Diese Schulen besitzen Gruppenantennen-Fernschanlagen, sodass die Sendungen in jedes Klassenzimmer geleitet werden können. Das Netz bringt Programme, die für besondere Unterrichtszwecke ausgewählt und planmässig dargeboten werden. Die Anordnung dieser modernen Anlagen bietet neue Darstellungen von Fernseh-Unterrichtsprogrammen, neue betriebliche Einrichtungen mit geplanter künftiger Automation und die Möglichkeit zum Anschluss an das Gesamtbild belehrender Rundfunksendungen.

Das EP-System: Eine Filmkassette zur Vereinfachung des Einlegens des Ton-Bild-Schulprojektors

JEAN-PIERRE LAVANCHY [900]

Eine Gruppe sechs Europäischer Fabrikanten von Schmalfilmapparaturen hat sich gemeinsam mit einem Programm zur Entwicklung einer neuen Filmkassette für audio-visuelle Zwecke beschäftigt. Die Einzelrollenkassette wurde entworfen, um das Einlegen des Films zu vereinfachen, und ermöglicht Schnellvorwärtslauf und rasches Umrollen. Dieselbe kann zur Unterbringung von 15, 60 oder 120m-Rollen hergestellt werden. (*Üb. Pablo Weinschenk-Tabernero*)

Erwägungen beim Entwurf eines leistungsfähigen Kinofilm-Kontaktkopiergerätes mit magnetischer Tonüberspielung und Überwachung

ANDREW BALINT, ROBERT C. LOVICK und WILLIS L. STOCKDALE [904]

Ein leistungsfähiges Kontaktkopiergerät wurde entwickelt, das die rationelle Arbeitsweise des magnetisch beschichteten Farbkopierfilms ausüntzt. Dieses Kopiergerät kann in Zukunft eine Schlüsselrolle auf dem audio-visuellen Gebiet spielen. Als 35mm/Super 8 Kopiergerät kann die Maschine in ihrer gegenwärtigen Form in einem einzigen Arbeitsgang vier gleiche Bildreihen und die vier, ebenfalls gleichen, dazugehörigen magnetischen Tonaufzeichnungen kopieren. Die Bilder werden von einem 35mm/Super 8 Zwischennegativ kontaktkopiert und die Tonaufzeichnungen werden von einem 16mm magnetischen Tonoriginal überspielt. Ständige Überwachung der vier magnetischen Tonaufzeichnungen gewährleistet Zuverlässigkeit des Gerätes. Die Leistung des Gerätes beträgt 61 Meter pro Minute, oder 244 Meter Super 8 Tonkopien pro Minute. Dieses System ist auch auf andere beschichtete Kinofilmformate anwendbar. (*Üb. S. Beauregard*)

Antrieb mittels Flüssigkeitsturbine, eine Neuerung für Filmentwicklungsmaschinen

EVERETT L. HANSON [907]

Wenig ist in den letzten 35 Jahren getan worden, un die traditionellen Transportvorrichtungen für Filmentwicklungsmaschinen zu verbessern; diese Vorrichtungen sind: der Zahntrommelantrieb und die verschiedenen Arten von Tendenztrieb (Antrieb mit selbständiger Filmspannungsregulierung, ohne Anwendung von Zahntrommeln), einschliesslich elektrischer Kuppelung, Filzscheibenkuppelung und des Bodenwellentriebs. In letzter Zeit ist eine neue Methode zum Filmtransport bei der Austrüstung einer Negativentwicklungsmaschine angewandt worden: der Antrieb mittels Flüssigkeitsturbine. Diese Antriebseinheiten sind unkompliziert und verhältnismässig klein: 10 cm im Durchmesser und 12,5 cm in der Länge. Der Antrieb funktioniert mittels Kraftübertragung durch die Flüssigkeit. Das Verhältnis von dem von der Maschine aufgenommenen Film zu dem 12 bis 16 prozentigen Übertrieb der angetriebenen Welle ergibt einen progressiven und gleichmässigen Zug. Film wird bis zu Geschwindigkeiten von mehr als 91.5 m per Minute verarbeitet, und die Turbineneinheit braucht keine Ersatzteile und wenig oder keine Pflege.

Neue Ideen und verbesserte Bildqualität für eine konkave 35 mm Bildwand für das Kino eines Einkaufszentrums

GLEN BERGGREN und KENNETH R. LEONARD [909]

Auf Ansuchen einer Kinoverwaltung wurde eine Analyse durchgeführt, um ein verbessertes Bild auf einer konkav angelegten Bildwand zu erhalten; auch wurden Ratschläge zur Verbesserung erteilt. Die Bildwand ist zylindrisch gebogen und besteht aus Standard-Material, doch besitzt sie im Vergleich mit der Projektionsentfernung einen kürzeren Radius. Die Dimensionen, Lichtbild-Bereiche und Bildwand-Licht-Faktoren dieses im Betrieb befindlichen Kinos werden beschrieben. Photographien wurden von den auf die Bildwand projizierten Bildern aufgenommen; die Leuchtdichte wurde zum Vergleich an neun Hauptstellen im Zuschauerraum gemessen. Das projizierte Bildbereich, eine mögliche "Bildbeschneidung" und das Vorhandensein von augenscheinlichen Deformationen, wie auch das Projizieren eines gebogenen Bildes und seine richtige Lage mit Einschluss der Methode zur Feststellung dieser Lage werden besprochen. Auch eine Besprechung des Querlichtproblems in Bezug auf eine gebogene Bildwand ist beigefügt.

standards and recommended practices

Approved USA Standards

Published here for your information are two USA Standards recently approved by the United States of America Standards Institute.

