.* Release is a generic term used to designate films used for or intended for general distribution and exhibition.

1.16.1 *Release Negative.* A release negative is a complete negative prepared specifically for printing release prints.

Note: A release negative may consist of separate picture and audio negatives and may be in either projection or editorial synchronism, depending upon the film printing technique to be employed in making release prints.

1.16.2 *Release Print.* A release print is a print made for general distribution and exhibition. It may be on films of 8-, 16-, 35-, or 70-mm width. Some release prints are composed of two or more 35-mm-width films which are projected simultaneously in lateral alignment.

2. Picture Negative Film, Black-and-White and Color

2.1 *Picture Negative.* A picture negative is any processed film that possesses a negative picture image of the subject or film image to which it was exposed. This term is sometimes erroneously used to refer to the raw film before processing, either with or without exposure.

2.1.1 *Original Picture Negative.* The original picture negative is the negative film that is exposed in a camera and processed to produce a negative image of the original subject.

2.1.2 *Background Plate Negative.* A background plate negative is a picture negative which is used for printing background plates.

2.1.3 *Picture Library Negative.* A picture library negative is a picture negative that is usually held in a film library for use in reproducing scenes which would otherwise have to be made as original material for each production.

2.1.4 *Title Negative.* A title negative is a negative that is exposed to a title card or to both a title card and background.

2.1.5 *Picture Duplicate Negative.* A picture duplicate (dupe) negative is a picture negative made from black-and-white, color, or separation master positive films or directly from a picture negative by a reversal process (see 1.5.3 Reversal Film).

Note: It may be used for making additional prints or it may be cut and edited to form a part of the picture release negative.

2.1.5.1 *Internegative.* An internegative film is a negative derived directly from a reversal original film.

Note: All other duplicating negatives derived from other than reversal film are known as duplicate negatives regardless of the generation.

2.1.6 *Picture Release Negative.* A picture release negative is a cut and edited picture negative used for printing the picture portion of release prints.

Note: It may consist of intercut original picture negatives, picture dupe negatives, etc., depending upon the choice of available material or the intended use of the release print.

2.1.7 *Foreign-Picture Release Negative.* A foreign-picture release negative is a picture release negative prepared specifically for printing foreign-version release prints.

Note: It is almost invariably a duplicate negative.

2.1.8 *16-mm-Picture Release Negative.* A 16-mm-picture release negative is a picture release negative on 16-mm film prepared specifically for printing 16-mm release prints.

3. Picture Positive Film, Black-and-White and Color

3.1 *Picture Print.* A picture print is a processed film that possesses a positive picture image of the subject or film image to which it was exposed.

3.1.1 *Picture Daily Print.* A picture daily print is the first picture print made from the original picture negative for use in checking photographic quality, camera technique, actions, etc.

3.1.2 *Picture Work Print.* A picture work print is a positive print which usually consists of intercut picture daily prints, picture library prints, prints of dissolves, montages, titles, etc., and has synchronism constantly maintained with the corresponding audio work print.

3.1.3 *Picture Library Print.* A picture library print is a picture print made from a picture library negative.

3.1.4 *Background Plate (Background Print Film).* A background plate (background print film) is a picture print made specifically for use in projection background or similar process work, and is a print of a background plate negative.

3.1.5 *Picture Master Positive.* A picture master positive is a print usually made on a special film, for the purpose of producing picture duplicate negatives.

3.1.5.1 *35-mm Separation Positive.* A 35-mm separation positive is a black-and-white film with a positive image of the red, green, or blue image component of a color negative. It is usually made by printing through suitable filters from a color negative onto a panchromatic black-and-white film.

3.1.5.2 *35-mm Protection Master Positive.* A 35-mm protection master positive film is a positive film made from the final cut and edited black-and-white or color release negative. In case of damage to the release negative, a duplicate negative could be made from this protection master positive. In the case of color, this protection master positive may be a set of three black-and-white separation master positives or a color master positive.

3.1.5.3 *35-mm Panchromatic Master Positive.* A 35-mm panchromatic master positive is a black-and-white print made on a panchromatic film from a color negative for the purpose of making a black-and-white duplicate negative.

3.2 *Composite Print.* A composite print is a positive film having both picture and corresponding audio on the same film, which may be in editorial or projection synchronism.

3.2.1 *Composite Daily Print.* A composite daily print is made from an original composite negative or original audio and picture negatives, and is used for checking photography, audio quality, action, etc. It is in projection synchronism.

3.2.2 *First Trial Composite Print.* The first trial composite print is the first composite print made from the picture and audio-release negatives for the purpose of checking and correcting picture and audio quality, negative cutting, and assembly, etc. It is in projection synchronism.

3.2.3 *Second, Third, Etc., Trial Composite Print.* The second, third, etc., trial composite print is similar to the first trial composite print, but has successive corrections incorporated as a result of viewing the previous trial composite prints.

3.2.4 *Final Trial Composite.* A final trial composite is a composite print, approved for release, in which all corrections found necessary in previous trial composite prints have been incorporated.

Note: The final trial composite may be any one of the various trial composite prints, depending upon the type and extent of corrections required.

3.2.5 *Composite Master Positive.* A composite master positive is a composite print usually made for the purpose of producing composite or picture and audio duplicate negatives which would be used for printing release prints.

Note: It is usually made on duplicating positive film and may be in either editorial or projection synchronism.

3.2.6 *Foreign-Version Release Print.* A foreign-version release print is a composite print in projection synchronism with dialogue made specifically for the particular language involved.

Note: Sometimes superimposed titles in a different language are used on the print. A superimposed title consists of printed words (usually transparent) overlaying the picture image.

3.2.7 *Foreign-Version Trial Composite Prints.* Foreign-version trial composite prints are similar to trial composite prints made during release, except that they are made for checking the release of the particular language version involved.

4. Reversal Film, Black-and-White and Color

4.1 *Reversal Original.* A reversal original is the film that is originally exposed in a camera or recorder and is processed by reversal to produce a positive image.

Note: The positive image obtained by the reversal process is not the same as a print from a negative. When viewed by projection on an opaque screen, the emulsion side of the print from a negative must face the light source and the emulsion side of a reversal original must face the lens in order for the screen image to have the same lateral orientation as the original scene.

