hat dieser Projektor eine Vorrichtung, die automatisch neue Schleifen bildet und somit die richtige Groesse der unteren Schleife gewaehrleistet.

Das Telstar-Projekt! Ein Versuch mit Nachrichtenübertragung [91]

Die Ausrüstung und der Arbeitslauf des Telstar-Satellits des Bell-Systems werden in Bezug auf die Nachrichten-übertragungsfunktion des letzteren beschrieben. Die Stromkreise des Satellits sind zwecks besserer Veranschaulichkeit in drei Teile zusammengefasst: Nachrichtenübertrager, Führungs- und Entsfernungsmestsyteme, sowie auch Kraftanlage. Drei Zwischensysteme der Erdstelle werden beschrieben: Nachrichtenübertragung, Richten der Antenna, sowie auch Führung und Entfernungsmessen. Bahnangaben und Ergebnisse der Versuche mit linearer Übertragung werden angeführt.

Fehlschlüsse in der Farb-Densitometrie

STANLEY A. POWERS und ORAN E. MILLER [97]

Diese Abhandlung erörtert eine Anzahl falscher Vorstellungen über die Konstruktion und Bedienung von Farb-Densitometern, deren Instandhaltung, Überprüfung und die Auswertung der Messergebnisse. Die fundamentalen, optischen Prinzipien eines Farb-Densitometers werden darin beschrieben, sowie die Beziehungen zwischen diesen Farb-Dichtemessungen und anderen Arten zuverlässiger Farb-Dichtemessungen. Die meistvorkommenden Missverständnisse und Fehlschlüsse werden eingehend dargelegt und sind in Bedienungs-, Uberprüfungs- und Instandhaltungsfehler unterteilt.

Ein Vorschlag zur Standardisierung von Fernseh-Abtastraten

M. W. S. BARLOW [104]

Der interkontinentale Austausch von Fernsehprogrammen erzeugt das Problem der Normenumaenderung. Es wird die Umaenderung des 525 Linien Systems in 625 Linien, oder umgekehrt, untersucht. Gemeinsame Normen werden nur fuer das Videosignal vorgeschlagen, waehrend Kanalzwischenraeume und -zuteilung, sowie Klang- zu Bildtraeger Zwischenraum, wie bisher beibehalten wuerden. Es wuerden keine Aenderungen in Empfaengern oder Sendern, und nur minimale Aenderungen in Studiogeraeten, noetig sein. Umaenderung des 625 Linien Systems in 525 Linien wuerde eine groessere Verbesserung der Bildqualitaet als das umgekehrte Verfahren ergeben. Es wird kein Problem mit NTSC, Iowa oder Secam Farbsystemen vorausgesehen. (*Üb. Fred Stockheim*)

standards and recommended practices

Proposed American Standards

Two proposed standards are published here for a trial period and public approval. These two proposals are actually revisions of PH22.34-1956, Dimensions for 35mm Motion-Picture Film, BH-1870, and PH22.102-1956, Dimensions for 35mm Motion-Picture Film, CS-1870. These revisions are not technical in nature, but merely editorial to clarify the standard for the user. Tutorial appendixes have been added to point out the reason for pitch variation in similar film stocks.

Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to April 15. If no adverse criticism is received by that date, the proposals will be submitted to ASA Sectional Committee PH22 for further processing.—*A.E.A.*

Approved American Standard

On January 3, 1963, the American Standards Association approved the proposed revision of American Standard Specifications for 16mm Multifrequency Test Film, Photographic Type, PH22.44. This standard is actually a reaffirmation of the technical material reflecting only the addition of a tolerance of ±1 per cent for the reproduce film travel rate.

A test film in accordance with this standard is available from the Society.