Specifications for Color Video Magnetic Tape Leader, C98.9-1967, approved July 19, 1967, is a new document and specifies the minimum requirement for a leader intended for color video-tape recording to permit adjustment of equipment for optimum performance during reproduction of program material.

Dimensions of Photographic Sound Record on 35mm Motion-Picture Prints, PH22.40-1967, approved April 26, 1967, is substantially a reaffirmation of the technical content of the 1957 issue, but modified editorially to facilitate its use.

Inasmuch as compliance with USA Standards is purely voluntary, these documents will only become effective if broad publicity is given to their existence. Any appropriately exerted personal influence to promote their use will benefit the motion-picture and television industry as a whole. Copies of each document may be obtained, for a nominal fee, from the United States of America Standards Institute, 10 East 40th Street, New York, N.Y. 10016.

Draft USA Standards

Three Draft USA Standards are published in this issue for a trial period and public review. Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to October 27. The Drafts will be submitted to USA Standards Committee PH22, and all remarks or criticisms received through *Journal* publication will be taken into consideration before action by that Committee is concluded.

Each of the Drafts is a new document dealing with various aspects of the super 8 system. Dimensions for 16mm Motion-Picture Film, Perforated Super 8, 2R-1667 (1–4), PH22.167, and Dimensions for 16mm Motion-Picture Film, Perforated Super 8, 2R-1664 (1–4), PH22.168, cover two super 8 motion-picture film stocks used in the production of prints.

Specifications for Super 8 Motion-Picture Film Camera Cartridge Notches for Exposure Control and Stock Identification, PH22.166, specifies the dimensions and location of camera cartridge notches used with super 8 motion-picture film. The notches are intended to automatically preset camera exposure devices, and each combination of notches is identified by a code number as described on page 4 of the Draft Standard. The assignment of code numbers is handled by the Photographic Division of the United States of America Standards Institute, and applications should be addressed to that organization at 10 East 40th Street, New York, N.Y. 10016. — *A.E.A.*

USA standard

Approved July 19, 1967

Specifications for

USAS
C98.9–1967

UDC 681.84.083:621.397.8

Sponsor
Society of Motion Picture
and Television Engineers, Inc.

Color Video Magnetic Tape Leader

1. Scope

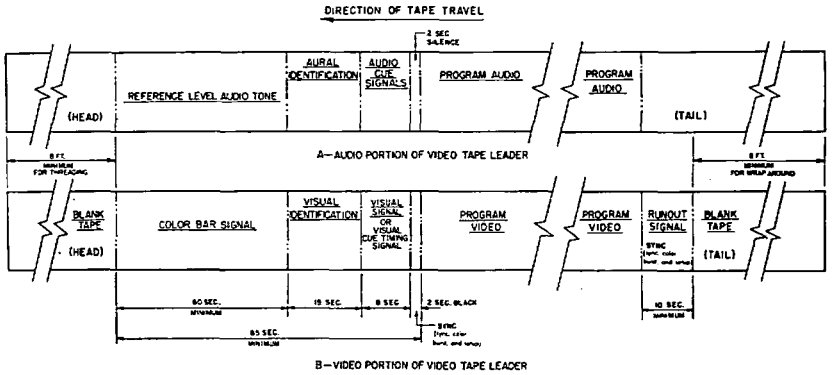
1.1 This standard specifies the minimum leader requirements for color video tape recording operation to permit adjustment of equipment for optimum performance during reproduction prior to the start of recorded program material.

1.2 The standard also specifies the audio and video information that precedes and follows the recorded program material (for purposes of ensuring uniformity of reproduction), and provides the necessary identification cue up and run out information, and the minimum lengths of tape required to ensure proper threading for color video tape recordings.

2. Color Bar Signal

2.1 At the head end of the tape, at least 60 seconds of color bar pattern, as defined by EIA Standard RS-189, Encoded Color Bar Signals, shall be recorded with maximum luminance at 77 IRE units corresponding to 75 percent chroma level, including a reference white bar and reference black bar.

The recording shall be made under the same conditions of equipment adjustment as used for recording the video program material. For original recording, the color bar signal shall originate in and be fed through the same studio and equipment used for the program.



NOTE: The figures of picture and sound sequences are shown related on a time basis. There is separation of the picture and sound records on the recorded tape, as defined in USA Standard Specifications of the Audio Records for 2-In. Video Magnetic Tape Recordings, C98.3-1963.

