

Approved SMPTE Recommended Practices

In January 1968, the Society's Board of Governors approved four Recommended Practices, which are printed here for your information.

SMPTE Recommended Practice, RP 8, Safe Action and Safe Title Areas for TV Transmission, is a combination of two earlier Recommended Practices, RP 8 and RP 13. The technical data have not been modified. Yet it should be noted that the percentage numbers are different and are now taken in respect to image area height instead of area width.

SMPTE Recommended Practice, RP 25, Sound and Picture Synchronization on Motion-Picture Film Relative to the Universal Leader for Magnetic and Photographic Tracks, establishes a sync point for use in cutting and editing procedures.

SMPTE Recommended Practice, RP 26, Label Specifications for 2-In. Quadruplex Video Magnetic Tape Recordings, specifies the minimum information to be placed on labels used with video-tape recordings.

SMPTE Recommended Practice, RP 28, Dimensions for 35mm Motion-Picture Film Perforated 8mm, 5R-1500, is being published for a one-year trial period. The document will then be reviewed by the USA Standards Committee PH22. If the committee finds that the standard has been accepted and is being followed, the document will be submitted to USASI as a Proposed USA Standard.

Proposed SMPTE Recommended Practice

A Proposed Recommended Practice is published here for a trial period and public review. Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to April 30. The Proposed Recommended Practice will then be submitted to the SMPTE Board of Governors. If any adverse criticism resulting from this publication is received prior to the date given, it will be taken into consideration before action on the document is concluded.

Proposed SMPTE Recommended Practice, RP 16, Specifications of Tracking Control Record for 2-In. Quadruplex Video Magnetic Tape Recordings, is a revision of the 1964 issue reflecting a relaxation of tolerances which were felt to be unnecessarily limiting.

Proposed Withdrawal of USA Standard

The Sound and Standards Committees have recommended withdrawal of USA Standard, 16mm Multi-Azimuth Test Film, Magnetic Type, PH22.126-1961, due to the fact that the test film described has never been manufactured and is considered to be impractical to produce. The Sound Committee is now preparing a Recommended Practice describing a similar test film which could be supplied by the SMPTE. The Standard was published in the November 1961 issue of the *Journal*.

If no objections are received, USA Standards Committee PH22 will be requested to approve termination of this outdated document.—*Alex E. Alden.*

RP 25-1968



SMPTE RECOMMENDED PRACTICE

Sound and Picture Synchronization on Motion-Picture Film Relative to the Universal Leader for Magnetic and Photographic Tracks

1. *Scope*

It is the purpose of this recommended practice to standardize the photographic and magnetic synchronizing signals and their position relative to the Universal Leader, as specified in USA Standard Specifications for Leaders and Cue Marks for 35mm and 16mm Sound Motion-Picture Release Prints, PH22.55-1966.

2. *Usage*

Two major areas of usage for this synchronizing information are (a) in editing and recording operations and (b) in preparing printing materials in the laboratory. During the latter, the signal position may be used for visual and aural checking of synchronization of release prints. The synchronizing information, therefore, applies to both magnetic and photographic sound tracks.

3. *Synchronizing Signal*

The synchronizing signal shall consist of a length equivalent to one picture frame of 1,000 Hz sine wave ± 10 percent. Modulation shall be at least 80 percent.

4. *Location*

The signal shall be so located on the sound track as to coincide with the single No. 2 (2-second) frame of the Universal Leader, when sound track and picture are aligned in editorial (parallel) sync. (This is the same distance from the first frame of the picture as the center 3-foot frame of the Academy and Society Leaders.)

Approved January 1968

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SMPTE RECOMMENDED PRACTICE

RP 28-1968

Dimensions for 35mm Motion-Picture Film Perforated 8mm, 5R-1500



1. Scope

1.1 This Recommended Practice specifies the cutting and perforating dimensions for 35mm motion-picture film with five rows of perforations and a perforation pitch of 0.1500 in. The film stock described in this practice is intended for the production of prints. The width of the 8mm strip after processing and slitting is, therefore, also specified.