Withdrawal of American Standard

On the same date, the American Standards Association approved withdrawal of American Standard Sound Transmission of Perforated Projection Screens, PH22.82-1951. Notification of the proposed withdrawal action was published in the August 1962 *Journal* in an attempt to canvass the opinion of engineers outside of the SMPTE Engineering Committees. The absence of response was taken as an indication that the standard is, in fact, outdated and unused; consequently, the recommendation of the SMPTE Engineering Committees was accepted and the withdrawal action taken.—*A.E.A.*

Proposed American Standard Dimensions for

35mm Motion-Picture Film, BH-1870

PH22.34

Revision of PH22.34-1956

1. Scope

This standard specifies the cutting and perforating dimensions for 35mm motion-picture film with a BH-type perforation and a perforation length pitch of 0.1870 in.

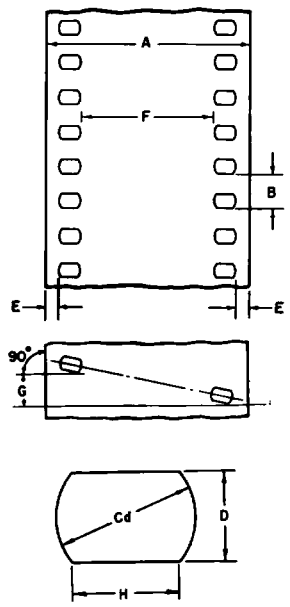
2. Dimensions

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

2.2 These dimensions apply to material immediately after cutting and perforating.

2.3 Dimension H is a calculated value.

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



Dimensions	Inches	Millimeters
A Film width	1.377 ± 0.001	34.975 ± 0.025
B Length pitch	0.1870 ± 0.0005	4.750 ± 0.013
C_d Perforation width (diameter)	0.1100 ± 0.0004	2.794 ± 0.010
D Perforation height	0.0730 ± 0.0004	1.854 ± 0.010
E Edge to perforation	0.079 ± 0.002	2.01 ± 0.05
F Width between perforations	0.999 ± 0.002	25.37 ± 0.05
G Perforation skewness	0.001 max	0.03 max
H Perforation chord width (BH perforation)	0.082 calculated	2.08 calculated
L Length pitch (100 consecutive pitch intervals)	18.700 ± 0.015	474.98 ± 0.38

Notes

1. 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 or 4R), depending upon which is the significant factor, and the perforation pitch without the decimal point.

2. The dimensions in the inch system are the fundamental standard. The dimensions in the metric system are practical approximations based on American Standard Practice for Inch-Millimeter Conversion for Industrial Use, B48.1-1933, reaffirmed in 1947.

Appendix

(This Appendix is not a part of American Standard Dimensions for 35mm Motion-Picture Film, BH-1870, PH22.34, 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 sometimes 0.1870 in. (or 0.3000 in.) and sometimes 0.1866 in. (or 0.2994 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-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 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 a 64-tooth 35mm sprocket or a 40-tooth 16mm sprocket (both of which have a circumference of about 12 in.) with film 0.0055 in. 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 the jump caused by nonuniformity of successive pitches, Dimension B.)

Experience has shown that the average pitch, Dimension L, of the negative 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 stock is 0.1866 in. or 0.2994 in. depending on whether the film width is 35mm or 16mm.

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.)

A3. The uniformity of pitch, margin, and hole size (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 sprocket hole to the next. Actually it is the maximum variation from one sprocket hole to the next within any small group of consecutive perforations that is important.

Proposed American Standard Dimensions for

35mm Motion-Picture Film, CS-1870

PH22.102

Revision of
PH22.102-1956

1. Scope

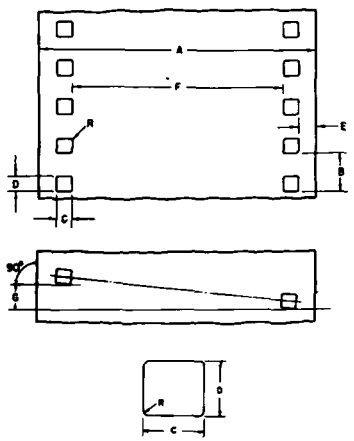
This standard specifies the cutting and perforating dimensions for 35mm motion-picture film with a CS-type perforation and a perforation length pitch of 0.1870 in.