4.1.1 *Composite Reversal Original.* A composite reversal original is a reversal original which has both picture and corresponding audio on the same film.

4.1.2 *Reversal Duplicate Negative.* A reversal duplicate negative is reversal-type film that has been exposed to a negative film image, usually an original picture negative, and developed by the reversal process.

4.2 *Reversal Print.* A reversal print is a reversal-type film that has been exposed to a positive film image, usually a reversal original film, and developed by the reversal process.

4.2.1 *Reversal Master Print, 16-mm.* A reversal master print is a 16-mm reversal print made specifically for use in producing other prints.

Note: It is sometimes referred to as a first-generation duplicate; prints from it are referred to as second-generation duplicates.

4.2.2 *Reduction Reversal Print, 16-mm.* A reduction reversal print is a reversal print made on 16-mm reversal film from a 35-mm positive by reduction printing and development by the reversal process.

5. Photographic Audio

Note: All definitions in this section are understood to be "photographic" unless the term "magnetic" is used. The term "photographic" replaced the term "optical" because the latter describes the method of reproduction and not the audio record itself.

5.1 *Photographic Audio.* Photographic audio is an audio record in the form of a photographic image.

5.2 *Audio Negative.* An audio negative is any film that, after exposure and subsequent processing, produces a negative audio record on the film. This audio record requires the printing and processing of a second film in order to obtain a reasonably faithful reproduction of the original audio, by the conventional scanning system. The negative image may be obtained by direct recording, by exposure through a positive audio image, or by the reversal process from another audio negative.

5.2.1 *Original Audio Negative.* The original audio negative is the audio negative that is exposed in a film recorder and, after processing, yields a negative audio image on the film.

5.2.2 *Audio-Effects Negative.* An audio-effects negative is an audio negative upon which audio effects have been recorded. It is ordinarily held in library stock.

5.2.3 *Music Negative.* A music negative is an audio negative upon which music has been recorded. It is usually an original audio negative but may be a library negative.

5.2.4 *Audio Cut Negative.* An audio cut negative is an audio negative that is composed of sections of original audio negatives spliced in sequence.

Note: The audio cut negative is generally in exact conformity with the audio work print and produces a single sequentially spliced negative. The print of the audio cut negative provides all, or portions of, the rerecording print.

5.2.5 *Rerecorded Negative.* A rerecorded negative is an audio negative which is exposed by rerecording and, when processed, yields a negative audio record image on the film.

5.2.6 *Audio Release Negative.* An audio release negative is a photographic audio negative in the form required for the final printing operation onto the release print raw stock.

Note: The audio release negative may consist of rerecorded negatives, intercut original audio negatives, duplicate negatives of audio records, etc., depending upon the choice of available material or the intended use of the print.

5.2.7 *Special Audio Release Negative.* A special audio release negative is an audio release negative made for the purpose of obtaining an audio record which has characteristics other than those obtained from the audio release negative.

Note: Three common forms of special audio release negatives are those listed under 5.2.7.1, 5.2.7.2, and 5.2.7.3.

5.2.7.1 *Special Audio Release Negative for Use in 16-mm Release of 35-mm Preprint Material.* The special audio release negative for 16-mm release of 35-mm original material is a photographic audio negative, either 35- or 16-mm, recorded with specific characteristics for reasonably faithful reproduction of the original audio on 16-mm reproduction equipment. It may be rerecorded from a print of the 35-mm audio release negative or from the 35-mm rerecording print.

5.2.7.2 *Special Audio Release Negative, Foreign Release in English.* The special audio release negative for use in English version for foreign release is rerecorded from the rerecording print, except that the dialogue track is modified to remove American colloquialisms.

5.2.7.3 *Special Audio Release Negative, Foreign-Language Version.* The special audio release negative for use in foreign-language version releases is usually rerecorded using all the rerecording tracks, except the dialogue track, for which is substituted a special synchronized dialogue track in the foreign language for which the release is being made.

5.2.8 *Audio Release Dupe Negative.* An audio release dupe negative is a duplicate negative of the audio record prepared specifically for printing the audio track of release prints.

5.3 *Audio Print.* An audio print is a positive audio record that provides a reasonably faithful reproduction of the original audio when running through the conventional scanning system. It is any positive obtained by printing from an audio negative or by direct positive recording or, by the reversal process, from another audio positive.

5.3.1 *Audio Daily Print.* An audio daily print is the first audio print made from the original audio negative for checking audio quality, technique, etc.

5.3.2 *Audio Work Print.* An audio work print is an audio print that usually consists of intercut audio daily prints, but may also include other audio tracks of audio effects or music, or both, on the same or separate films, with synchronism constantly maintained with the corresponding picture work print.

5.3.3 *Audio-Effects Print.* An audio-effects print is an audio print made from an audio-effects negative, or from another audio-effects print by reversal processing.

5.3.4 *Music Print.* A music print is an audio print made from a music negative.

5.3.5 *Rerecording Print.* A rerecording print is an audio print prepared specifically for use in rerecording to produce a rerecorded negative.

Note: A rerecording print may be a print from an audio cut negative, a specially intercut print, or a combination of both. It usually consists of several audio records on separate films that include dialogue, audio effects, music, or any other required material. The term is used interchangeably to designate the entire group of associated films or any individual film that is part of the group.

5.3.6 *Rerecorded Print.* A rerecorded print is an audio print from a rerecorded audio track negative.

5.3.7 *Audio Check Print.* An audio check print is an audio print made from the audio release negative for the purpose of checking negative cutting, printing lights, audio quality, etc.

Note: When an audio check print is required, it is usually made prior to the first trial composite print.

5.3.8 *Audio Master Positive.* An audio master positive is an audio print on special film stock that is usually made from an audio release negative for the purpose of producing duplicate negatives of the audio record for release printing.

5.4 *Composite Print*

[**3.2** *Composite Print.* A composite print is a positive film having both picture and corresponding audio on the same film, which may be in editorial or projection synchronism.]

5.4.1 *Composite Daily Print*

[**3.2.1** *Composite Daily Print.* A composite daily print is made from an original composite negative or original audio and picture negatives, and is used for checking photography, audio quality, action, etc. It is in projection synchronism.]

