

Because only low impedances are involved, the potentiometer or fader can be located any reasonable distance from the card — up to several hundred feet in fact — without degrading the signal. We use the monitor driver card in this fashion to provide signals to all monitor and cue amplifiers for Control Room, Announce Booth and Studio. It is also used as the No. 1 card of the line amplifier group to provide remote line amplifier gain control at the console panel. Without the external gain control, the inputs of IC-1 and IC-2 can be paralleled. We then have an audio distribution amplifier with high-impedance input and two well-isolated low-impedance outputs. We use the card in this manner to provide isolated feeds from this console to two other Control Rooms.

Figure 10 is a view of the console and associated rack. The rack houses all of the card equipment, jack panels and auxiliary equipment. The auxiliary equipment consists of a Fairchild reverbetron, an Altec compressor and a Pultec equalizer. This equalizer is used for special effects and to equalize incoming remote lines when required. There are 16 microphone inputs divided into four groups of four each. Each group of four has a sub-master fader. A microphone master fader is also provided. There are two announce booth inputs and 11 so-called high-level inputs. All of the high-level inputs are attenuated to a level of -20 dBm before

appearing on the jack panel. This corresponds to the output level of the microphone preamplifiers. This -20 -dBm level is maintained consistently through the system up to the line amplifier input.

Many points of access are provided on the jack panel making the system very versatile in patching special setups. Reverberation can be applied to any single microphone, to any group of four, or to all 16. It can also be applied to any other single input. A Fairchild microphone filter can be patched into any single microphone circuit, into any group of four, or into the final mixed output of all 16 microphones. Panel cutouts have been provided for three additional microphone filters should their use ever become necessary. There is a total of 26 video monitors in this control room. In addition, the three auxiliary units in the rack have power transformers.

With all of the video monitors operating and with the three auxiliary units turned on, the system shows a 63-dB SNR with a -60 -dBm input level to a microphone preamplifier. If all . . . repeat ALL . . . video monitors and the three auxiliary units in the rack are turned off, the SNR improves by just 0.25 dB, which demonstrates the excellent immunity of the system to hum and noise pickup from external fields. In the period of just over six months since the complete system was put into service we

have had one card failure due to a shorted Zener diode. Otherwise both performance and reliability have been perfect. This, as with our other construction projects, has been an excellent Engineering Department morale booster. The importance of this is second only to having end products which in every way meet our requirements as well as meeting the highest standards of the industry.

Acknowledgment: This project could never have been completed without a patient and understanding Management who never lost faith that we would accomplish our objectives and that the results would be worth the cost and effort. It still could not have been completed without the help, advice and assistance of our Chief Engineer, Hugo Bondy. Hugo simply refused to accept our conclusions reached many times that it just couldn't be done. His answer was always the same: try again. The various card building blocks of the system were my design. Walter Mickle, Senior Technician, put the building blocks together into a system. He also designed the layout for the console panel and did most of the panel wiring. Jim Brannon, Senior Technician, did most of the rack and interconnecting wiring. All members of the Engineering staff participated at various times in building up the card equipment.

standards and recommended practices

Approved American National Standards

On 10 August 1973, the American National Standards Institute approved three new standards: PH22.10-1973, Specifications for Projector Usage of 16mm Motion-Picture Film; PH22.94-1973, Dimensions of Image Areas and Mounts for Slides and Opaques for Television; and PH22.184-1973, Motion-Picture Raw Stock Identification and Labeling.

PH22.10 is an editorial revision and consolidation of two standards, PH22.10-1964 and PH22.16-1965, and does not reflect a technical change of either standard. PH22.94 is also an editorial revision, but does contain minor dimensional changes to reflect current practices. PH22.184 is a new standard.

Reaffirmed American National Standards

On 10 August 1973, the American National Standards Institute, taking the recommendations of the SMPTE Engineering Committees and American National Standards Committee PH22, reaffirmed without change the following American National Standards: PH22.162-1973 (R-1968), Dimensions of Magnetic Striping of 16mm Motion-Picture Film Perforated Super 8, 2R-1667 (1-4) and PH22.163-1973 (R-1968), Dimensions of Magnetic Striping of 35mm Motion-Picture Film Perforated Super 8, 5R-1667. Please note that the year of reaffirmation now follows the ANSI alphanumeric designation rather than the year date of approval. The

earlier year date of approval is preceded by the letter R in parentheses and follows the reaffirmation date.

