

Mr. Krolak: I really don't know; it may have been acetate or it may have been Mylar.

Mr. Lohse: How would you handle your black printer if you carried the black printer information in the three separation colors, how close is your overprint—in registration terms again? In your separation films, you will have

more map colors, of course, than you have tones available, so would you overprint two colors to produce a third one?

Mr. Krolak: No, we did not use additive color mixture. When I speak of overprinting, I refer to electrostatic printing on a surface on which a developed image already exists. The printer of

which I speak contained a separate color toner for each color to be printed.

Mr. Lohse: Then you are not using standard Army maps?

Mr. Krolak: We are printing from reduced cartographic separations of standard Army maps.

standards and recommended practices

Revision of American Standards

On August 29, 1960, the American Standards Association, Incorporated approved the following American Standards:

- PH22.27-1960, Method of Determining Transmission Density of Motion-Picture Films (revision of PH22.27-1947)
- PH22.50-1960, Reel Spindles for 16mm Motion-Picture Projectors (revision of PH22.50-1946)
- PH22.62-1960, 9 kc Sound Focusing Test Film for 35mm Motion-Picture Sound Reproducers (revision of PH22.62-1948)
- PH22.67-1960, 1000-Cycle Balancing Test Film for 35mm Motion-Picture Sound Reproducers (revision of PH22.67-1948)

The standards were approved by the Society's Engineering and Standards Committees and ASA Sectional Committee PH22. Since they reflect no technical change from the versions published previously, the standards are not being published

here. The editorial changes incorporated in the new revisions consist of the following:

PH22.27: American Standard for Diffuse Transmission Density, Z38.2.5-1946, which is the basis for PH22.27, was revised. Therefore, the reference to this standard has been changed to PH2.19-1959.

PH22.50 now contains a scope which reflects the purpose of the standard.

PH22.62 and .67: The reference to applicable standards has been brought up to date, the word "record" has been substituted for "track" in section 2.2 and the note relating to the availability of test films made in accordance with the standards has been corrected to indicate the current source of supply which is the SMPTE. PH22.67 has also been given a more descriptive title.

The standards may be obtained from the American Standards Association, Incorporated, 10 East 40 Street, New York 16, N.Y., at a nominal cost.—*J. Howard Schumacher, Staff Engineer.*

Proposed American Standard

A Proposed American Standard, 16mm Television Intermittent Projector for Vidicon Camera Operation, PH22.125, is published here for a three-month period of trial and comment.

The need for a standard relating to a 16mm television intermittent projector for vidicon camera operation was recognized by the SMPTE Television Committee during its October 1955 meeting. A subcommittee under the chairmanship of Dr. H. N. Kozanowski was constituted to formulate a draft proposal. The first draft was based on American Standard, 16mm Motion Picture Projector for Use With Monochrome Television Film Chains Operating on Full-Storage Basis, PH22.91-1955.

Subsequent to its circulation in 1956, three additional drafts were submitted to the Television Committee before agreement was reached on this proposal.

The members may be interested in the fact that the Television Committee at its May 4, 1960, meeting voted unanimously to recommend the withdrawal of PH22.91-1955 subsequent to ASA approval of PH22.125.

This published version has been approved by the Standards Committee and if no adverse comments are received prior to January 15, 1961, it will be submitted to ASA Sectional Committee PH22 for further processing as an American Standard. All comments should be addressed to Society Headquarters, attention of J. Howard Schumacher, Staff Engineer.—*J.H.S.*

16mm Television Intermittent Projector for Vidicon Camera Operation

PH22.125

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1. Scope

1.1 This standard applies only to 16mm motion picture projectors in which the film is advanced intermittently.

1.2 This standard describes two types of projectors in combinations with vidicon TV camera chains. The first operates on a full-storage basis, and the second on a partial-storage basis. The standard applies to both types unless otherwise specified.

1.2.1 In synchronous operation the projector motor and the television system vertical period generator are locked to the same frequency, generally the alternating-current power supply.

1.2.2 In nonsynchronous operation the projector motor and the television synchronizing generator are not locked to each other and their frequencies may differ by a maximum of 0.5 cycles per second.

1.2.3 In full-storage operation illumination from the projector is restricted to the vertical retrace period of the television scan.

1.2.4 In partial-storage operation the illumination will not be restricted to the vertical retrace period but may occupy a portion of the vertical scanning time.

1.3 The characteristics of the projector are standardized in terms of the one-inch vidicon which has now displaced the iconoscope used as the basis of American Standard 16mm Motion Picture Projector for Use with Monochrome Television Film Chains Operating on Full-Storage Basis, PH22.91-1955.

2. Image Dimensions

2.1 The image on the face of the vidicon shall be $\frac{3}{8}$ -inch (height) \times $\frac{1}{2}$ -inch (width), $\frac{5}{8}$ -inch diagonal.

