Eine Plumbicon Farb-Fernsehkamera

E. F. DE HAAN und A. G. VAN DOORN [922]

Neue Farbfernseh-Aufnahmegeräte fur günstigste Anwendung der Plumbicon-Röhre wurden entworfen. Die Entwicklung vollzieht sich in Richtung auf Röhren höherer Auflösung unter gleichzeitiger Erweiterung des Spektralbereiches und nach grösseren Empfindlichkeiten. Die Kamera enthält eine servogesteuerte Zoom-Optik, ein neuartiges Strahlenteilungsprisma und Transistorkreise. Sowohl die Ausmasse, als auch der Stromverbrauch sind klein gehalten. Die lange lineare Übertragungs-Charakteristik der Plumbicon-Röhre in Zusammenwirkung mit der Vermeidung von Abschattung ermöglichen ausgezeichnete farbtreue Wiedergabe über weite Bereiche von Objekt-Beleuchtungsstärken und -Reflektionsfaktoren. Bilder von Fernsehfunk-Qualität sind erhältlich bei 1600 lux einfallender Beleuchtungs-Stärke und Abblendung auf 1:4 (entsprechend 1:8 bei Bildspeicherröhren), während die Farbwiedergabe bis unterhalb 270 lux bestehen bleibt.

Fortschritte in der Entwicklung von Studio-Fernsehkameras

DONALD A. PAY und THOMAS MAYER [927]

Die Marconi Mark IV 4½-in (ca. 11.43 cm) Zwischenbildorthikonkamera ist in 1959 zur SMPTE eingeführt worden. In der weiteren Entwicklung der 4½-in Zwischenbildorthikonkamera ist miteinbegriffen die Verwendung von Halbleitern, eine einzige Linse (mit veränderlichem Fokus—Zoom) und automatische Zählung der Zeitlänge. Dem Entwurf und der Entwicklung einer neuen Farbenkamera wird manche Rücksicht geschenkt.

Eine transistorisierte Fernsehkamera für Farbfilmaufnahme

D. M. TAYLOR [930]

Fernsehkamera TK27 für Farbfilmaufnahme ist das neueste Modell einer zweiten Serie, bei der normale transistorisierte Teile Verwendung finden. Diese Kamera wurde derart entwickelt, dass eine bessere Stabilität, bessere Zuverlässlichkeit und eine bessere Bildqualität erzielt werden als wie mit zur Zeit verwendeten Röhrengeräten. Aufgrund der Gleichartigkeit der verschiedenen Sendekreise, die heute verwendet werden, ist der Gedanke eines "gemeinsamen Moduls" weitverbreitet, und wurde auch bei diesem Modell TK-27 berücksichtigt. Diese hier vorliegende Abhandlung befasst sich darüber hinaus mit Fragen der Konstruktion wie Kontrolle, automatische Bedienung, leichtere Wartung und mit der Frage einer geschmeidigen und anpassungsfähigen Arbeitsweise im Grossen und Ganzen.

Ed Note: Titles and abstracts of all papers published in the *Journal* are published in French, Spanish and German. This department (Résumés/Resumenes/Zusammenfassungen) was set up in recognition of the growth in the Society's overseas membership, and first appeared as a regular feature of the *Journal* in the January 1961 issue. Comments and suggestions are invited on the quality and possible improvement of the translations. Because of the prohibitive cost of commercial translations, volunteer help is needed, and such assistance will represent an important contribution to the Society. Contributors will, of course, be given full acknowledgment in the *Journal*.

standards and recommended practices

Approved American Standards

Published here for your information are three American Standards approved on August 9, 1965, by the American Standards Association. Two of these standards, PH22.109–1965, Dimensions for 16mm Motion-Picture Film, 1R-2994, and PH22.110–1965, Dimensions for 16mm Motion-Picture Film, 2R-2994, are revisions of existing standards differing from their previous versions only in an editorial manner.

The third standard, PH22.145–1965, Dimensions for 65mm Motion-Picture Film, KS-1866, is a new standard.