6. Magnetic Audio

6.1 *Magnetic Audio Film*

[**1.3** *Magnetic Audio Film.* Magnetic audio film is a film base having film perforations along one or both edges and bearing a magnetic coating, either completely across the film or in stripes, the coating capable of accepting and reproducing audio records. Note: Unperforated materials usually are referred to as magnetic tape.]

6.2 *Full-Coat Magnetic Film.* Full-coat magnetic film has the magnetic-coating compound applied across the film from edge to edge.

6.2.1 *Full-Coat-Between-Perforations Magnetic Film.* Full-coat-between-perforations magnetic film has the magnetic-coating compound across the film from perforation to perforation.

6.3 *Magnetic Striping.* Magnetic striping is a process by which a magnetic-coating compound is applied in the form of single or multiple stripes, having specific widths and placements, to either surface of a film base which may or may not have a photographic emulsion.

6.4 *Balance Stripe.* A balance stripe is a magnetic coating or coating of another material that is equal in thickness to, but may be narrower than, the stripe used for recording. It is applied along the edge of the film, opposite the stripe used for recording. Its primary purpose is to equalize the effective thickness of the two edges of the striped film in order to obtain uniform winding. The stripe is sometimes used for the recording of additional audio or control records.

6.5 *Magnetic Original.* A magnetic original is the original or first audio record on a magnetic film.

6.6 *Magnetic Transfer.* A magnetic transfer is a magnetic audio record obtained by electrical rerecording of a magnetic original onto another magnetic film.

6.7 *Magnetic Master.* A magnetic master is a final edited or rerecorded magnetic audio record used for transfer to a magnetic release print or for transfer to a photographic audio negative to be used for manufacturing prints with photographic audio records.

6.8 *Magoptical Release Print.* (See 7.4.)

7. Release Prints

7.1 *Release Print.*

[**1.16.2** *Release Print.* A release print is a print made for general distribution and exhibition. It may be on films of 8-, 16-, 35-, or 70-mm width. Some release prints are composed of two or more 35-mm-width films which are projected simultaneously in lateral alignment.]

7.1.1 *Composite Release Print.* A composite release print is a print having both picture and audio records in projection synchronism on the same film.

Note: The audio record may be photographic, magnetic, or both.

7.1.2 *Domestic Release Print.* A domestic release print is a release print intended for distribution within the country where the print was manufactured and having dialogue in the language of that country. It may be a composite print or have a magnetic audio record or records on a separate film.

7.1.3 *Foreign-Version Release Print.*

[**3.2.6** *Foreign-Version Release Print.* A foreign-version release print is a composite print in projection synchronism with dialogue made specifically for the particular language involved. Note: Sometimes superimposed titles in a different language are used on the print. A superimposed title consists of printed words (usually transparent) overlaying the picture image.]

7.2 *Anamorphic Release Print.* An anamorphic release print is a release print in which the picture image is compressed laterally, requiring a deanamorphosing lens on the projector to cause objects in the projected picture to have correct proportions.

7.3 *Wide-Screen Release Print.* A wide-screen release print is a print which has no anamorphosis but, when projected, produces a screen image having an aspect ratio greater than 1.37:1.

Note: Some prints are made from negatives exposed in a camera aperture having an aspect ratio of 1.33:1, but which have been composed for projection to yield a projected picture having an aspect ratio greater than 1.37:1. A wide-screen print may also be obtained from an anamorphic negative by deanamorphosing in the printing process.

7.4 *Magoptical Release Print.* A magoptical release print is a composite release print which has both magnetic and photographic (optical) audio records.

8. Video Tape (Film-Video Interface)

Note: The definitions included in this section are meant to afford motion-picture personnel an understanding of the television terms defined in approximately equivalent motion-picture terms. The definitions are not intended as literal television definitions.

8.1 Chroma. The color in the video picture.

Motion-Picture Film Equivalent:
Color.

8.1.1 Chroma Phase. Electronically recorded color balance. Can be shifted toward magenta or green tones.

Motion-Picture Film Equivalent:
Overall printer color balance.

8.2 Tape-to-Film Transfer. The process of transferring video tape sound and picture information to motion-picture film.

Motion-Picture Film Equivalent:
None.

8.2.1 Film-to-Tape Transfer. The process of transferring still or motion-picture information to a video tape. (Telecine.)

Motion-Picture Film Equivalent:
None.

8.3 Dropout. Partial loss of picture information on video tape due to scratches or missing oxide.

Motion-Picture Film Equivalent:
Negative or positive scratches.

8.3.1 Dropout Compensator (DOC). Unit used to replace missing picture information due to dropouts from other video information such as the previous line.

Motion-Picture Film Equivalent:
Scratch-removal process.

8.4 Dub. A video tape copy from a video tape master.

Motion-Picture Film Equivalent:
Release print.

8.5 Master. Electronically edited master video tape.

Motion-Picture Film Equivalent:
Edited negative.

8.5.1 Submaster. A duplicate video tape master made from the final edited version.

Motion-Picture Film Equivalent:
Dupe negative or Internegative.

8.6 Banding. A distortion of picture information which appears as horizontal bands.

Motion-Picture Film Equivalent:
Poor printer contact, printer slippage.

8.6.1 Velocity Compensator. An electronic device which reduces distortion caused by velocity error of the video head.

Motion-Picture Film Equivalent:
None.

8.6.2 High Band. A video tape recording using the 7.9- to 10-MHz carrier signal.

Motion-Picture Film Equivalent:
Improved fine grain negative. (In audio terms, high band is the equivalent of high fidelity.)

8.6.3 Low Band. A video tape recording using the 5- to 6.5-MHz carrier signal.

Motion-Picture Film Equivalent:
None.

8.7 Picture Monitor. (All TV sets convert electronic information to a visual image.) A monitor is a TV set or studio picture display of higher quality than a typical TV receiver and more stable in adjustment. Monitors have baseband video or RGB inputs.

Motion-Picture Film Equivalent:
Projector and screen. (A film print can be viewed on a TV monitor if projected into a TV film chain.)