2.2 Simultaneously with the color bar signal, a reference level audio tone of 400 Hz ± 5 percent shall be recorded at the same level and under the same conditions of equipment adjustment used for recording the audio portion of the program material.

2.3 The color bar signal shall be preceded by 8 ft minimum of blank tape for threading purposes.

3. Identification Information

3.1 Visual identification information shall be recorded for at least 15 seconds following the color bar signal specified in Section 2. The identification shall contain the following information (if known):

(1) title
(2) subject
(3) production number
(4) take number
(5) name of recording studio
(6) date of recording
(7) broadcast date

3.2 Simultaneously, an aural identification of the information specified in Section 3.1 shall be recorded under the same conditions as defined in Section 2.2.

4. Cue Timing Signals

4.1 Audio cue signals, as described below, shall be recorded on the audio program track following the aural identification signals specified in Section 3.

4.1.1 The audio cue tone signals shall consist of a series of 400 Hz ± 5 percent bursts, each of ½-second duration, occurring at one-second intervals over the range from ten or more seconds ahead of the program material to two seconds ahead. The recording level shall be as defined in Section 2.2.

4.1.2 In addition, a steady component of the audio cue tone shall be recorded approximately 20 dB below the level used in Section 4.1.1 above, starting with the first tone burst and ending with the last one, to leave a two-second silent interval before the start of program material.

4.2 A visual signal shall be recorded during the entire period of the steady component of the above-described audio tone signals. Sync (sync, color burst, and setup) only shall be recorded during the two-second interval from the end of the tone bursts to the start of program. The recording level shall be as described in Section 2.1.

If a visual cue timing signal is used, it shall be coincident with and identify the tone burst in Section 4.1.1.

5. Continuity of Recorded Signals

Continuity of recorded signals, beginning with the color bar signal, shall not be interrupted. This continuity of sync, color burst, and control track shall be achieved by continuous recording or by equivalent splicing, provided that the requirements of Section 2.1 are fulfilled.

6. Run-Out Signal

6.1 There shall be at least 10 seconds of sync (sync, color burst, and setup) recorded immediately following the conclusion of program material.

6.2 The run-out signal shall be followed by 8 ft minimum of blank tape for wrap around purposes.

USA standard

Approved April 26, 1967

Dimensions of

Photographic Sound Record on 35mm Motion-Picture Prints

USAS
PH22.40–1967
Revision of
PH22.40-1957
UDC 778.534.4

Sponsor
Society of Motion Picture
and Television Engineers, Inc.

1. Scope

1.1 This standard specifies the location and dimensions of variable area and variable density sound records on 35mm motion-picture prints.

1.2 This standard specifies the area scanned in the sound reproducer.

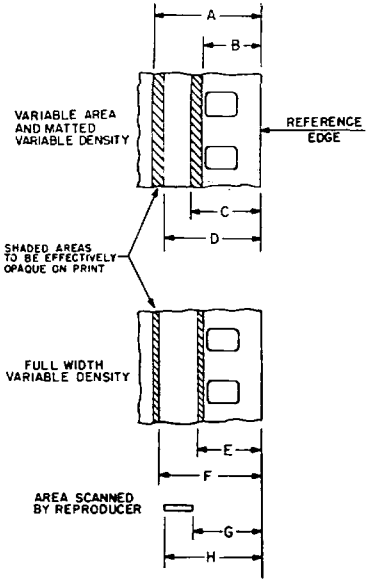
2. Dimensions

2.1 The dimensions and location of the sound record shall be as specified in the figure and table.

2.2 The sound record on the film shall be displaced from the center of the corresponding picture by a distance of 21 frames ± ½ frame in the direction of film travel during normal projection.

3. Related Standards

3.1 Prints made in conformance with this standard are intended to be used in accordance with USA Standard 35mm Photographic Sound Motion-Picture Film, Usage in Projector, PH22.3-1961.



Dimensions	Inches	Millimeters
A	0.308 nom	7.82 nom
B	0.192 nom	4.88 nom
C	0.205 ± 0.001	5.21 ± 0.03
D	0.281 ± 0.001	7.14 ± 0.03
E	0.193 + 0.004 − 0.000	4.90 + 0.10 − 0.00
F	0.293 + 0.000 − 0.004	7.44 + 0.00 − 0.10
G	0.202 ± 0.001	5.13 ± 0.03
H	0.286 ± 0.001	7.26 ± 0.03

3.2 Dimensions A and B, describing the printed area of the sound record, are established by USA Standard Dimensions of Exposed Areas for Picture and Photographic Sound on 35mm Motion-Picture Prints Made on Continuous Contact Printers, PH22.111-1965, and are shown in the table as nominal values for reference only.

Appendix

(This Appendix is not a part of USA Standard Dimensions of Photographic Sound Record on 35mm Motion-Picture Prints, PH22.40-1967, but is included to facilitate its use.)

This standard specifies that the photographic sound record will be advanced with respect to the picture by 21 frames when a composite print is produced. Consequently, when sound and corresponding picture should be synchronized for an observer close to the projected picture, or if a situation not introducing an acoustic delay at the time of projection is desired, the scanning point of the sound record must be positioned at the 21st frame ahead of the corresponding picture frame.