Inasmuch as compliance with American National Standards is purely voluntary, these standards will become truly effective when broad publicity is given to their existence. ANSI and SMPTE would appreciate any personal influence to promote the use of these standards where such action is appropriate. Copies of the standards may be obtained for a nominal fee from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

Proposed SMPTE Recommended Practices

Two Proposed SMPTE Recommended Practices are published here for a trial period and public review: RP 50, Dimensions for 8mm Type S Motion-Picture Projector Reel Spindles, and RP 51, Screen Luminance and Viewing Conditions for 8mm Review Rooms.

Comments on the proposals should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to 1 January 1973. If no adverse criticism is received by that date, the Proposed SMPTE Recommended Practices will be submitted to the Board of Governors for final approval.—Alex E. Alden, *Staff Engineer*

American National Standard specifications for projector usage of 16 mm motion-picture film

Approved August 10, 1973

Secretariat: Society of Motion Picture and Television Engineers, Inc.

Page 1 of 2 pages

1. Scope

This standard specifies the position of the emulsion and the rate of projection for 16 mm motion-picture film perforated one or two edges, and the projector thread-up distance between sound and picture for 16 mm motion-picture film with sound.

2. Emulsion Position

For original reversal film, the emulsion side shall be toward the projection lens. For prints, the emulsion position is dependent upon the process of preparation; however, the preferred position for most uses, including telecine, is also emulsion side toward the projection lens. (See Note below.)

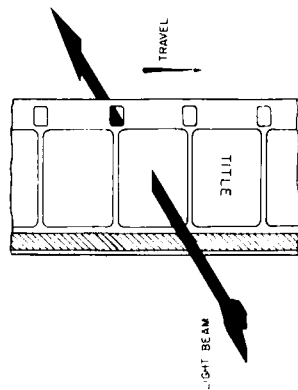
3. Projection Rate

3.1 The rate of projection for film perforated two edges not used for sound shall normally be 18 or 24 frames per second, depending upon its intended use. Amateur films are usually photographed at 18 frames per second and should be projected at that rate. Professional films may be photographed at any rate from time lapse to high speed but are generally intended for projection at 24 frames per second, except when special study is desired.

3.2 The rate of projection for film containing a sound record shall be 24 frames per second for both photographic and magnetic sound, except for films photographed at 18 frames per second having post-process recorded magnetic sound which should be projected at 18 frames per second.

4. Relationship Between Sound and Picture

The projection thread-up path for motion-picture films containing a sound record, regardless of projection rate, shall place the sound-scanning point ahead (in the direction of film travel) of the center of the picture being projected. Counting the frame in the projector picture aperture as zero (0), the sound-scanning point shall be opposite the center of the 26th frame for photographic sound or the 28th frame for magnetic sound to accommodate film with sound, as specified in American National Standard Dimensions of Photographic Sound Record on 16 mm Motion-Picture Prints, PH22.41-1969, and Draft American National Standard Dimensions for Magnetic Sound Record on 16 mm Motion-Picture Prints (Revision of PH22.112-1958). If there is a significant dis-



Film as Seen from the Light Source in the Projector

for each nominal 50 feet of distance from loud-speaker to average audience.

NOTE: When a relatively small number of prints is required, contact prints are often made from 16 mm original materials, resulting in the emulsion position toward the light source (contrary to Section 2). The majority of 16 mm release prints are printed by contact from a 16 mm intermediate or by reduction from a 35 mm intermediate in order to protect the originals. The resulting prints generally have the emulsion side toward the projection lens. This permits intercutting of prints and originals without requiring a change of focus during projection.

tance between the average observer and the loudspeaker when the sound record is reproduced, the distance from the center of the projected aperture to the sound-scanning point may need to be shortened in the projector thread-up to bring the picture and sound into synchronization for the average observer (because of the slower rate of travel of sound compared to that of light). If the average loudspeaker-to-audience distance is greater than 50 feet, the projector thread-up distance between projected picture and sound scan should be shortened by one frame

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American National Standard dimensions of image areas and mounts for slides and opaques for television

Approved August 10, 1973
Secretariat: Society of Motion Picture and Television Engineers, Inc.

Page 1 of 2 pages

1. Scope

- 1.1** This standard specifies the size and location of that portion of the image area to be reproduced by a television telecine chain in slides and opaques designated for television use.
- 1.2** It specifies the slides and opaques designated for television use as those having nominal dimensions of 2 x 2, 3/4 x 4 and 4 x 5 inches. It also specifies the dimensions of the mounts.
- 1.3** It also specifies the size and location of the minimum overall image areas considered necessary to ensure appropriate coverage for the scanned transmitted areas.