8.8 Recording Head, Video. Electro-mechanical device used to record video information on magnetic tape.

Motion-Picture Film Equivalent:
Film printer.

8.8.1 Recording Head, Audio. Electro-mechanical device used to record audio information on magnetic tape.

Motion-Picture Film Equivalent:
Film sound recorder.

8.9 Vectorscope. An oscilloscope that displays electronic picture information in vector form. This enables the setting of correct color phase and chroma for playback.

Motion-Picture Film Equivalent:
Printer and developer control systems for achieving proper color balance.

8.10 Waveform Monitor (Oscilloscope). An electronic test unit that displays the video signal in line or field mode.

Motion-Picture Film Equivalent:
Any method used to establish gamma and density.

8.11 Film Chain. A television camera designed to accept projected images from motion-picture film or slides for display in a television system.

Motion-Picture Film Equivalent:
Motion-picture projector.

8.12 Multiplexer. An electro-mechanical optical device used to route multiple projected film images into the film chain camera.

Motion-Picture Film Equivalent:
Projector changeover.

8.13 A and B Mix. Method of combining two or more rolls of video tape master into one complete roll. Complete roll often referred to as master.

Motion-Picture Film Equivalent:
A and B printing.

8.14 Video Level. Amplitude of video signal.

Motion-Picture Film Equivalent:
Measurement of density.

8.15 Pedestal. Refers to black level of video signal, establishes low end of gray scale.

Motion-Picture Film Equivalent:
Sets D-max.

8.16 Blanking. The period during which the scanning beam of the picture tube retraces to start the next line or field of the picture.

Motion-Picture Film Equivalent:
Frameline.

8.17 Burst. 3.58-MHz color reference subcarrier. Enables receiver to decode color transmission properly.

Motion-Picture Film Equivalent:
None.

8.18 Video Camera. Device to convert optical images to electronic video signals for use (as an input to magnetic tape or for live broadcast).

Motion-Picture Film Equivalent:
Motion-picture camera.

8.19 Video Magnetic Tape. A magnetic-coated continuous strip to record electronic signals.

Motion-Picture Film Equivalent:
Motion-picture film.

9. Referenced American National Standards

This standard is intended for use in conjunction with the following American National Standards:

ANSI PH1.10-1981 (R1986), Dimensions for Unperforated and Perforated Photographic Film in Rolls, Including Leaders and Trailers, for Aerial and Related Uses

ANSI/SMPTE 7-1988, Motion-Picture Film (16-mm)—Camera Aperture Image and Usage

ANSI PH22.40-1984, Motion-Picture Film (35-mm)—Photographic Audio Records—Release Prints

ANSI/SMPTE 41-1989, Motion-Picture Film (16-mm)—Photographic Audio Records—Prints

ANSI/SMPTE 73-1987, Motion-Picture Film (32-mm)—35-mm Film Perforated 32-mm, 2R

ANSI/SMPTE 93-1986, Motion-Picture Film (35-mm)—Perforated BH

ANSI/SMPTE 102-1986, Motion-Picture Film (35-mm)—Perforated CS-1870

ANSI/SMPTE 109-1986, Motion-Picture Film (16-mm)—Perforated 1R

ANSI/SMPTE 110-1986, Motion-Picture Film (16-mm)—Perforated 2R

ANSI/SMPTE 112-1989, Motion-Picture Film (16-mm)—100-Mil Magnetic Audio Record

ANSI/SMPTE 119-1988, Motion-Picture Film (70-mm)—Perforated 65-mm, KS-1870

ANSI/SMPTE 137-1988, Motion-Picture Film (35-mm)—Four Magnetic Audio Records—Release Prints

ANSI/SMPTE 139-1986, Motion-Picture Film (35-mm)—Perforated KS

ANSI/SMPTE 145-1988, Motion-Picture Film (65-mm)—Perforated KS

ANSI/SMPTE 149-1988, Motion-Picture Film (8-mm Type S) Perforated 1R

ANSI/SMPTE 151-1987, Motion-Picture Film (8-mm Type S)—16-mm Film Perforated 8-mm Type S, (1-3)

ANSI/SMPTE 164-1988, Motion-Picture Film (8-mm Type S)—Magnetic Audio Record—Position, Dimensions and Reproducing Speed

ANSI/SMPTE 165-1988, Motion-Picture Film (35-mm)—Perforated 8-mm Type S, 5R (1-3-5-7-0)

ANSI/SMPTE 168-1986, Motion-Picture Film (16-mm)—Perforated 8-mm Type S, (1-4)

ANSI/SMPTE 169-1986, Motion-Picture Film (35-mm)—Perforated 8-mm Type S, 2R-1664 (1-0)

ANSI/SMPTE 171-1986, Motion-Picture Film (35-mm)—Perforated 16-mm, 3R (1-3-0)

ANSI PH22.182-1978 (R1984), Dimensions for Photographic Sound Record on 8-mm Type S (Super 8) Motion-Picture Prints

ANSI/SMPTE 185-1987, Motion-Picture Film (70-mm)—Position, Dimensions and Reproducing Speed—Six Magnetic Records on Release Prints

ANSI/SMPTE 223M-1985, Motion-Picture Film—Safety Film

ANSI/SMPTE 237-1988, Motion-Picture Film (35-mm)—Perforated DH-1870

ANSI/SMPTE 239-1989, Motion-Picture Film (16-mm)—Perforated 8-mm Type R, 2R

Index

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 156

Bar Code Labeling for Type D-1 Component and Type D-2 Composite Cassette Identification

1. *Scope*

This practice describes the requirements for the generation of bar code labels for the automatic identification of type D-1 component and type D-2 composite cassettes. Dimensions and tolerances of the printed bar code symbols are specified. The symbol encoding, data structure, and formatting of the label information is also specified. Lastly, the label characteristics, size, orientation, and placement are specified. This practice includes both rear and side labels.

2. *Referenced American National Standards*

This practice is intended for use in conjunction with the following American National Standards:

ANSI MH10.8M-1983, Specifications for Bar Code Symbols on Transport Packages and Unit Loads

ANSI X3.4-1986, Coded Character Set—7-Bit American National Standard Code for Information Interchange

SMPTE 226M, Television Digital Recording—19-mm Type D-1 Component and Type D-2 Composite Formats—Tape Cassettes

3. *Bar Code Symbology*

The interleaved 2 of 5 bar code shall be the symbology used for the identification of type D-1 and type D-2 cassettes.