Inasmuch as compliance with American Standards is purely voluntary, these standards will become truly effective if very broad publicity is given to their existence. The ASA and the SMPTE would appreciate any personal influence to promote the use of these standards where such action is appropriate and proper. Copies of the standards may be obtained for a nominal fee from the American Standards Association, 10 East 40th Street, New York City, 10016.—*A.E.A.*

*UDC 771.531.1/.3:531.7

1. Scope

standard specifies the cutting and per-
g dimensions for 16mm motion-picture
ith perforations along one edge and a
ation pitch of 0.2994 in.

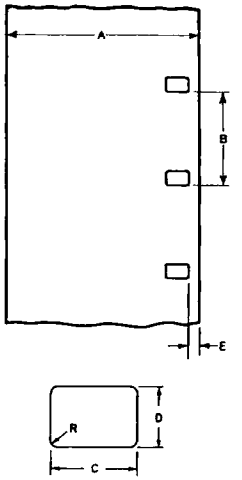
2. Dimensions

ne dimensions shall be as given in the
and table.

nese dimensions pertain to a safety film
ned in Appendix A5.

nese dimensions apply to material immedi-
after cutting and perforating.

imension L represents the length of any
nsecutive perforation pitch intervals.



Dimensions	Inches	Millimeters
Film width	0.628 ± 0.001	15.95 ± 0.03
Perforation pitch	0.2994 ± 0.0005	7.605 ± 0.013
Perforation width	0.0720 ± 0.0004	1.829 ± 0.010
Perforation height	0.0500 ± 0.0004	1.270 ± 0.010
Edge to perforation	0.0355 ± 0.0020	0.902 ± 0.051
100 consecutive perforation pitch intervals	29.94 ± 0.03	760.5 ± 0.8
Radius of perforation fillet	0.010 ± 0.001	0.25 ± 0.03

1: The title of this standard was established
pplication of a nomenclature system developed
ilm dimension standards: Each title provides an
n of the film width, a code designation for the
ion shape (BH, KS, DH, or CS) or the number
of perforations (1R, 2R or 4R), depending upon which is the significant factor, and the perforation pitch without the decimal point.

NOTE 2: The metric values in the table of dimensions are converted from the inch values in accordance with conversion principles outlined in American Standard Practice for Inch-Millimeter Conversion for Industrial Use, B48.1-1933 (Reaffirmed 1947).

*Universal Decimal Classification

he American Standards Association, Incorporated
New York, N. Y. 10036

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facilitate its use.)

A.1 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 which seem much alike in wording. The difference lies in the longitudinal pitch which is either 0.2994 in. or 0.3000 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 40-tooth 16mm 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 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 0.3 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
the earlier ones and hence a shorter
comes desirable. To satisfy this requirer
or sound-negatives, it is common man
tice to aim for a pitch value 0.2 perc
the positive stock onto which they will
additional shrinkage that occurs during
the aging that takes place before the r
made then bring the pitch differenti
optimum and desired value of 0.3 perce
the pitch chosen for the negative stock

Low-shrink negative film perforated
sions should not thereafter shrink appre
0.2 percent under normal use conditi
reasonable life span, so that the optim
ential from the positive stock of 0.3 ±
maintained. (The film should be meas
libration with air at 70 F and 55 percen
ity or at the conditions prevailing at t
forating.)

A3. The uniformity of pitch, hole si
(Dimensions B, C, D, and E) is an im
affecting steadiness. Variations in th
from roll to roll, are of little significan
variations from one sprocket hole to th
it is the maximum variation from one
the next within any small group of cons
tions that is important.