2. Dimensions

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

2.2 These dimensions apply to material immediately after cutting and perforating.

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



Dimensions	Inches	Millimeters
A Film width	1.377 ± 0.001	34.975 ± 0.025
B Length pitch	0.1870 ± 0.0005	4.750 ± 0.013
C Perforation width	0.0780 ± 0.0004	1.981 ± 0.010
D Perforation height	0.0730 ± 0.0004	1.854 ± 0.010
E Edge to perforation	0.086 ± 0.002	2.18 ± 0.05
F Width between perforations	1.049 ± 0.002	26.64 ± 0.05
G Perforation skewness	0.001 max	0.03 max
L Length pitch (100 consecutive pitch intervals)	18.700 ± 0.015	474.98 ± 0.38
R Radius of perforation fillet	0.013 ± 0.001	0.33 ± 0.03

Notes

1. 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 or 4R), depending upon which is the significant factor, and the perforation pitch without the decimal point.

2. The dimensions in the inch system are the fundamental standard. The dimensions in the metric system are practical approximations based on American Standard Practice for Inch-Millimeter Conversion for Industrial Use, B48.1-1933, reaffirmed in 1947.

Appendix

(This Appendix is not a part of American Standard Dimensions for 35mm Motion-Picture Film, CS-1870, PH22.102, 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 sometimes 0.1870 in. (or 0.3000 in.) and sometimes 0.1866 in. (or 0.2994 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-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 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 a 64-tooth 35mm sprocket or a 40-tooth 16mm sprocket (both of which have a circumference of about 12 in.) with film 0.0055 in. 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 the jump caused by nonuniformity of successive pitches, Dimension B.)

Experience has shown that the average pitch, Dimension L, of the negative 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 stock is 0.1866 in. or 0.2994 in., depending on whether the film width is 35mm or 16mm.

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.)

A3. The uniformity of pitch, margin, and hole size (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 sprocket hole to the next. Actually it is the maximum variation from one sprocket hole to the next within any small group of consecutive perforations that is important.

A4. Most 35mm motion-picture films produced prior to 1954 were perforated with two rows of perforations, each perforation being 0.110 x 0.078 in. for positive film or 0.110 x 0.073 in. for negative film or both. Such film, in addition to carrying the picture, accommodates a single sound record between one row of perforations and the picture frame. The desire to reproduce multichannel sound on the same film that carries the picture image, and yet not reduce the image size, led to the use of smaller perforations on positive film. Films perforated to this smaller perforation standard have wider margins (Dimension E) and wider usable film areas between the rows of perforations than positive films perforated to American Standard Dimensions for 35mm Motion-Picture Film, PH22.1 and American Standard Dimensions for 35mm Motion-Picture Positive Raw Stock, PH22.36. This permits the placement of a magnetic coating for the multichannel sound record along both edges just outside the perforations and along both sides of the picture just inside the perforations.

A5. It should be particularly noted that film made to this standard will not fit over pins and sprocket teeth designed to fit film perforated to the following American Standards: Dimensions for 35mm Motion-Picture Film, Alternate Standards for Either Positive or Negative Raw Stock, PH22.1; Dimensions for 35mm Motion-Picture Film, BH-1870, PH22.34; Dimensions for 35mm Motion-Picture Positive Raw Stock, PH22.36; Dimensions for 35mm Motion-Picture Short-Pitch Negative Film, PH22.93.