3.1 General Description. The interleaved 2 of 5 bar code is a bidirectional, self checking, numerical bar code. Different start and stop characters are employed to permit bidirectional decoding. This bar code is a two-level code and employs a combination of wide and narrow elements to represent each symbol. The elements may be either bars or spaces. Wide elements are assigned a value of 1 and narrow elements a value of 0.

The characters are interleaved using bars to encode symbols in the odd-data positions and spaces to encode symbols in the even positions. The position numbering of the symbols begins with the first character after the start character (data 0). The interleaving process always requires an even number of characters. For example, if an odd number of characters must be encoded, a leading 0 shall be used to change the number of characters to an even number (as shown in Fig. 1).

3.2 Code Configuration. Each symbol is comprised of five elements, two of which are wide and three narrow. Table 1 shows the code symbology for characters 0 through 9.

The start and stop characters are encoded as follows (see Fig. 1):

Start character	0000
Stop character	100

The start character is constituted by two narrow bars and two narrow spaces. The stop character is constituted by one wide bar, one narrow space, and one narrow bar.

The start character is at the normal left-hand end adjacent to the most significant character. The stop character is at the normal right-hand end adjacent to the least significant character.

Table 1
Interleaved 2 of 5 Bar Code Symbology

Character	Code
0	00110
1	10001
2	01001
3	11000
4	00101
5	10100
6	01100
7	00011
8	10010
9	01010

The interleaved 2 of 5 bar code is continuous because there are no inter-character gaps; all spaces contain information. Figs. 1 and 2 show examples of encoded data.

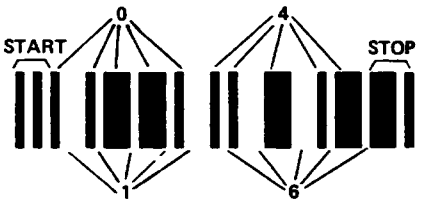

Fig. 1
Interleaved 2 of 5 Bar Code Symbol Encoding 0146

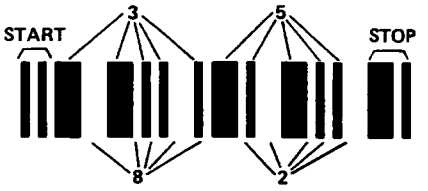

Fig. 2
Interleaved 2 of 5 Bar Code Symbol Encoding 3852

3.3 Alphanumeric Data. For rear labels, mixed use of alpha characters, numerics, and symbols shall be permitted in fields defined as alphanumeric. These characters are encoded using a pair of numeric symbols. Symbol encoding is shown in Table 2. Encoding for alphanumeric characters may be calculated from the standard ASCII value according to the formula shown below.

Conversion from ASCII to the required format may be accomplished by subtracting 20_{hex} from the hexadecimal ASCII code and then converting the result to base 10.

$$\text{Required form} = \{[\text{ASCII}]_{hex} - [20]_{hex}\}_{10}$$

Refer to ANSI X3.4-1986 for details concerning ASCII encoding. Table 2 defines one hundred alphanumeric characters that may be used for cassette bar code labels. An example of alpha encoding is as follows:

To encode the letter A

$$\begin{array}{r} \text{ASCII } 41_{hex} \\ -20_{hex} \\ \hline 21_{hex} = 33_{10} \end{array}$$

The position of alphanumeric data is defined by the label format.

Alphanumeric data shall be encoded, decoded, or both only in fields defined as alphanumeric.

Table 2
Bar Encoding of Alphanumeric Data

Upper / Lower	0	1	2	3	4	5	6	7	8	9
0	SP	•	4	>	H	R	\	f	p	z
1	!	+	5	?	I	S	]	g	q	{
2	"	,	6	@	J	T	^	h	r	¦
3	#	—	7	A	K	U	_	i	s	}
4	$	.	8	B	L	V	`	j	t	~
5	%	/	9	C	M	W	a	k	u	
6	&	0	:	D	N	X	b	l	v	
7	´	1	;	E	O	Y	c	m	w	
8	(	2	<	F	P	Z	d	n	x	
9	)	3	=	G	Q	[	e	o	y	[Note 1]

Note 1: Data 99 is reserved and is invalid as an alphanumeric code. Refer to 4.4.

Note 2: SP represents a space character.

3.4 Code Density and Dimensions. The significant parameters of the interleaved 2 of 5 code are the width of the narrow elements and the ratio of the width of wide to narrow elements. For optimum automatic scanning, the bar height (see Table 3), the code's position on the label, and the label's orientation on the cassette shall be specified (see 4.2 and 4.3, 5.1.1 and 5.1.2, 5.2.1 and 5.2.2).

The width of a narrow element shall be 0.26 mm for rear labels and 0.68 for side labels. The minimum and maximum width of an element is determined by the application and constraints imposed by the specific scanning equipment. This application requires the symbols to be printed in accordance with the ratios and tolerances specified in Table 3.

The ratio of the width of the wide elements to that of the narrow elements shall be 2.5:1.

The width of the various elements and the nominal ratio of the widths of the wide to narrow elements shall not change within a given bar code label.

3.5 Bar and Space Width Tolerances. The allowable printing width tolerance (T) is a function of the nominal width (W) of the narrow bars and spaces and the nominal ratio (N) of the wide to narrow elements. The tolerance is defined as follows:

$$T = \pm \left(\frac{18N - 21}{80} \right) W$$

The values of N for any interleaved 2 of 5 symbol must be in the range of 2 to 3. For the narrow element width and the specified ratio, the dimensions shall be as given in Table 3.