A4. The optimum width for 16mm fi
goes through channels of fixed size)
the shrinkage characteristics of the film
in times past there have been standar
of 16mm stock of the "usual" shrinkag
of "low shrinkage" characteristics. The
obtain films of approximately the same
of the type of film base during their
standard is based on the values adapte
film base since nearly all films now
the U.S. meet the definition noted belo

For the purpose of choice of width, lo
base is film base which when coated wi
any other normal coating treatment,
in the manufacturer's normal commerc
six months at 65 to 75 F, exposed, proc
exposed to air for a period not to exc
65 to 75 F and 50 to 60 percent relativ
measured under like conditions of t
humidity, shall have shrunk not more t
from its original dimension at the time

cturers in slitting their stock. Departure from finition shall not be cause for rejection of the Note that this definition of shrinkage differs from erion applying to the choice of longitudinal pitch, greater periods of time are involved and where ne tests can be deceptive.

vance has been made in arriving at these values made for this factor in equipment design and in no case should 16mm equipment fail to accommodate a film of 0.630-in. width.

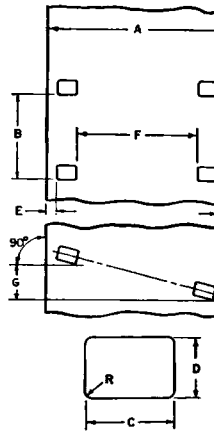
A5. This film is to be made on safety base complying with American Standard Specifications for Safety Photographic Film, PH1.25-1956 (Reaffirmed 1962).

16mm Motion Picture Film, 2R 2994

PH
*UDC 7

1. Scope

This standard specifies the cutting and perforating dimensions for 16mm motion-picture film with perforations along both edges and a perforation pitch of 0.2994 in.



2. Dimensions

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

2.2 These dimensions pertain to a safety film as defined in Appendix A5.

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

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

	Dimensions	Inches	Mi
A	Film width	0.628 ± 0.001	15.95
B	Perforation pitch	0.2994 ± 0.0005	7.60
C	Perforation width	0.0720 ± 0.0004	1.82
D	Perforation height	0.0500 ± 0.0004	1.27
E	Edge to perforation	0.0355 ± 0.0020	0.90
F	Width between perforations	0.413 ± 0.001	10.49
G	Perforation skewness	0.001 max	0.03
L	100 consecutive perforation pitch intervals	29.94 ± 0.03	760.5
R	Radius of perforation fillet	0.010 ± 0.001	0.25

NOTE 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 without the decimal point.

NOTE 2: The metric values in the tal are converted from the inch values in conversion principles outlined in Am Practice for Inch-Millimeter Conversi Use, B48.1-1933 (Reaffirmed 1947).

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its use.)

dimensions given in this standard represent the of film manufacturers in that the dimensions erances are for film stock immediately after per- . The punches and dies themselves are made to es considerably smaller than those given, but n is a plastic material the dimensions of the slit forated film stock never agree exactly with the ons of the slitters, punches and dies. Film can r swell due to loss or gain in moisture content shrink due to loss of solvent. These changes in- result in changes in the dimensions during the e film. The change is generally uniform through- ll.

will be noted that among the various standards ng and perforating film stock there are often ndards which seem much alike in wording. The ce lies in the longitudinal pitch which is either in. or 0.3000 in. In general, the longer pitch is stock and the shorter pitch is for negative stock.

hoice of pitch for negative motion-picture films , within certain limits, on the type of printer sed. Where step-printers are used, and the film nary when exposed, the choice of pitch is not imited. Where the film moves continuously over lrical surface at time of printing (sprocket-type there are three major considerations involved sing the pitch. These considerations are: (1) the diameter, (2) the film thickness, (3) the film ge and the rate at which shrinkage occurs.

mum steadiness and definition are secured on a -type printer when the negative stock is some- orter in pitch than the positive stock in the ap- te proportion of the thickness of the film to the of curvature. For printing on a 40-tooth. 16mm (circumference of about 12 in.) with film 0.0055 55 in. thick, the optimum pitch differential is 0.3 . The use of the ideal pitch differential for the e would minimize slippage between the positive nd negative during the printing operation, thus g the amount of blurring and jumping of hori- ines in the picture or sound image. (This error differentiated from the jump caused by nonuni- of successive pitches, Dimension B.)

rience has shown that the average pitch of the e can vary ± 0.1 percent from the ideal pitch, s 0.3 percent shorter than the positive stock, blurring of picture and sound image being letected.

nany years this desired difference in pitch was 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 0.2994 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.)