The perforation hole size shown in the American Standards listed above is 0.073 x 0.110 in. except for PH22.36 which has 0.078 x 0.110 in. holes. This standard, PH22.102, has a hole size of 0.073 x 0.078 in. Films with holes of this size would be damaged at the perforation edges when run on sprockets or pins of equipment designed for the larger holes. American Standard Dimensions for 16 Tooth 35mm Motion-Picture Projector Sprockets, PH22.35-1962, describes projector sprockets suitable for any of the perforations listed regardless of the perforation size.

American Standard Specifications for

16mm Multifrequency Test Film, Photographic Type

ASA
Reg. U.S. Pat. Off.
PH22.44-1963
Revision of PH22.44-1953
*UDC 778.554.427

1. Scope

This standard describes a multifrequency sound test film used for testing and adjusting the sound systems of 16mm sound motion-picture projection equipment. The test frequencies on this film are adequate for normal field and general laboratory use.

2. Test Film

2.1 Frequencies. The test film shall contain the following series of frequencies, each preceded by a spoken announcement recorded at approximately 10 db below full modulation:

Frequency, cycles	*Tone Footage, feet*	*Frequency, cycles*	*Tone Footage, feet*
400	12	2000	6
50	6	3000	6
100	6	4000	6
200	6	5000	6
300	6	6000	6
500	6	7000	6
1000	6	400	12

2.2 Frequency Tolerance. The frequency tolerance of the recorded signals shall be ±2 percent of the nominal frequency of each portion of the test track when the film is reproduced at a film travel rate of 24 perforations per second (approximately 36 ft per minute) with a tolerance of ±1 percent.

2.3 Recording. The test film shall be an originally recorded, splice-free, direct play-back, positive variable-area soundtrack, recorded so that the modulated light is substantially constant when the film is reproduced with a scanning beam of negligible width. Modulation of the recording shall be 95 ± 5 percent at 7000 cycles. The level within any one frequency of each reel shall be constant to within ±0.5 db. The recording shall be accomplished on a recorder so constructed as to keep the flutter content of the film to the absolute minimum consistent with the state of the art. The distortion of the recorded wave, up to a frequency of 3000 cycles, shall not exceed 5 percent.

2.4 Film Stock. The film stock used for the test film shall be cut and perforated in accordance with American Standard Dimensions for 16mm Film, Perforated One Edge, PH22.12-1953.

2.5 Resistance to Shrinkage. The film stock used for the test film shall have a maximum lengthwise shrinkage of 0.50 percent when tested as follows: At least 20 strips of film approximately 31 in. in length shall be cut for measurement of shrinkage. After normal development and drying (not over +80 F (+26.7 C)), the strips shall be placed at least ¼ in. apart in racks and kept for 7 days in an oven maintained at +120 F (+49 C) and a relative humidity of 20 percent. The strips shall then be removed, reconditioned thoroughly to 50 percent relative humidity at +70 F (+21.1 C), and the shrinkage measured by a suitable method. The percent shrinkage shall then be calculated on the basis of deviation from the nominal dimension for the length of 100 consecutive perforation intervals given in American Standard PH-22.12-1953.

Approved January 3, 1963, by the American Standards Association, Incorporated
Sponsor: Society of Motion Picture and Television Engineers

* Universal Decimal Classification

Printed in U.S.A.
ASA1M263/50

2.6 Film Identification. Each test film shall be provided with a suitable leader, title, and trailer, and shall be accompanied by a calibration of the level of the frequency recordings.

2.7 Calibration. The calibration shall be in terms of light modulation at the photocell with a scanning beam of negligible width, and shall be correct to within ±0.25 db up to and including 3000 cycles, and within ±0.5 db above 3000 cycles up to and including 7000 cycles. The correction for each frequency shall be so stated that it will give the true level when the correction is added algebraically to the output level measured using the film.

3. Revision of American Standard Referred to in This Document

When the following American Standard referred to in this document is superseded by a revision approved by the American Standards Association, Incorporated, the revision shall apply:

American Standard Dimensions for 16mm Film, Perforated One Edge, PH22.12-1953

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