2. Dimensions

- 2.1** The dimensions shall be as specified in the table.
- 2.2** The center of the overall image area shall be located within the limits specified of the true center of the slide mount.

	2 X 2 SLIDE		3/4 X 4 SLIDE & OPAQUE		4 X 5 OPAQUE	
	Inches	Millimeters	Inches	Millimeters	Inches	Millimeters
Mount height	1.985 + 0.015 - 0.015	50.4 + 0.4 - 0.4	3.25 + 0.02 - 0.03	82.6 + 0.5 - 0.8	4.00 ± 0.03	101.6 ± 0.8
Mount width	1.985 - 0.015	50.4 - 0.4	4.00 - 0.03	101.6 - 0.8	5.00 ± 0.03	127.0 ± 0.8
Mount maximum thickness	0.120	3.05	0.156	3.96	0.03	0.8
Minimum overall image height	0.952	24.18	2.25	57.2	3.19	81.0
Minimum overall image width	1.417	35.99	3.00	76.2	4.25	108.0
Transmitted image height	0.843 - 0.005	21.41 - 0.13	2.06 + 0.00 - 0.03	52.3 + 0.0 - 0.8	3.00 + 0.00 - 0.04	76.2 + 0.0 - 1.0
Transmitted image width	1.124 - 0.005	28.55 - 0.13	2.75 + 0.00 - 0.03	69.8 + 0.0 - 0.8	4.00 + 0.00 - 0.04	101.6 + 0.0 - 1.0
Centering radius	0.02	0.5	0.05	1.3	0.06	1.5

3. Thumb Mark

To indicate proper orientation, a thumb mark shall be placed in the lower left-hand corner of the mount when the slide is viewed directly as it is to appear on the screen.

NOTE 1: Dimensions for 2 x 2 inch slide mounts and slides specified in this standard are not intended for precision uses such as those specified in SMPTE Recommended Practice RP 9-1966, Dimensions of Double-Frame 35 mm 2 x 2 Slides for Precise Applications in Television, and American National Standard Dimensions and Optical

Specifications of Test Slides and Transparencies for Television, PH22.144-1969 (R-1965).

NOTE 2: Dimensions of slides for nontelevision usage are specified in American National Standard Dimensions for Projector Slides, PH3.43-1969.

NOTE 3: The dimensions shown for the transmitted picture are those which will be scanned by a perfectly aligned camera chain. To allow for some misalignment of the camera chain and an additional misalignment in the home receiver, it is recommended that all essential information be contained in a centrally located area, as specified in SMPTE Recommended Practice RP 27.3-1972, Specifications for Safe Action and Safe Title Areas Test Pattern for Television Systems.

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American National Standard motion-picture raw stock identification and labeling

Approved August 10, 1973

Secretariat: Society of Motion Picture and Television Engineers, Inc.

Page 1 of 5 pages

1. Scope

This standard specifies the information to be included by the manufacturer covering the physical specifications and certain packaging characteristics of motion-picture raw stock. The suggested location of this information on the manufacturer's label is also specified.

2. Film Identification

2.1 The physical specifications of the raw stock shall be contained in one sequential listing, preferably in one line but allowing a continuance on a second line if there are space restrictions.

2.2 The method of identifying the cutting and perforating physical specifications and the sequence in which the information should appear when included shall be as follows:

2.2.1 The film width shall be specified in its nominal millimeter equivalent. For example, the common, currently available film widths are 8, 16, 32, 35, 65, and 70, and designated as shown.

2.2.2 If the end-use width is narrower than the parent width, or if the film is an intermediate or negative film whose subsequent print has an end-use width narrower than the parent width, the end-use width shall follow the parent width after a solidus; for example, 35/16, 35/8, and 16/8. Use of the millimeter abbreviation, mm, following the width designation is not preferred but is optional.

2.2.3 The number of rows of perforations in the parent width film shall be listed in the Arabic numeral followed by the letter R; for example, 1R, 2R, 3R.

2.2.4 The perforation shape shall be indicated by a code letter or combination of letters. The letter designation for the perforation shape shall be as specified in the Note or the appropriate film dimensions standard.