In the average theater, however, it is necessary to emit the sound pulses before the corresponding picture frame is positioned in the aperture. Since sound travels approximately 1100 ft per second or about 50 ft per frame during the normal projection rate of 24 frames per second, the projectionist can place the sound and picture in synchronization in the theater where he wishes by varying the length of the threading path in the projector.

For example, if the positioning of frame 21 at the scanning point brings the corresponding picture and sound to the screen and the speaker at the same instant, then positioning frame 20 at the scanning point would give synchronism at about 50 ft from the screen, 19 frames would give synchronism at 100 ft, etc.

Draft USA Standard Specifications for

Super 8 Motion-Picture Film Camera Cartridge Notches for Exposure Control and Stock Identification

PH22.166

1. Scope

1.1 This standard specifies the dimensions and location of super 8 motion-picture film camera cartridge notches intended to automatically preset exposure devices with respect to the film speed and color balancing filter.

1.2 This standard also specifies the dimensions, location, and method of assignment of cartridge notches intended for identification of the motion-picture stock inside the cartridge.

2. Dimensions

2.1 The dimensions of the cartridge notches shall be as specified in the figures and tables.

2.2 The dimensions of the filter and film speed notches are measured from the centerline of the cartridge locating slot, Datum plane A.

2.3 The film identification notches are measured from the centerline of the cartridge locating slot, which is indicated as Datum plane A.

2.4 Dimension N applies to all film identification notch locations.

3. Assignment Code

3.1 The stock identification notch location positions are numbered 1 through 6 from the locating slot so that combinations of notches can be assigned.

3.2 The 63 possible film identification notch combinations have been systematically arranged and identified with a notch combination code number, as shown in Table 4. Assignment of specific combinations of notches can be made according to the manufacturer's needs by application to the United States of America Standards Institute.

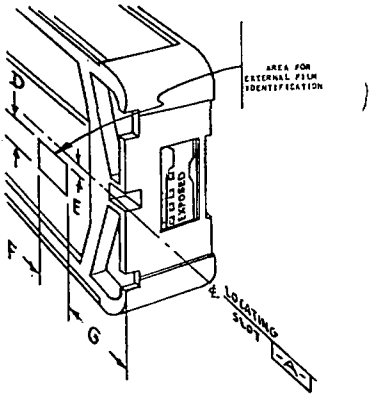


Figure 1

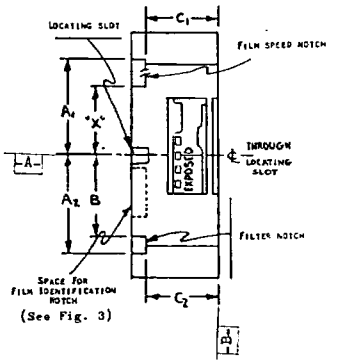


Figure 2

Table 1

Dimensions	Inches	Millimeters
A_1	1.100 ± 0.015	27.94 ± 0.38
A_2*	1.100 ± 0.015	27.94 ± 0.38
B*	0.913 ± 0.015	23.19 ± 0.38
C_1	0.800 ± 0.015	20.32 ± 0.38
C_2	0.800 ± 0.015	20.32 ± 0.38
D	0.250 ± 0.015	6.35 ± 0.38
E	0.052 ± 0.015	1.32 ± 0.38
F	0.563 ± 0.015	14.30 ± 0.38
G	1.062 ± 0.015	26.97 ± 0.38

*See Appendix A3.

Table 2

Black-and-White and Daylight Film Speed (Cartridge has No Filter Notch)	Black-and-White and Tungsten Light Film Speed (Cartridge has a Filter Notch)	Dimension X* Inches	Millimeters
10	16	1.000	25.40
16	25	0.900	22.86
25	40	0.800	20.32
40	64	0.700	17.78
64	100	0.600	15.24
100	160	0.500	12.70
160	250	0.400	10.16
250	400	0.300	7.62
400	640	0.200	5.08

*The tolerance for Dimension X is ± 0.015 in. (0.38mm).