Table 3
Bar Code Element Dimensions and Tolerances
(All dimensions in millimeters)

Label	Narrow Element Width (W) ± (T)	Wide Element Width	Wide/Narrow Ratio (N)	Bar Height
Rear:	0.26 ± 0.078	0.65	2.5	5.0 ± 0.1
Side:	0.68 ± 0.23	1.70	2.5	10.0 ± 0.5

4. *Bar Code Label Details*

4.1 Rear Label. There shall be three areas of information on the rear bar code label. These are listed from the top of the label to the bottom and each occupies the full length of the label (see Fig. 3):

User information area
Bar code symbols
Human readable interpretation of the bar code

At each end of the bar code label, there shall be a quiet zone. The zone shall extend for a minimum of 3.5 mm beyond each end of the bar code extending toward the edges of the label. No markings of any kind are permitted in this area. For interchange of tape cassettes, any human readable information printed on this label shall be in the English language.

4.2 Rear Label Size and Placement. The rear bar code label shall be affixed to the cassette in the recessed area designated as the rear label area as described in SMPTE 226M.

The rear label dimensions shall be as follows (see Fig. 3):

Length 138.7 ± 0.2 mm
Width 17.5 + 3.0 — 0.1 mm

The label's thickness shall be in accordance with specifications of SMPTE 226M.

The label shall be oriented such that the label information can be read when the cassette is viewed from the rear edge with the top label area uppermost.

4.3 Label Format. Information areas, dimensions, and tolerances for the rear-label area are shown in Fig. 3.

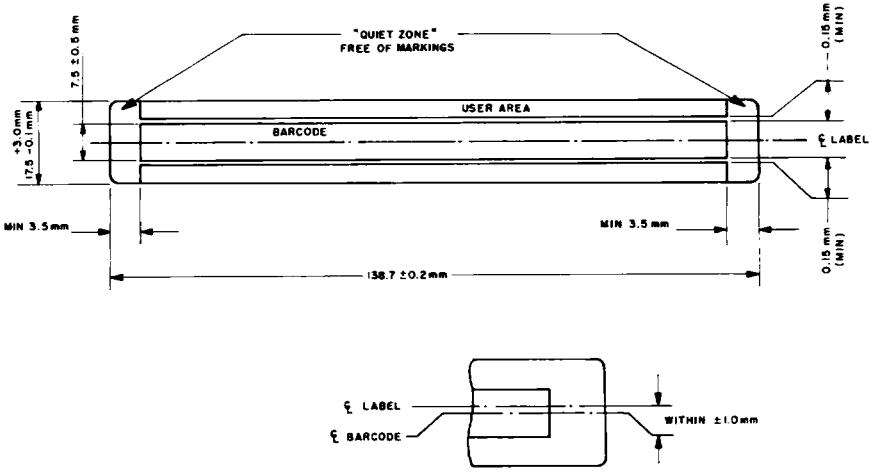

Fig. 3
Rear Label Information Areas, Dimensions and Tolerances

4.4 Rear Label Bar Code Data Format. The data in Table 4 shall be encoded to identify the contents of a cassette.

Table 4
Rear Label Bar Code Data Format

Symbol Position	Field	Type	Note
0	Type Number	numeric	1
1 → n	Identification No.	alphanumeric	2
n+1 → n+2	Separator		2
n+3 → 40	Title	alphanumeric	2
41 → 48	Start of Message (SOM)	numeric	3
49 → 56	Duration (DUR)	numeric	3
57	Checksum	numeric	4

Note 1: The type number shall be used to define the contents of the cassette as either a single-event (0) cassette or a multi-event (1) cassette. A single bar code symbol is used to specify the type number. Type numbers 2 to 9 are reserved.

Note 2: The identification number and title fields are alphanumeric and require 2 bar code symbols per character. A 20-character block is allocated to these fields. The identification number may be between 3 and 8 characters in length. A separator code is used to indicate the end of the identification number and the beginning of the title. The title data fills the remainder of the 20-character block. The separator code is always defined as 99 and is an unprinted character that is reserved in the alphanumeric table for this purpose.

Note 3: The SOM and DUR are numeric and are in the HHMMSSFF format.

Note 4: S3,S2,S1 is the three-digit resultant of the following expression:

(S3,S2,S1) = 3x (data0+data2+data4+ . . . +data56) + (data1+data3+data5+ . . . +data55)

S1 is the least significant digit of that resultant and is used to calculate the checksum.

Checksum = 10 — S1

If S1 = 0 then checksum = 0

An example of data encoded in the correct format is shown in Fig. 4 and the resulting bar code label is shown in Fig. 5.

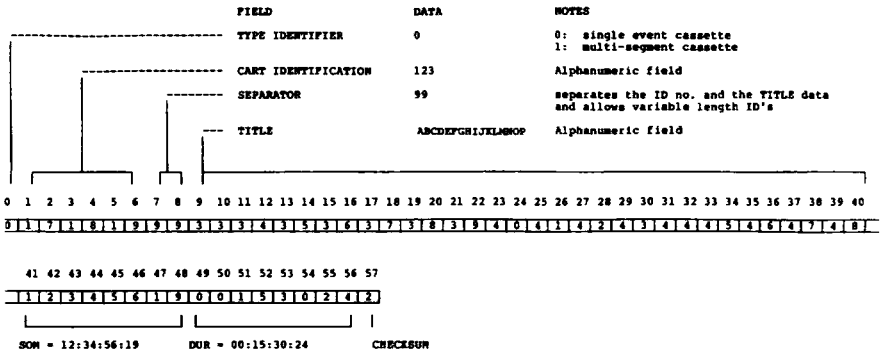

Fig. 4
Rear Label Bar Code Data Format

Fig. 5
Sample Rear Bar Code Label

4.5 Type Number. The type number defines the cassette as either a single-event cassette containing one identified event or as a multi-event cassette containing two or more identified events.

Type No. 0, Single-event cassette. The SOM and DUR fields on the label define the cue points for the identified event.

Type No. 1, Multiple-event cassette. The SOM defines the time code location of an on-tape directory containing the location of each identified segment on the tape. The DUR on the label is the sum of the individual segment durations that have been identified and are contained in the on-tape directory.

4.6 Identification Number and Title. The identification number and title fields are alphanumeric and variable in length. The total combined length is 20 alphanumeric characters (including the separator). This separator marks the end of the identification number data and the beginning of the title data.