2.2.5 The perforation pitch shall be as specified in its appropriate millimeter equivalent without the decimal point; for example, 3810, 4234, 4750, and 7620. It is recognized that it has been the practice to specify the perforation in its inch equivalent without the decimal point. Therefore, a manufacturer may include the inch equivalent of the perforation pitch in parentheses without the decimal point; for example, 3810 (1500), 4234 (1667), 4750 (1870), and 7620 (3000).

2.2.6 The arrangement of rows of perforations shall be specified by numerals separated by a dash to indicate 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 total number of rows for the perforation type and end-use considered is determined by including all rows of all combinations.

The perforation rows shall be numbered starting at the reference edge. The reference edge is that edge of the strip nearest to the row of perforations which is retained on one of the slit prints (i.e., not discarded in any subsequent slitting). The row(s) of perforations which is discarded will always be given the number 0. Negative or intermediate films which are not slit may contain the 0-numbered row of perforations if that perforation row corresponds

to the discard row of perforations on the subsequent print stock.

For all films with nonsymmetrical perforation rows, there could be two different windings for the same numbered rows of perforations. Film perforated 16/8 1-3 would be 1-3 regardless of winding, but the winding could be A or B, depending upon the location of the reference edge.

2.2.7 A designation of emulsion orientation shall be specified. If the emulsion side of the film is in, it shall face toward the center of the wound roll, and the designation EI shall be used. If the emulsion side of the film is out, it shall face away from the center of the wound roll, and the winding designation EO shall be used.

2.2.8 The designation of winding orientation is indicated only when a nonsymmetrical format is involved, and shall be specified as A or B in compliance with American National Standard Designation of A and B Windings for Motion-Picture Raw Stock, PH22.75-1969.

2.2.9 The designation M shall be included if the film has been striped with a magnetic coating for sound recording. Magnetic striping is usually placed on the base of the product; however, variations are possible when it is believed important to the end-use. To identify the location of the stripe, the symbol MB may be used when the magnetic material is on the base side and the symbol ME when it appears on the emulsion side.

3. Spooling Specifications

3.1 The roll length (which in some cases may be the usable length) shall be specified on the label and designated in feet and meters. In lieu of or in addition to the separate designation, the roll length may be included as part of the sequential listing of physical specifications following the item designated in Section 2.2.9 with the length specified first in meters and parenthetically in

feet; e.g., 304.8 (1000). When the designation of length applies to the slit width (not a usual practice), the designation SL shall follow the length specification.

3.2 Currently, there is no national standard nomenclature for the device (core, spool, reel or cartridge) containing the film. If such standard nomenclature is derived, it should be indicated in the sequential listing or separately.

4. Suggested Characteristics and Specifications of the Label

4.1 The label may be any color and of any suitable material. The shape should be a simple geometric form and of a size consistent with legibility.

4.2 The line(s) of physical specifications (Sections 2 and 3 above) should be distinct and placed prominently in the upper half of the label. The line(s) may also be used on other parts of the individual or bulk film containers.

4.3 The manufacturer's notices (e.g., warranty, disclaimer, open in darkness, safety film, etc.) should be grouped together in one area of the label, preferably the lower portion.

4.4 The description of the film product should include the primary intended use of the film together with the manufacturer's product code identification and trade name. Examples of common uses of motion-picture films are: negative, positive or print, intermediate, internegative, reversal, and leader.

NOTE: The nomenclature system adopted several years ago for the titles of American National Standards contains a reference to the perforation types used for 35 mm films. However, symbols for 16 mm, 8 mm, and super-8 perforation shapes were not included. The list below specifies the symbols used for identifying perforation shapes. The symbols differ from those previously used and represent recent international agreement. It is anticipated that revisions of American National Standards on film dimensions will incorporate the new symbols in their titles and that these documents will specify the symbols for any new perforation shapes.

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Perforation Shape Symbols

- KS — 35 mm, 65 mm, 70 mm positive type (known internationally as P)
- BH — 35 mm negative (known internationally as N)
- DH — 35 mm Dubray-Howell
- SE — 16 mm and 8 mm (8 mm Type R)?
- S — Super 8 (8 mm Type S)

- SC — Soviet CinemaScope
- AC — American CinemaScope (now preferred and documented as CS)

At this time, these symbols represent the American National Standard proposal, international acceptance, modification, or counter proposal if pending.

This perforation designation was recommended for adoption to the International Organization for Standardization but, to date, has not been adopted. Certain features, described herein including the SE designation, are being included in the international revision. Currently draft ISO documents propose no symbol identifier for 16 and 8 mm-type perforations.