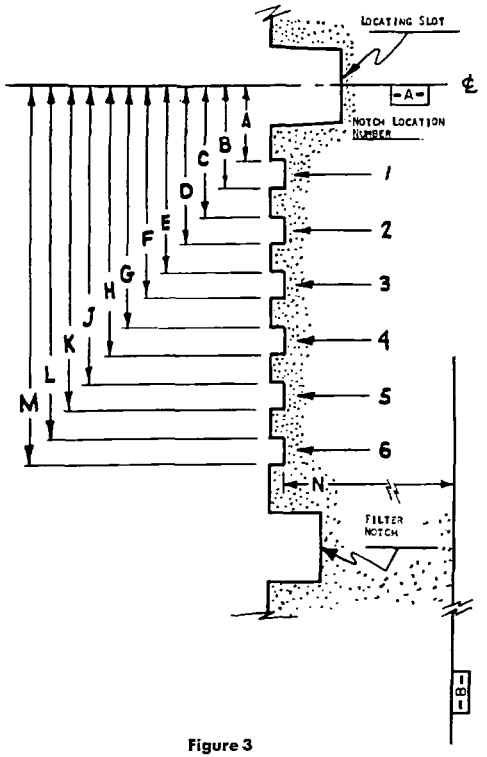


Figure 3

Table 3

Dimensions	Inches Minimum	Inches Maximum	Millimeters Minimum	Millimeters Maximum
A	0.150	0.170	3.81	4.32
B	0.220	0.256	5.59	6.50
C	0.256	0.292	6.50	7.42
D	0.342	0.378	8.69	9.60
E	0.378	0.414	9.60	10.52
F	0.464	0.500	11.79	12.70
G	0.500	0.536	12.70	13.61
H	0.586	0.622	14.88	15.80
J	0.622	0.658	15.80	16.71
K	0.708	0.744	17.98	18.90
L	0.744	0.780	18.90	19.81
M	0.830	0.850	21.08	21.59
N	0.894 ±	0.020	22.71 ±	0.51

NOTCH COMBINATION CODE NUMBER	LOCATION NUMBER 1	2	3	4	5	6
1	1					
2		2				
3			3			
4				4		
5					5	
6						6
7	1	2				
8		2	3			
9			3	4		
10				4	5	
11					5	6
12	1		3			
13		2		4		
14			3		5	
15				4		6
16	1			4		
17		2			5	
18			3			6
19	1				5	
20		2				6
21	1					6
22	1	2	3			
23		2	3	4		
24			3	4	5	
25				4	5	6
26	1	2		4		
27		2	3		5	
28			3	4		6
29	1	2			5	
30		2	3			6
31	1	2				6
32	1		3	4		
33		2		4	5	
34			3		5	6
35	1		3		5	
36		2		4		6
37	1		3			6
38	1			4	5	
39		2			5	6
40	1			4		6
41	1				5	6
42	1	2	3	4		
43		2	3	4	5	
44			3	4	5	6
45	1	2	3		5	
46		2	3	4		6
47	1	2	3			6
48	1	2		4	5	
49		2	3		5	6
50	1	2		4		6
51	1	2			5	6
52	1		3	4	5	
53		2		4	5	6
54	1		3	4		6
55	1		3		5	6
56	1			4	5	6
57	1	2	3	4	5	
58		2	3	4	5	6
59	1	2	3	4		6
60	1	2	3		5	6
61	1	2		4	5	6
62	1		3	4	5	6
63	1	2	3	4	5	6

NOTE 1: The dimensions for the filter notch apply only if the cartridge is loaded with film balanced for tungsten light exposure. This area is not notched if the cartridge is loaded with color film for daylight exposure or with black-and-white film.

NOTE 2: The space available for notch-sensing devices is specified in Draft USA Standard Specifications for Super 8 Motion-Picture Film Camera Cartridge and Cartridge-Camera Fit, PH22.159.1.

NOTE 3: The dimensions permit the material between adjacent notch locations to be retained or removed, whenever two or more adjacent notch locations are used. When material is retained, caution should be exercised to ensure that it is of sufficient width to withstand normal handling without breaking off.

NOTE 4: If film data, such as film name and length of film load, are to be provided on the cartridge, they should be within the area shown by Dimensions D, E, F, and G to provide for visual film identification in the camera.

NOTE 5: Many general-purpose black-and-white reversal films can be processed satisfactorily in a universal process. Notch combination code number 1, therefore, has been reserved for such general-purpose black-and-white reversal films.

NOTE 6: The film speed notch is used to set the exposure of an automatic camera with the daylight film speed. When the cartridge is loaded with film balanced for tungsten light, the tungsten light values are those at which the films are rated by the manufacturer. The effective speeds to daylight illumination for which the camera will expose these films (unless instructed otherwise) are based on the premise that a typical tungsten light-balanced camera color original film will have a speed two-thirds of a lens stop less when exposed through an appropriate filter to daylight illumination than it has when exposed unfiltered to tungsten light. The filter notch established by Dimensions A_2 and B must, therefore, be used when the cartridge is loaded with color film balanced for tungsten illumination because this notch activates the camera to position a tungsten-to-daylight illumination correcting filter in the exposing light path. Black-and-white films are usually notched according to their daylight speed; however, a manufacturer may choose to speed notch a black-and-white film according to its speed to tungsten light, depending upon the intended use of the film. If this is done, the film would be exposed to daylight illumination through a tungsten-to-daylight correcting filter, as described above. A filter notch may also be used with black-and-white film if the manufacturer wishes to reduce the effective speed of a given film to daylight illumination by approximately ⅔ of a stop.

Appendix

(This Appendix is not a part of Draft USA Standard Specifications for Super 8 Motion-Picture Film Camera Cartridge Notches for Exposure Control and Stock Identification, PH22.166, but is included to facilitate its use.)