The cassette identification number is the primary identifier for the cassette. The minimum length shall be 3 characters and the maximum 8 characters. Leading spaces in this field are not permitted. Unused space in the field shall be filled with spaces (ASCII = 20_{hex}).

The title occupies the remaining portion of the field. The maximum size of the title field is 16 characters and the minimum 11 (corresponding to the minimum and maximum length of the identification number). Unused space in this field shall be filled with space characters.

4.7 SOM and DUR. Both fields are numeric and are formatted in the HHMMSSFF format. The start of message (SOM) defines a time code location to be interpreted as defined in 4.5.

The duration (DUR) for type 0 cassettes shall specify the desired duration of the material.

The duration (DUR) for type 1 cassettes shall be the sum of the segment durations identified on the tape.

4.8 Rear Label User Information Area. This area is reserved for user information and does not contain any essential machine readable data. Printed information in this area shall be separated vertically from the bar code by a space of not less than 0.15 mm. The last two characters at the right end of the user information area are reserved and shall indicate the type of cassette, using the letter S for a type 0 (single event) cassette and the letter M for a type 1 (multi-event) cassette (see 4.5).

4.9 Rear Label Bar Code Symbol Area. This area contains the machine readable information and is formatted as described in 4.4. The bar code shall be centered vertically on the label within 1 mm of the label's horizontal centerline.

4.10 Rear Label Human Readable Interpretation. This area is reserved for a translation of the bar code identification number, title, SOM and DUR data. Printed information in this area shall be separated vertically from the bar code by a space of not less than 0.15 mm.

5. *Side Labels*

5.1 Right-Side Label. The areas of information on the right-side label are identified and located as shown in Fig. 6:

Bar code symbols
Human readable interpretation of the bar code

At each end of the bar code label, there shall be a quiet zone. The zone shall extend for 9.0 ± 0.5 mm beyond each end of the bar code and is also shown in Fig. 6.

5.1.1 Right-Side Label Size and Placement. The right-side label shall be affixed to the side-label area of the cassette as shown in Fig. 7.

The right-side label dimensions shall be as follows:

Length:	58.5 ± 0.5 mm
Width:	20.5 ± 0.5 mm

The label's thickness shall be in accordance with specifications defined in SMPTE 226M.

The label shall be oriented such that the label information can be read when the cassette is viewed from the side with the top label area uppermost.

5.1.2 Right-Side Label Format. Information areas, dimensions, and tolerances for the right-side label are shown in Fig. 7.

5.1.3 Right-Side Label Bar Code Symbol Area. This area contains the machine readable information and is formatted as described in 3.2. The bar code shall be nominally offset 2 mm vertically above the centerline of the label.

5.1.4 Right-Side Label Bar Code Data Format. The right-side label contains a single field of 6 numeric digits for cassette identification purposes and the start and stop characters as described in 3.2. No other data is encoded in this area.

The checksum is excluded due to the low density of the data.

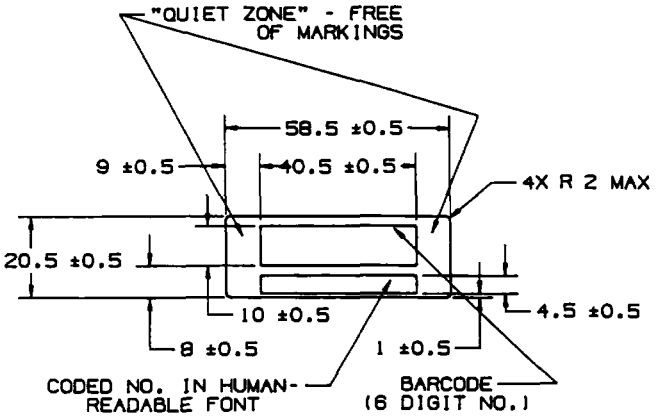

Fig. 6
Right-Side Label Information Areas, Dimensions and Tolerances

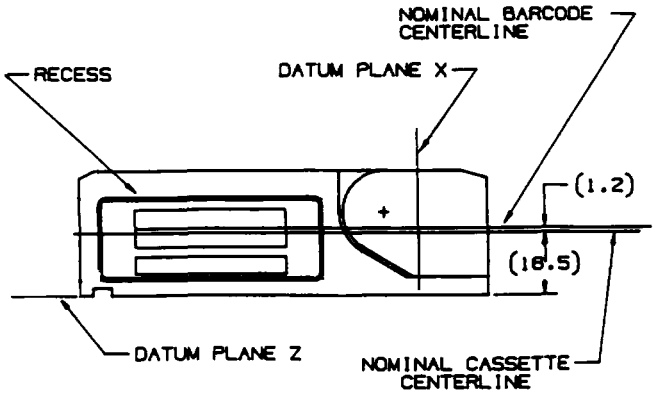

Fig. 7
Location of Right-Side Label

5.1.5 Right-Side Label Human Readable Interpretation. This area is a translation of the bar encoded data. The order of the translated information will correspond to the encoded data.

5.2 Left-Side Label. Optionally, another side label may be affixed to the left side of the cassette as shown in Fig. 8.

There shall be two areas of information on the optional left-side labels, located as shown in Fig. 9:

User information area
Human readable interpretation of the bar code on the left side of the cassette

5.2.1 Left-Side Label Size and Placement. The left-side label shall be affixed to the side-label area of the cassette as shown in Fig. 8.

The left-side label dimensions, thickness, and orientation shall be as specified in 5.1.1.

The dimensions and tolerancing of this optional label are shown in Fig. 9.

5.2.2 Left-Side Label User Information Area. The optional left-side label may be utilized for user information and shall, as a minimum requirement, contain the human readable interpretation of the bar code which is on the right side.

If a bar code is included in the user information area of the left-side label, it shall be located as shown (for the right-side label) in Fig. 6.

6. *Printing and Scanning Requirements*

Detailed information regarding printing of bar codes, paper type, ink election, and the requirements of the bar code scanner may be found in ANSI MH10.8M-1983.