2.2 In a relay type optical system, the image projected on the field lens shall be $3\frac{3}{8}$ -inches (height) \times $4\frac{1}{2}$ -inches (width), a $5\frac{5}{8}$ -inch diagonal.

2.3 The projector shall contain adequate provisions for meeting all specifications of 2.1 (direct-in projection) and 2.2 (relay projection).

3. Projection Lens Resolution

3.1 Resolution shall be defined and measured in accordance with American Standard Method of Determining Resolving Power of 16mm Motion-Picture Projector Lenses, PH-22.53-1953 (see Section 19), except that measurement shall be made with the standard picture widths. (See 2.1 and 2.2.)

3.2 The resolution shall be at least 80 lines per millimeter for the patterns identified as E and D and at least 90 lines per millimeter for all others.

4. Optical Axis Adjustment

4.1 The projector shall include, or have available as an accessory, a sturdy pedestal. Means shall be provided to place the optical axis (when level) at any height from 47 to 49 inches from the floor.

4.2 A tilting mechanism shall be included although this need not permit either quick change or change during operation. The minimum range of tilt shall be ± 2 degrees.

4.3 A leveling mechanism capable of rotating the projector about an axis parallel to the optical axis shall be included.

4.4 The vidicon camera may be affixed to the projector as an integral part with appropriate optics. In this case the camera mount shall be provided with appropriate means of horizontal, vertical, and axial adjustments.

5. Film Gate Dimensions

The dimensions of the picture aperture and its location relative to the film shall be in accord with American Standard Projected Image Area of 16mm Motion-Picture Film, PH22.8-1957. (See Section 19.)

6. Framing Device

6.1 The projector shall have a readily accessible means for positive framing of the picture when the projector is in operation. The range of the framing mechanism shall extend 0.025 inch above and below the standard position measured at the film. The framing device shall be free from creep during operation.

6.2 The method employed for framing shall not change the horizontal position of the projected image of the picture aperture by more than 1.0 percent of the picture width over the full framing range.

7. Picture Stability

7.1 *Definition.* The stability of the image depends upon the ability of the projector to locate succeeding frames of film in exactly the same position relative to the picture aperture. Failure to perform this function perfectly results in either jump (vertical instability) or weave (horizontal instability) or both.

7.1.1 Jump and weave shall be measured in terms of the peak-to-peak excursions observed. In each case the result shall be stated as a percentage of picture width.

7.2 Standard

7.2.1 Jump shall not exceed 0.2 percent of picture width.

7.2.2 Weave shall not exceed 0.15 percent of picture width.

8. Image Illumination

8.1 *Methods of Light Application.* Illumination can be applied from the projector to the vidicon either as a single light pulse per television field or as a plurality of pulses per television field. It is important that successive television fields receive substantially the same

exposure both in timing and in intensity to avoid flicker disturbances.

8.2 Means shall be provided for internal or external to the projector to maintain light intensity reaching the film over a range of 100 to 1000 foot-candles changes in color temperature.

8.3 *Intensity of Illumination.* Illumination shall be measured on a 0.625-inch diagonal of the plane of the photo-surface. The objective for the time-averaged illumination as measured in a horizontal plane shall be a minimum of 100 foot-candles under adverse conditions of transmission density.

8.3.1 *Measurement of Intensity of Illumination.* shall be as follows:

(1) With projector in the gate

(2) Light intensity at the intensity position

(3) Image size: (a) $\frac{3}{4}$ -inch for direct-in use; (b) $3\frac{3}{8}$ -inch for field lens use
The intensity of illumination shall be 40,000 foot-candles, for field lens use

8.3.2 Uniformity

(1) With no film in the gate, the illumination at any point shall be within 10 percent of the maximum intensity

(2) Upon replacement of projection lamp, if adjustment shall be required

(3) The receptive sensitive element used shall have a diameter not less than 10 percent of the picture width. It shall be taken with the center of

* This is the product of Recommendation (100 foot-candles) \times Color Factor (20) \times Reserve for Den

place the plane of optimum focus in coincidence with the emulsion plane.

17.4.3.2 Focus shall be adjusted to secure maximum response using a test film complying with the requirements of American Standard 16mm Sound-Focusing Test Film, PH22.42-1955. (See Section 19.)

17.4.3.3 Means shall be provided for rapidly and accurately shifting the plane of optimum focus to coincide with the emulsion position on either side of the film.

17.5 Light Distribution. The light distribution in the scanning aperture shall be sufficiently uniform to produce a signal across a resistive load at the output of the preamplifier which is constant within ± 1.5 db when reproducing a Scanning-Beam Uniformity Test Film complying with the requirements of American Standard Scanning-Beam Uniformity Test Film for 16-Millimeter Motion-Picture Sound Reproducers (Laboratory Type), Z22.80-1950, or American Standard Scanning-Beam Uniformity Test Film for 16-Millimeter Motion-Picture Sound Reproducers (Service Type), Z22.81-1950.² (See Section 19.)