3. Discard Edge

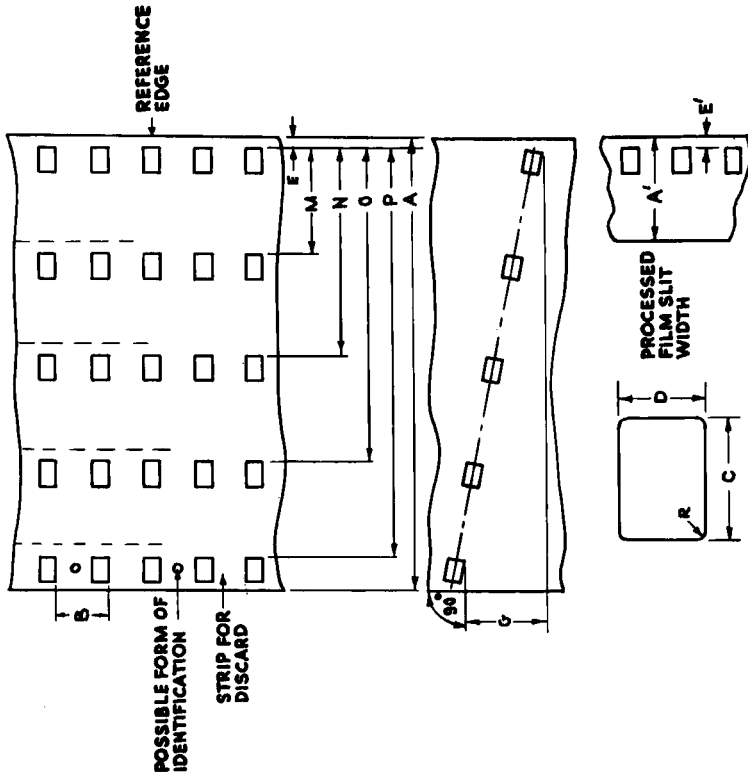
3.1 A strip, containing the perforations in the fifth row, is discarded after slitting four strips of nominal 8mm width from the processed film. The discard row of perforations must, therefore, be provided with a means of identification visible on the raw film.

2. Dimensions

- 2.1 The dimensions shall be as given in the figure and table.
- 2.2 The dimensions pertain to a safety film as defined in USA Standard Specifications for Motion-Picture Safety Film, PH22-31-1967.
- 2.3 Dimension 1, represents the length of any 100 consecutive perforation-pitch intervals.
- 2.4 Except for Dimensions A' and E', the dimensions apply to the 35mm film immediately after cutting and perforating; Dimensions A' and E' apply to the 8mm strip immediately after slitting.

Notes

- 1. The title of this practice was established by the application of a nomenclature system developed for all film dimension specifications. Each title provides an indication of the film width, a code designation for the perforation shape (BH, KS, DH, or CS) or the number of rows of perforations (1R, 2R, etc.), depending upon which is the significant factor, and the perforation pitch without the decimal point.
- 2. The metric values in the table of dimensions are converted from the inch values in accordance with conversion principles outlined in USA Standard Practice for Inch-Millimeter Conversion for Industrial Use, B48.1-1955 (Reaffirmed 1947).



	Dimensions	Inches	Millimeters
A	Film width	1.877 ± 0.001	44.975 ± 0.025
A'	Film width after slitting	0.314 ± 0.002	7.98 ± 0.05
B	Perforation pitch	0.1500 ± 0.0005	3.810 ± 0.013
C	Perforation width	0.0720 ± 0.0004	1.829 ± 0.010
D	Perforation height	0.0500 ± 0.0004	1.270 ± 0.010
E	R-reference edge to first perforation row	0.0355 ± 0.002	0.902 ± 0.05
E'	Edge to perforation after slitting	0.0355 ± 0.002	0.902 ± 0.05
F	Perforation skewness	0.001 max	-0.03 max
G	100 consecutive perforation pitch intervals	15.000 ± 0.015	381.00 ± 0.38
L	Lateral perforation displacement	0.8145 ± 0.001	20.697 ± 0.03
M	Lateral perforation displacement	0.6290 ± 0.001	15.977 ± 0.03
N	Lateral perforation displacement	0.9435 ± 0.001	23.965 ± 0.03
O	Lateral perforation displacement	1.2340 ± 0.001	31.344 ± 0.03
P	Lateral perforation displacement	0.010 ± 0.001	0.254 ± 0.03
R	Radius of perforation fillet		

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Appendix

This Appendix is not a part of SMPTE Recommended Practice RP 26-1968, Dimensions for 35mm Motion Picture Film Perforated 8mm, 3K-1500, but is included to facilitate its use.