A1. The film exposure speeds referred to in this standard are the exposure ratings recommended by the film manufacturers. ASA film speeds are not specified because, at present, there is no USA Standard for the determination of film speeds for reversal camera color original motion-picture films. However, there is a Proposed USA Standard Method for Determining Speed of 16mm and 8mm Reversal Color Films Intended for Camera Use and Direct Projection in Motion-Picture Photography, PH22.146. If adopted, the reference to film speed in this standard will be changed to ASA film speed.

A2. To ensure proper identification of film products whose production volume or market life does not warrant the assignment of a film identification notch, the absence of a notch in the area specified will require the film product to be identified by its label.

In addition, to provide for the possible correction of errors in notching by the manufacturer, the use of notch combination code number 63 (all notch locations) will also require the film product to be identified by its label.

A3. In order to clarify the system of speed notching specified in this standard, examples are provided below describing picture-taking situations that will require a fully automatic camera to insert or remove a color-correcting filter, and to make adjustments to the camera exposure system in order to obtain theoretically correct exposure and color balance of the resulting pictures.

CASE I. Assume an automatic exposure camera, having its exposure-sensing device separate from the camera lens system, is used. The following will apply:

Example A. A super 8 film cartridge loaded with a color original film balanced for tungsten light with a film speed rating of 40. This cartridge will be notched with a filter notch and with a film speed notch dimensioned to allow the camera to sense that the appropriate exposure required is for film with a speed rating of 25.

Situation 1. If daylight pictures are to be taken with this cartridge and camera, a color-correcting filter would be inserted into the lens axis by the camera when it senses the filter notch, and the camera exposure-sensing device would be adjusted to provide the appropriate exposure for a film speed rating of 25.

Situation 2. If tungsten-light pictures are taken, a means of removing the color-correcting filter inserted into the camera lens axis by the sensing of the filter notch would be required. Furthermore, the camera exposure-control system would have to be adjusted for a film speed

of 40 (two-thirds of a lens stop faster). These two adjustments could be accomplished when the color-correcting filter is removed from the lens axis automatically, when a lighting unit is attached to the camera, or manually by the operator.

Example B. Super 8 film cartridge loaded with a color film balanced for daylight or with black-and-white film having a film speed rating of 25. The cartridge would not include a filter notch, and the film speed notch would be dimensioned to allow the camera to sense that the appropriate exposure required is for a film with a film speed rating of 25.

Situation 1. Daylight pictures would be made without a color-correcting filter in the lens axis because there is no filter notch for the camera to sense. The camera exposure-sensing device would be adjusted to properly expose a film with a film speed rating of 25.

Situation 2. Tungsten-light pictures would be made without a color-correcting filter in the lens axis because there is no filter notch for the camera to sense. If, however, the operator actuates the mechanical means of removing the color-correcting filter (which could be coupled to the lighting unit attachment), it would be necessary for the camera to distinguish this situation from that described in Case I, Example A, Situation 2, and no change in the adjustment of the camera exposure-sensing device should be made (i.e., it should remain set for a film with a speed rating of 25).

CASE II. Assume a camera designed with its automatic exposure-sensing system behind the lens and obtaining its information from the lens axis by reflex or split-beam arrangement is used. Any light correction filter used in the lens axis would, therefore, be ahead of the film and the exposure-sensing device.

Example A. A super 8 film cartridge loaded with a color original film balanced for tungsten light with a film speed rating of 40. This cartridge will be notched with a filter notch and with a film speed notch dimensioned to allow the camera to sense that the appropriate exposure required is for a film with a film speed rating of 25.

Situation 1. Daylight pictures would be made with the color-correcting filter inserted into the lens axis by the camera where it senses the filter notch. Then, if the camera exposure-control device has a spectral sensitivity comparable to that of a tungsten-light balanced color film, the film speed rating adjustment for the exposure-sensing device should be corrected to properly expose a film with a film speed rating of 40 instead of 25, as notched. This adjustment is necessary because the light-correcting filter is in front of the exposure-sensing device, and the effective film speed rating sensitivity of 25 is accomplished by the filter's spectral density.

Situation 2. When tungsten-light pictures are made, it will be necessary to mechanically remove the light-correcting filter actuated by the camera's sensing the cartridge filter notch without allowing any change in the film speed rating adjustment of the exposure-sensing device.

Example B. Super 8 film cartridge loaded with a color film balanced for daylight or with black-and-white film having a film speed rating of 25. The cartridge would not include a filter notch, and the film speed notch would be dimensioned to allow the camera to sense that the appropriate exposure required is for a film with a film speed rating of 25.

Situation 1. Daylight pictures would be made with no light-correcting filter in the lens axis because there is no filter notch for the camera to sense. However, the camera exposure-sensing device would have to be adjusted to provide proper exposure for a film with a film speed rating of 25 (differing from that in Case II, Example A, Situation 1). This could be accomplished because no filter notch is incorporated in the film cartridge, and the camera could sense the absence of this notch to properly adjust its exposure-sensing device (two-thirds of a lens stop less exposure).

Situation 2. If tungsten-light pictures are made, there would be no light-correcting filter in the lens axis because there is no filter notch for the camera to sense, and the camera exposure-sensing device should be adjusted, as described in Situation 1 above (for a film with a speed rating of 40).