Appendix

The Appendix is not a part of this American National Standard, but is included for information purposes only.

Listed below is the recommended method of applying the specifications for film identification and spooling (contained in Sections 2 and 3 above) to most of the existing motion-picture film sizes and formats. The emulsion orientation, winding, magnetic coating and length are hypothetical and included to supplement the perforation format and gauge specifications shown to illustrate possible applications of this standard.



8 1R SE3810(1500) EIB 30.5(100)



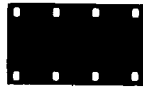
8 1R S4234(1667) EOB 15.2(50)



16 1R SE7605(2994) EIB M 122(400)



16 1R SE3810(1500) EIB 61(200)



16 2R SE7620(3000) EI 30.5(100)



16/8 2R SE3810(1500) 1-4 EI M 15.2(50)



16/8 2R S4234(1667) 1-4 EI M 305(1000)



16/8 2R SE3810(1500) 1-3 EIB-305(1000)



16/8 2R S4227(1664) 1-3 EOA M 610(2000)



32/16 2R SE7620(3000) 1-4 EI 610(2000)



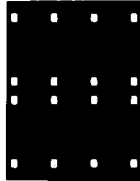
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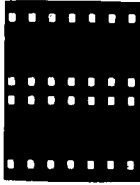
35/16 2R SE7620(3000) 1-4 EO 610(2000)



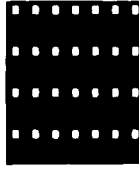
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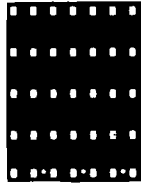
35/16 4R SE7620(3000) 1-2-3-4 EI 610(2000)



35/8 4R SE3810(1500) 1-4-5-8 EO 610(2000)



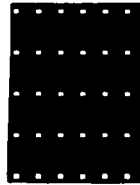
32/8 4R SE3810(1500) 1-3-5-7 EIB 610(2000)



35/8 5R SE3810(1500) 1-3-5-7-D EIA 610(2000)



35/8 2R SE3802(1497) 1-0 EOB 610(2000)



35/8 5R S4234(1667) 1-3-5-7-D EIA M 610(2000)



35/8 2R S4227(1664) 1-0 EIB 610(2000)

PROPOSED

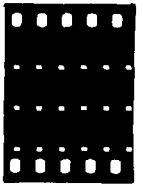
SMPTE RECOMMENDED PRACTICE

RP 51

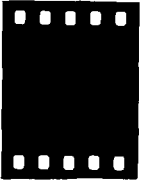
*Screen Luminance and Viewing Conditions
for 8 mm Review Rooms*



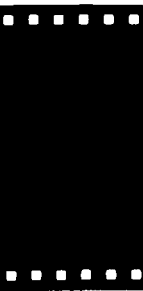
35/16 3R SE7620(3000) 1-3-0 EIA 610(2000)



35/8 3R SA234(1667) 1-3-5 2R BH4740(1866)
EIA 610(2000)



35 2R KS4750(1870) EI 610(2000)



55 2R AC4750(1870) EI 610(2000) (Type I)



35 2R DH4750(1870) EI 610(2000)



55 2R AC4750(1870) EI 610(2000) (Type II)



35 2R BH4740(1866) EI 305(100)



65 2R KS4740(1866) EI 305(1000)



35 2R AC4750(1870) EO 610(2000)



70 2R KS4750(1870) EO 610(2000)

1. *Scope*

This recommended practice specifies the luminance (brightness) level and quality of the projection screen and the viewing conditions for 8 mm review rooms.

2. *Specifications for Normal Prints*

The luminance and conditions specified in American National Standard Screen Luminance and Viewing Conditions for 16 mm Review Rooms, PH22-100-1967, shall apply to the review room for 8 mm prints intended to be viewed in a conventional theatrical manner, i.e., front projection in a darkened room. This is essentially 16 ± 2 foot lamberts (35 ± 7 candels per square meter).

3. *Specifications for Special-Purpose Prints*

3.1 Because of the multitudinous applications of 8 mm prints, they are occasionally intended to be viewed under conditions quite different from the theoretical projection defined in American National Standard PH22-100-1967. The most common departures include the following:

3.1.1 High stray light levels, reducing apparent tone scale, contrast and color saturation

3.1.2 High image brightness, swamping highlight detail

3.1.3 Low image brightness, making shadow detail

3.1.4 Rear projection, introducing differences in definition and image detail from those provided by most front projection screens

3.1.5 Different subjective viewing environment

3.2 Experience has shown that modifications to the viewing conditions such as those above usually introduce more stringent limitations upon print density, color balance, etc., such that some prints that would be accepted under the conditions specified in American National Standard PH22-100-1967 become less satisfactory for these modified viewing conditions.