1. The dimensions given in this document represent the practice of film manufacturers in that the dimensions and tolerances are for film stock immediately after perforation except for Dimensions V and F, which are for film after processing and apply to any slit strip. The punches and dies themselves are made to tolerances considerably smaller than those given, but since film is a plastic material, the dimensions of the slit and perforated film stock never agree exactly with the dimensions of the slitters, punches, and dies. Film can shrink or swell due to loss or gain in moisture content or can shrink due to loss of solvent. These changes invariably result in changes in the dimensions during the life of the film. The change is generally uniform throughout a roll.

2. It will be noted that among the various standards for slitting and perforating film stock there are often two standards which seem much alike in wording. The difference lies in the longitudinal pitch which is either 0.1500 in. or 0.1497 in. In general, the longer pitch is for print stock and the shorter pitch is for negative stock.

The choice of pitch for negative motion picture films depends, within certain limits, on the type of printer to be used. Where step-primers are used, and the film is stationary when exposed, the choice of pitch is not strictly limited. Where the film moves continuously over a cylindrical surface at time of printing (sprocket-type printer), there are three major considerations involved in choosing the pitch. These considerations are: (1) the sprocket diameter, (2) the film thickness, (3) the film shrinkage and the rate at which shrinkage occurs.

Maximum steadiness and definition are secured on a sprocket-type printer when the negative stock is somewhat shorter in pitch than the positive stock, in the approximate proportion of the thickness of the film to the radius of curvature. For printing on an 8mm sprocket (circumference of about 12 in.) with film 0.0095 to 0.0065 in. thick, the optimum pitch differential is 0.3 percent. The use of the ideal pitch between the positive stock and negative will minimize slippage during printing operation, thus reducing the amount of blurring and jumping of horizontal lines in the picture or sound image. (This error is to be differentiated from the jump caused by nonuniformity of successive pitches, Dimension B.)

Experience has shown that the average pitch of the negative can vary ± 0.1 percent from the ideal pitch, which is 0.5 percent shorter than the positive stock.

without slurring of picture and sound image being easily detected.

For many years this desired difference in pitch was caused by the shrinkage of the negative film during processing and aging. Current film bases shrink less than the earlier ones and hence a shorter initial pitch becomes desirable. To satisfy this requirement for picture or sound negatives, it is common manufacturing practice to aim for a pitch value 0.2 percent shorter than the positive stock onto which they will be printed. The additional shrinkage that occurs during processing and the aging that takes place before the release prints are made then bring the pitch differential close to the optimum and desired value of 0.3 percent. Accordingly, the pitch chosen for the negative stock is 0.1497 in.

Low-shrink negative film perforated to these dimensions should not thereafter shrink appreciably more than 0.2 percent under normal use conditions and for a reasonable life span, so that the optimum pitch differential from the positive stock of 0.3 ± 0.1 percent is maintained. (The film should be measured after equilibration with air at 70° F and 55 percent relative humidity or at the conditions prevailing at the time of perforating.)

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

4. The film stock described in this practice is intended for the economical production of prints. It is slit after printing and developing, to 8mm width. If the error of slitting exceeds tolerances, one of the 8mm strips may exceed the width allowed for 8mm film and cause interference in the projector gate. In addition to errors of centering, there are errors caused by recurring variations in width. These errors will cause wear on the screen even though the maximum width of the film may not be great enough to cause interference in the projector gate.

SMPTE RECOMMENDED PRACTICE

Label Specifications for 2-In. Quadruplex Video Magnetic Tape Recordings

RP 26-1968



1. Scope

This recommended practice specifies the minimum information required on labels attached to reels and reel containers of 2-in. quadruplex video magnetic tape recordings.

2. Specifications

The following represents the minimum information required on a video tape label. The label shall be affixed to both the reel and container:

- (1) Name of company or studio
- (2) Name of program or commercial
- (3) Number of program or commercial
- (4) Modulation practice—high band or low band
- (5) Color or black and white
- (6) Original or copy

SMPTE RECOMMENDED PRACTICE

RP 8-1968



Safe Action and Safe Title Areas for TV Transmission

1. Scope

1.1 This recommended practice defines for TV transmission the safe action image area within which all significant action must take place to ensure visibility of the action on the average home receiver.

1.2 The practice also defines the safe title image area within which the more important information must be confined to ensure visibility of the information on the majority of home receivers.