Film speed ratings of 25 for daylight and 40 for tungsten illumination were selected for camera color original films used in the examples above. The same principles and color film speed rating relationships would apply if other film speed ratings had been selected.

Draft USA Standard Dimensions for

16mm Motion-Picture Film, Perforated Super 8, 2R-1667 (1-4)

PH22.167

1. Scope

This standard specifies the cutting and perforating dimensions for 16mm motion-picture film with super 8 perforations in positions 1-4 and a perforation pitch of 0.1667 in. The width of the 8mm strip after processing and slitting is also specified.

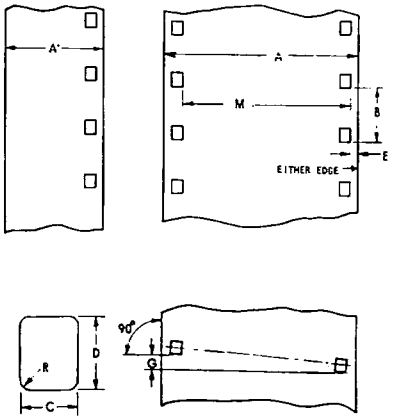
2. Dimensions

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 Motion-Picture Safety Film, PH22.31-1958.

2.3 Except for Dimension A', the dimensions apply to the 16mm film immediately after cutting and perforating. Dimension A' applies to the 8mm strip immediately after slitting.

2.4 Dimension L represents the length of any 100 consecutive perforation pitch intervals.



	Dimensions	Inches	Millimeters
A	Film width	0.628 ± 0.001	15.95 ± 0.03
A'	Film width after slitting	0.314 ± 0.002	7.98 ± 0.05
B	Perforation pitch	0.1667 ± 0.0004	4.234 ± 0.010
C	Perforation width	0.0360 ± 0.0004	0.914 ± 0.010
D	Perforation height	0.0450 ± 0.0004	1.143 ± 0.010
E	Edge to perforation	0.020 ± 0.002	0.51 ± 0.05
G	Perforation skewness	0.001 max	0.03 max
L	100 consecutive perforation pitch intervals	16.670 ± 0.017	423.42 ± 0.43
M	Lateral perforation displacement	0.552 ± 0.001	14.02 ± 0.03
R	Radius of perforation fillet	0.005 ± 0.001	0.13 ± 0.03

NOT APPROVED

2.5 Some equipment may be used to slit super 8 film that had been originally designed for the slitting of less critical conventional 8mm film from 16mm 2R-1500 camera originals or prints. With this procedure, a larger tolerance for Dimension A' of 0.314 + 0.002 — 0.003 in. may be used for film that has not been prestriped with magnetic material. New slitting equipment should me designed to function within the prescribed tolerances.

NOTE 1: Although the film stock described in this standard may be used as a reversal camera original film, its principle use is intended for the production of prints.

NOTE 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, B48.1-1933 (Reaffirmed 1947).

NOTE 3: The title of this standard was established by the application of a nomenclature system developed for all film dimension standards: Each title provides an indication of the film width, a code designation for the perforation shape (BH, KS, DH, or CS) or the number of rows of perforations (1R, 2R, etc.), depending upon which is the significant factor, and the perforation pitch without the decimal point.

The numerals have been added to the title of this standard to specify how the rows of perforations are placed on the film. This designation is necessary only when the film stock is wider than its end use and more than one combination of perforation rows is possible. The perforation rows shall be numbered starting at the reference edge. The reference edge is that edge of the strip nearest to the perforations which is retained on one of the slit prints that is not discarded in any subsequent slitting. The designations 1 through 4 of 16mm films indicates that the perforations are in row:

1—adjacent to the reference edge
2—on the reference side of center
3—on the non-reference side of center
4—adjacent to the non-reference edge

when the film end is observed from the base side with the spool above and away from the point of observation.

There can be two different windings for the same numbered rows of perforations. This applies, however, only when the film is perforated in the 1-3 position and the designation of the film would be 1-3, regardless of winding. Winding could be A or B depending upon the location of the reference edge (See PH22.75-1953).

Appendix

(This Appendix is not a part of Draft USA Standard Dimensions for 16mm Motion-Picture Film Perforated Super 8, 2R-1667 (1-4), PH22.167, but is included to facilitate its use.)

A1. The dimensions given in this standard represent the practice of film manufacturers in that the dimensions and tolerances are for film stock immediately after perforation. 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.

A2. It will be noted that among the various standards for slitting and perforating film stock there are often two standards that seem much alike in wording. The difference lies in the longitudinal pitch which is either 0.1664 in. or 0.1667 in. In general, the longer pitch is for print stock and the shorter pitch is for negative or intermediate stock.