3.3 Prints intended for special applications should be judged in a review room which simulates that special purpose as closely as possible.

SMPTE RECOMMENDED PRACTICE

Dimensions for 8 mm Typc S (Super 8) Motion-Picture Projector Reel Spindles

RP 50

Page 2 of 2 pages

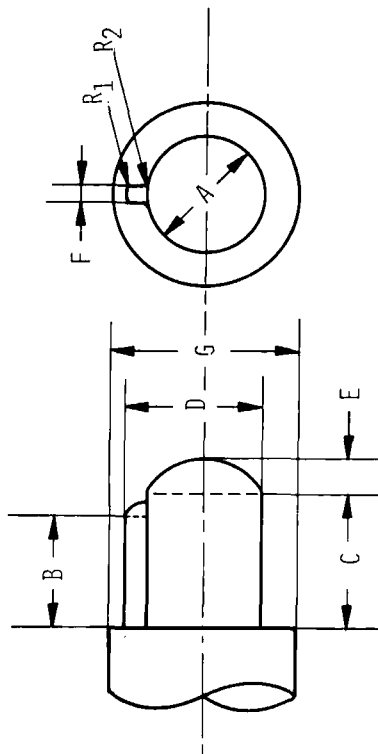
2. Purpose

American National Standard Dimensions for Projection Reels for Super 8 Motion-Picture Film, PH22.160.1969, describes the reels most likely to be used on 8 mm Type S spindles and are the primary items of interchange which must fit onto various projectors. The intent of this recommended practice is to ensure that the primary reel specifications have been adequately considered and will be applied during projector design.

Fig. 1 of 2 pages

1. Scope

This recommended practice specifies the dimensions for 8 mm Type S motion-picture projector reel spindles.



Dimensions	Millimeters*	Inches
A	12.70 + 0.004 - 0.25	0.500 + 0.000 - 0.010
B	1.0 min	0.16 min
C	11.0 ref	0.55 ref
D	11.2 + 0.0 - 0.0	0.56 + 0.006 - 0.000
E	optional	optional
F	1.0 max	0.055 max
G	16.00 min	0.630 min
R ₁	21.50 max	0.965 max
R ₂	0.7 max	0.03 max
R ₂	0.20 max	0.008 max

*Millimeter dimensions are primary

or other design considerations. Hence, Dimension E is optional.

- The shape and amount, if any, of the extension of the drive lug beyond Dimension B is optional with the manufacturer, provided that it does not exceed Dimensions C and D.
- A minimum spindle shoulder diameter is provided by Dimension C. Good design practice would place any ree-locking device of the spindle outward of the width of the projection reel at the spindle hole, possibly forcing the reel against the shoulder. The maximum for Dimension C is intentionally less than the minimum diameter of the corresponding surface of the reel to allow for runout tolerances of both the spindle and reel and for a loose fit of the reel on the spindle.
- A radius is permitted on the drive lug equivalent to half its width in order to allow manufacturers to use a variety of construction methods or materials. The Dimension D specified is for a drive lug with no radius (i.e., flat). Any radius (R₁) utilized by the manufacturer may be added to Dimension D so the maximum overall span of the spindle plus lug becomes D + R₁.
- The use of three driving lugs spaced approximately 120° around the spindle is not restricted by this document. However, the width and height tolerances of the lug have not been adequately accounted for if such a design is incorporated. If the manufacturer chooses to utilize this approach, he is referred to American National Standard PH22.160.1969 to ensure adequate fit.

3. Dimensions

The dimensions shall be as given in the figure and table. The dimensional values stated first (metric) are primary and those stated second (inches) are conversions in accordance with ISO practice.

Notes:

- Use of spindles in 8 mm projection equipment is not necessarily restricted to reels having a vertical plane of rotation. Because horizontally-oriented reels are possible, it is not necessary that the spindle protrude completely through the projection reel. Therefore, a reference dimension is supplied primarily for use with vertical reels. When horizontal reels are considered, the minimum spindle length shall be governed by the minimum lug protrusion, Dimension B.
- If the manufacturer desires to round, taper or point the end of the spindle, this may be done at his discretion with any value needed for aesthetic