2. Dimensions

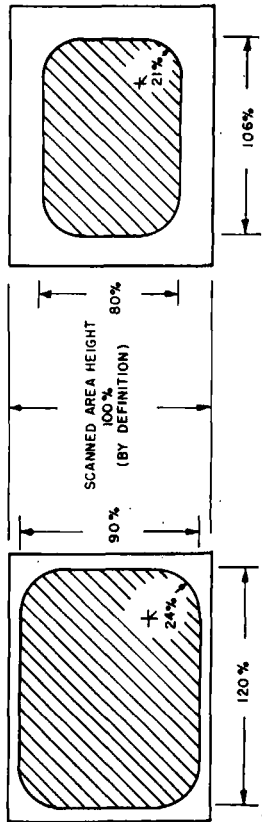
2.1 The dimensions shall be as given in the figure and table.

2.2 The dimensions are given in terms of the percentage of the nominal height of the scanned area transmitted by the television system. (See Appendix.)

2.3 The height of the scanned area shall be as specified in USA Standards:

- Dimensions of Television Image Area on 16mm Motion-Picture Film, PH22.96-1963
- Dimensions of Television Image Area on 35mm Motion-Picture Film, PH22.95-1963
- Slides and Opaques for Television Film Camera Chains, PH22.94-1964

2.4 Significant action shall be kept within the safe action area defined by the 90 x 120 percent guidelines.



Dimensions of Safe Action Area			Dimensions of Safe Title Area		
Width (120%)	Height (90%)	Radius (24%)	Width (106%)	Height (80%)	Radius (21%)
0.331 in.	0.248 in.	0.066 in.	0.294 in.	0.221 in.	0.059 in.
0.713 in.	0.535 in.	0.143 in.	0.634 in.	0.475 in.	0.127 in.
1.013 in.	0.759 in.	0.203 in.	0.900 in.	0.675 in.	0.180 in.
		Medium			
		16mm Film			
		35mm Film			
		2" x 2" Slide			

2.5 Essential information shall be kept within the safe title area defined by the 80 x 106 percent guidelines.

3. Operating Procedures

3.1 It is recommended that the appropriate area be outlined in camera viewfinders.

3.2 Projectors used for production evaluation of prints intended for television transmission should be equipped with apertures in accordance with USA Standard Specifications for Film.

Note: Projectors used for print inspection should have apertures at least as large as the scanned area. The dimensions of the safe action area and safe title area should be indicated on the projection screen.

Appendix

This Appendix is not a part of SMPTE Recommended Practice RP 8-1968, Safe Action and Safe Title Areas for TV Transmission, but is included to facilitate its use.

It should be pointed out that the dimensions of the two safe areas remain as established in earlier issues. The method of specifying the dimensions in terms of the image height has been adopted to conform with current practices.

Image Area Used for Review Room Viewing of 35mm and 16mm Motion-Picture Prints Intended for Television Transmission, PH22.148-1967.

3.3 The safe title area should be indicated on the review room screen.

SMPTE RECOMMENDED PRACTICE

Specifications of Tracking Control Record for 2-In. Quadruplex Video Magnetic Tape Recordings

RP 16
Revision of
RP 16-1964

1. Scope

This recommended practice specifies the recorded dimensional relationships among (a) tracking-control signal, (b) frame-pulse signal, and (c) vertical synchronizing signal for 2-in. quadruplex video magnetic tape recordings.

2. Dimensions

2.1 The dimensional relationships among the tracking control record, frame pulse record, and video record, not specified elsewhere in this practice,

shall be as specified in Figs. 1a and 1b and in the table.

2.2 Dimensions pertaining to the video, audio, and control records on 2-in. magnetic tape shall be as specified in USA Standard Dimensions of Video, Audio, and Tracking Control Records on 2-in. Video Magnetic Tape, C98.6-1963.

3. Magnetic Coating

With the direction of tape motion shown, the magnetic coating is on the surface facing the observer.

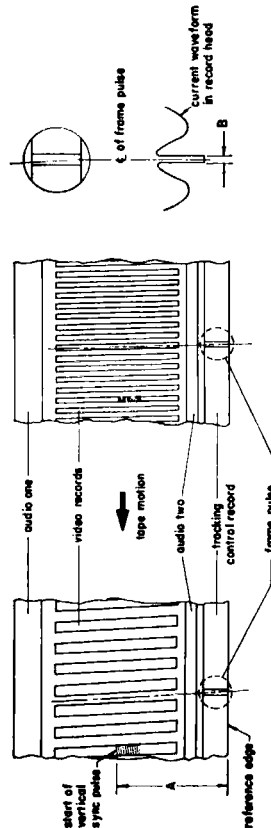


Fig. 1a. 15 in./sec

Fig. 1b. 7.5 in./sec

Dimensions	Inches		Millimeters	
	Minimum	Maximum	Minimum	Maximum
A	1.135	1.165	28.83	29.59
B			60 ± 10*	

* Measured at 50 percent amplitude points. Widths observable and measurable on developed tape will vary with recording level and properties of developing solution.