The choice of pitch for negative or intermediate motion-picture film depends, within certain limits, on the type of printer to be used. Where release step-printers 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 contact printer), there are three major considerations involved in choosing the pitch. These considerations are: (1) the sprocket diameter, (2) the film thickness, and (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 a 72-tooth sprocket (circumference of about 12 in.) with film 0.0055 to 0.0065 in. thick, the optimum pitch differential is 0.3 percent. The use of the ideal pitch differential for the negative would minimize slippage between the positive stock and negative during the 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 jump caused by nonuniformity of successive pitches, Dimension B.)

Experience has shown that the average pitch derived from Dimension L of the intermediate can vary ± 0.1 percent from the ideal pitch, which is 0.3 percent shorter than the positive stock, without blurring 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 or intermediate stock is 0.1664 in.

Low-shrinkage 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.)

A3. 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.

A4. The width for 16mm film is controlled by the shrinkage characteristics of the films involved. Thus there have been standards for the width of 16mm stock of the "usual" shrinkage and for stock of "low-shrinkage" characteristics. The purpose was to obtain films of approximately the same width regardless of the type of film base during their useful life. This standard is based on the values adapted to "low-shrinkage" film base since nearly all films now manufactured in the U.S. meet the definition noted below.

For the purpose of choice of width, low-shrinkage film base is film base which, when coated with emulsion and any other normal coating treatment, perforated, kept in the manufacturer's normal commercial packings for six months at 65 to 75 F, exposed, processed, and stored exposed to air for a period not to exceed 30 days at 65 to 75 F and 50 to 60 percent relative humidity, shall have shrunk not more than 0.2 percent from its original dimension at the time of perforating.

This definition of low-shrinkage film stock has been found by experience to be useful as a guide to film manufacturers in slitting their stock. Departure from this definition shall not be cause for rejection of the stock. Note that this definition of shrinkage differs from the criterion applying to the choice of longitudinal pitch, where greater periods of time are involved and where short-time tests can be deceptive.

Allowance has been made in arriving at these values for the common tendency of film to expand when exposed to high relative humidity. Allowance should be made for this factor in equipment design and in no case should the equipment design fail to accommodate a film of 0.630-in. width.

Draft USA Standard Dimensions for

16mm Motion-Picture Film, Perforated Super 8, 2R-1664 (1-4)

PH22.168

1. Scope

This standard specifies the cutting and perforating dimensions for 16mm motion-picture film with super 8 perforations in positions 1-4 and a perforation pitch of 0.1664 in.

2. Dimensions

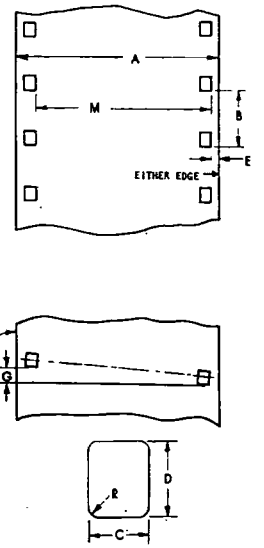
2.1 The dimension shall be as given in the figure and table.

2.2 The dimensions pertain to a safety film as defined in USA Standard Motion-Picture Safety Film, PH22.31-1958.

2.3 The dimensions apply to material immediately after cutting and perforating.

2.4 Dimension L represents the length of any 100 consecutive perforation pitch intervals.

NOTE 1: The principal use of film stock described in this standard is as an intermediate film in the production of prints. If this film is used in a camera and slit after processing, the width of the strips so slit shall be 0.314 ± 0.002 in. (7.98 ± 0.05mm).



	Dimensions	Inches	Millimeters
A	Film width	0.628 ± 0.001	15.95 ± 0.03
B	Perforation pitch	0.1664 ± 0.0004	4.227 ± 0.010
C	Perforation width	0.0360 ± 0.0004	0.914 ± 0.010
D	Perforation height	0.0450 ± 0.0004	1.143 ± 0.010
E	Edge to perforation	0.020 ± 0.002	0.51 ± 0.05
G	Perforation skewness	0.001 max	0.03 max
L	100 consecutive perforation pitch intervals	16.640 ± 0.017	422.70 ± 0.43
M	Lateral perforation displacement	0.552 ± 0.001	14.02 ± 0.03
R	Radius of perforation fillet	0.005 ± 0.001	0.13 ± 0.03

NOTE 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, B48.1-1933 (Reaffirmed 1947).

NOTE 3: The title of this standard was established by the application of a nomenclature system developed for all film dimension standards: Each title provides an indication of the film width, a code designation for the perforation shape (BH, KS, DH, or CS) or the number of rows of perforations (1R, 2R, etc.), depending upon which is the significant factor, and the perforation pitch without the decimal point.

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when the film end is observed from the base side with the spool above and away from the point of observation.

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Appendix

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A1. The dimensions given in this standard represent the practice of film manufacturers in that the dimensions and tolerances are for film stock immediately after perforation. 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.

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Low-shrinkage 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.)

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This definition of low-shrinkage film stock has been found by experience to be useful as a guide to film manufacturers in slitting their stock. Departure from this definition shall not be cause for rejection of the stock. Note that this definition of shrinkage differs from the criterion applying to the choice of longitudinal pitch, where greater periods of time are involved and where short-time tests can be deceptive.

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