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 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. The optimum width for 16mm film (which often goes through channels of fixed size) is controlled by the shrinkage characteristics of the films involved. Thus in times past 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-shrink" 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, and measured under like conditions of temperature and humidity, shall have shrunk not more than 0.2 percent from its original dimension at the time of perforating.

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

case should 16mm equipment fail to film of 0.630-in. width.

A5. This film is to be made on safety with American Standard Specifications f graphic Film, PH1.25-1956 (Reaffirmed

5mm Motion-Picture Film, KS-1866

*UDC 771.531.1/.3:531.7

1. Scope

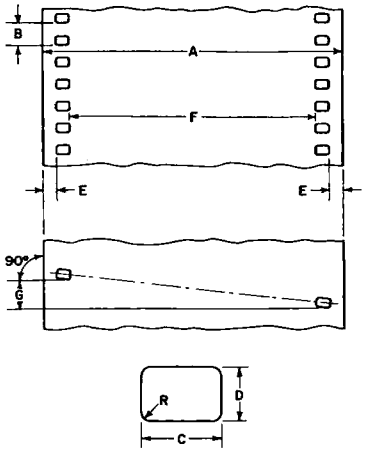
standard specifies the cutting and per-g dimensions for 65mm motion-picture th a KS-type perforation, and a perfora-tch of 0.1866 in.

2. Dimensions

he dimensions shall be as given in the and table.

hese dimensions apply to material immedi-after cutting and perforating.

imension L represents the length of any onsecutive perforation pitch intervals.



Dimensions	Inches	Millimeters
Film width	2.558 ± 0.002	64.97 ± 0.05
Perforation pitch	0.1866 ± 0.0005	4.740 ± 0.013
Perforation width	0.1100 ± 0.0004	2.794 ± 0.010
Perforation height	0.0780 ± 0.0004	1.981 ± 0.010
Edge to perforation	0.117 ± 0.003	2.97 ± 0.08
Width between perforations	2.104 ± 0.003	53.44 ± 0.08
Perforation skewness	0.002 max	0.05 max
100 consecutive perforation pitch intervals	18.660 ± 0.015	474.00 ± 0.38
Radius of perforation fillet	0.020 ± 0.001	0.51 ± 0.03

E 1: The title of this standard was established by lication of a nomenclature system developed for dimension standards: Each title provides an in-of the film width, a code designation for the tion shape (BH, KS, DH, or CS) or the number of perforations (1R, 2R or 4R), depending upon which is the significant factor, and the perforation pitch without the decimal point.

NOTE 2: The metric values in the table of dimensions are converted from the inch values in accordance with conversion principles outlined in American Standard Practice for Inch-Millimeter Conversion for Industrial Use, B48.1-1933 (Reaffirmed 1947).

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t, New York, N. Y. 10016

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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 0.1870 in. or 0.1866 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, 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 64-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 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 0.3 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 man
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ing steadiness. Variations in these dime
to roll, are of little significance compar
from one sprocket hole to the next. A
maximum variation from one sprocket
within any small group of consecutive
is important.

A4. Film of this size is generally used as
tive. There are two advantages in using
One is the possibility of producing larg
tact printing for exhibition in special th
to provide the audience with a large vie
other purpose is to serve as an origi
35mm prints can be produced by red
grain and better definition than can
making contact prints from 35mm negat

Prints may be made on 70mm film.
film is described in American Standard
70mm Motion-Picture Film, Perforated
PH22.119-1961. Note that the 70mm
65mm negative differs in its dimension
earlier films described by American S
sions for 70mm Unperforated and Perf
Cameras Other Than Motion-Picture C
1963, Type I and Type II. The perforatio
70mm film have the same size and pit
scribed by PH1.20-1963, Type II, but
distance between perforations are d
quently Dimension F is the same in both
and KS-1866 films and also for 70mm
65mm, KS-1870. The increased space
larger margin E is used to make roo
sound records.

Note that the image usually placed o
pitches high. The manufacture of the f
this idea and best results accrue from u