5. Tracking Control Signal

- 5.1 The frequency of the tracking-control signal shall be four times the field frequency of the television video signal.
- 5.2 The amplitude of the tracking-control signal current in the recording head shall be such that the tape is driven to the verge of saturation. This amplitude can be established by the method described in the Appendix.
- 5.3 The tracking-control signal shall be positioned so that a point of maximum record current and the extended centerline of the area between the second and third video tracks after the track containing the vertical synchronizing pulse shall coincide within ± 0.001 in. at the reference edge of the tape when the recording is made at 15 in./sec tape speed.
- 5.4 The tracking-control signal shall be positioned so that a point of maximum record current and the extended centerline of the fifth video track after the track containing the vertical synchronizing pulse shall coincide within ± 0.001 in. at the reference edge of the tape when the recording is made at 7.5 in./sec tape speed.
- 5.5 The wave shape of the tracking-control signal current in the record head should be sinusoidal.

4. Frame Pulse

- 4.1 A pulse to identify the position of the vertical synchronizing pulse shall be superimposed on the tracking control signal.
- 4.2 One pulse shall be recorded per television frame to identify the vertical blanking interval that is preceded by a full horizontal line when the tape is recorded at 15 in./sec and to identify the vertical blanking interval that is preceded by a half horizontal line when the tape is recorded at 7.5 in./sec.
- 4.3 The pulse shall be positioned so that the centerline of the recorded pulse and the extended centerline of the area between the second and third video tracks after the track containing the vertical synchronizing pulse shall intersect within ± 0.002 in. at the reference edge of the tape when the recording is made at 15 in./sec tape speed (Fig. 1a). The pulse shall be positioned so that the centerline of the fifth video track after the track containing the vertical synchronizing pulse shall intersect within ± 0.002 in. at the reference edge of the tape when the recording is made at 7.5 in./sec tape speed (Fig. 1b).
- 4.4 The amplitude of the frame pulse current shall be greater than 150 percent of the peak-to-peak value of the tracking control signal current in the record head.
- 4.5 The polarity of the pulse with respect to the tracking control signal shall be as shown in Fig. 1c.

Appendix

This Appendix is not a part of Proposed SMPTE Recommended Practice RP 16, Specifications of Tracking Control Record for 2-In. Quadruplex Video Magnetic Tape Recordings, but is included to facilitate its use.

- 1. The transfer characteristic of magnetic tape is non-linear. The B₁ H₁ curve of the tape as recorded has a shape indicated in Fig. 2a. When a sinusoidal record current (Fig. 2c) is applied to the record head, the resulting recorded flux density is as shown in Fig. 2b. The playback voltage waveform (Fig. 2d) is the first derivative of the recorded flux. Thus, the zero axis crossing region of the reproducing signal corresponds to the maximum recorded flux region. The verge of saturation is considered to be the condition where the recorded flux waveform is just noticeably flattened on its peaks. This flattening of the flux peaks results in an inflection in the reproducing signal waveform in the zero axis crossing region. The verge of saturation can thus be determined by increasing the record current until a just perceptible inflection occurs in the zero axis crossing region of the reproducing signal.
- 2. Areas to which a compass is attracted (see Section 5.4) do not coincide with point of maximum record current. The compass will be attracted to two areas (X, as shown in Fig. 2) adjacent to the point where the record current crosses the zero axis. The two areas will appear as bars when the track is developed with carbonyl iron or an equivalent material.
- 3. The location of vertical sync and the frame pulse, as specified herein, will apply only if the recorded video

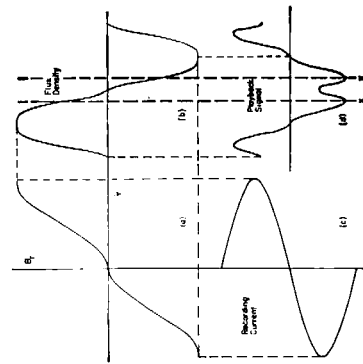


Fig. 2