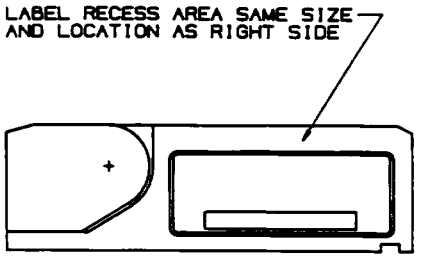

Fig. 8
Location of Left-Side Label

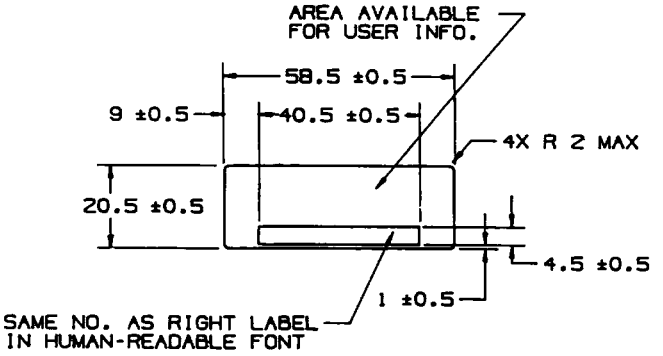

Fig. 9
Left-Side Label Information Areas, Dimensions and Tolerances

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 155

Audio Levels and Indicators for Digital Audio Records on Digital Television Tape Recorders

1. *Scope*

This practice specifies a reference amplitude to be used for the calibration of audio level indicators and to be recorded on the digital audio records of reference tapes intended for digital television tape recorders to facilitate the interchange of digital television tape recordings.

2. *Specifications*

2.1 The reference signal shall be the digital representation of a 1000-Hz sine wave whose positive peaks attain the value 0CCD (hex) and whose negative peaks attain F333 (hex), considering only the 16 most significant bits. This is 20 dB below the system maximum.

2.2 Where present in a system in analog form, the reference signal shall be a 1000-Hz sine wave with an amplitude such that the system analog-to-digital converter generates a digital representation as in 2.1 above, ± 0.1 dB.

2.3 Digital television tape recorders which have level-indicating instruments with ballistics akin to the vu meter, as described in IEEE Std 152-1953, Volume Measurements of Electrical Speech and Program Waves, shall have a standard calibrated reading of zero when the reference signal is being recorded or reproduced.

2.4 Digital television tape recorders which have level-indicating instruments with ballistics akin to the peak program meter shall deflect to a point 9 dB below the reference mark corresponding to the maximum peak program signal according to CCITT Recommendation J.14, Relative Levels and Impedances on an International Sound-Programme Connection.

2.5 When transmitting according to American National Standard for Digital Audio Engineering—Serial Transmission Format for Linearly Represented Digital Audio Data, ANSI S4.40-1985, the most significant bit of the reference signal shall coincide with the most significant bit of the audio sample data.

2.6 Preemphasis shall not be used when recording the reference signal.

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 157

Key Signals

1. *Scope*

   This practice describes the format of a key video signal which is used to control the contribution of an associated fill video signal into a composite of two or more signals. Such signals are commonly referred to simply as key signals. This description is given for composite and component analog and digital signals.

2. *Referenced American National Standard*

   This practice is intended for use in conjunction with the following American National Standard:

   ANSI/IEEE 511-1979, Video Signal Transmission Measurements of Linear Waveform Distortion

3. *General Specifications*

   A key video signal represents the opacity or transparency of its associated fill video signal. When the fill video signal is opaque, it will obscure all videos of lower priority in the composited image and will be visible unless it is itself obscured by videos of higher priority. When the fill video is transparent, it will not be visible. When the fill video is partially transparent, it will be mixed with the video(s) of lower priority.

   Normally, the key signal shall have the same video format as the video signal with which it is associated. (See Note 1.)

   The key information shall be treated as a video signal, with black representing complete transparency and white representing complete opacity. (See Note 2.) Values between black and white indicate partial transparency. Black-and-white levels shall conform to the specifications for the appropriate video format. (See Note 3.)

   The chrominance of the signal shall be set to zero. (See Note 4.)

4. *Synchronization and Timing* (See Note 5.)

   4.1 Synchronization. The key signal shall incorporate the same synchronizing elements as a video signal of the same format, including color burst for composite formats. (See Note 6.)

   4.2 Picture Phase. Picture phase defines the timing relationship between picture information in the video, and the synchronizing information of the same video. The key signal shall have picture phase identical with that of its associated fill video signal, ± 0 lines vertically and ± $T/25$ horizontally. (See Note 7.) In digital component systems, key samples shall be co-sited with the corresponding luminance samples.

   4.3 Timing. The key signal shall be timed coincident with its associated fill video signal, ± 0 lines vertically and ± $T/25$ horizontally. In composite systems, SC/H timing shall match that of the associated fill video signal.

Notes:

1. In facilities employing multiple video formats, it is possible that the key signal and fill video signal will be of different formats. The intent of this practice is that the key signal shall be constituted according to the equipment through which it will pass. For example, a key signal which is to be handled by analog NTSC equipment should conform to specifications for analog NTSC video signals.
2. It should be noted that chroma keyers have traditionally used the opposite polarity to all other key signals. The method of implementation within equipment is at the discretion of the designer, but any key signal outputs from chroma keyers for external connection should conform to this practice.
3. When the fill video is required to be opaque at the horizontal edges of the picture, use of transmission blanking width on the key signal may give rise to undesirable edge effects. Facilities using narrow blanking for video should use the same blanking width for key signals. Edge artifacts will be removed when transmission blanking is applied. Facilities using transmission blanking width may wish to use narrower blanking for key signals to avoid edge artifacts.
4. In component systems, it is possible to use the color information channels for other purposes. Any such information does not form part of the key signal.
5. Much equipment now in use does not meet these specifications. Designers of new equipment should take this into account. The tolerances specified are those required to ensure no discernible error in the composited picture.
6. It should be noted that, for composite systems, burst is an essential part of the synchronization information. Many devices which operate in the composite domain do not operate properly when burst is not present. Consequently, burst is required on key signals in a composite environment.
7. T is the letter symbol for the duration of one half-period of the nominal upper cutoff frequency of a transmission system, thus $T = 1/(2f_c)$. It is commonly referred to as the Nyquist interval. For system M, T is about 125 ns. (See ANSI/IEEE 511-1979, p. 8.)