17.6 Exciter Lamp

17.6.1 The exciter lamp shall be so mounted as to permit rapid replacement.

17.6.2 It is not desirable that uniformity of illumination in the scanning aperture be critically dependent upon exciter lamp position. If this condition exists, means shall be provided for independent horizontal and vertical adjustment of the exciter lamp position.

17.6.3 The exciter lamp shall be a pre-focused type, unless the lamp holder is a replaceable type equipped with adequate adjustments which can be preset and a spare lamp holder is provided.

17.6.4 The exciter lamp shall be operated at all times within any applicable ratings established by the manufacturer of the lamp.

² Test films in accordance with these standards are available from the Society of Motion Picture and Television Engineers.

18. Sound Amplification System

Any statement of sound-reproduction characteristics must necessarily cover the performance of a preamplifier which is specifically designed as a component of the projector. However, it is not essential that all or even any part of the preamplifier be included in the projector structure. Wherever they are mounted, all parts of the preamplifier should be readily accessible.

18.1 Output Impedance. There shall be balanced output impedances of 600 and 150 ohms available.

18.2 Output level

18.2.1 Standard. The output level shall be -10 decibels referred to 1 milliwatt (dbm).

18.2.2 Method of Measurement. This level shall be produced using level test film complying with the requirements of American Standard 16mm 400-Cycle Signal-Level Test Film, PH22.45-1955.² (See Section 19.)

18.2.3 A gain normalization control shall be provided having sufficient range to insure compliance with the above standard for any normal combination of exciter lamp, photocell and amplifier tubes.

18.3 Frequency Response

18.3.1 If the frequency response from film to output is fixed, it shall be flat within ± 1 db from 50 to 6000 cycles per second. If tone controls are provided in the preamplifier, their range of adjustment shall include this response.

18.3.2 Method of Measurement The frequency response shall be determined by means of a multifrequency test film complying with American Standard 16mm Multifrequency Test Film, PH22.44-1953.² (See Section 19.) The amplitude of response shall be measured across a resistance load at the output of the preamplifier. The frequency response shall be determined with standard gain. (See 18.2.)

² A test film in accordance with this standard is available from the Society of Motion Picture and Television Engineers.

18.4 Distortion. Although it is desirable to state a distortion standard which will cover the photocell as well as the preamplifier, a method of measurement which will accomplish this result is not known. Consequently, the present standard covers only distortion in the preamplifier.

18.4.1 Standard. Total harmonic distortion in the preamplifier at standard output level shall not exceed 0.5 percent in the input signal range from 50 to 6000 cycles per second.

18.4.2 Method of Measurement. Test signals from an oscillator shall be applied at the photocell input of the preamplifier and distortion shall be measured with a distortion analyzer at the preamplifier output at standard output level.

18.5 Preamplifier Noise Level

18.5.1 Standard. The noise level of the preamplifier shall be at least -65 dbm.

18.5.2 Method of Measurement. The noise level of the preamplifier shall be measured at standard gain (see 18.2), with the projector running, the exciter lamp energized and no light entering the photocell.

18.6 Over-all Noise Level

18.6.1 Standard. The over-all noise level shall be at least -55 dbm.

18.6.2 Method of Measurement. The over-all noise level shall be measured at standard gain (see 18.2), with the projector running, the exciter lamp energized and no film in the machine.

19. Revisions of American Standards Referred to in This Document

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

PH22.8-1957, American Standard Projected Image Area of 16mm Motion-Picture Film.

PH22.11-1953, American Standard 16-Millimeter Motion-Picture Reels.

PH22.41-1957, American Standard Photographic Sound Reels.

PH22.42-1955, American Standard Sound-Focusing Test Film.

PH22.43-1953, American Standard 3000-Cycle Flutter Test Film.

PH22.44-1953, American Standard Multifrequency Test Film.

PH22.45-1955, American Standard 400-Cycle Signal-Level Test Film.

PH22.53-1953, American Standard Method of Determining the Image Area of 16mm Motion-Picture Film.

PH22.57-1955, American Standard Buzz-Track Test Film.

PH22.112-1958, American Standard Structure-Sound Separation Test Film.

PH22.113-1958, American Standard Genetic Sound Projection Test Film.

Z22.80-1950, American Standard Scanning-Beam Uniformity Test Film for 16mm Motion-Picture Sound Reproducers (Laboratory Type).

Z22.81-1950, American Standard Scanning-Beam Uniformity Test Film for 16mm Motion-Picture Sound Reproducers (Service Type).

Appendix

(This Appendix is not a part of the American Standard 16mm Television Interchangeable Vidicon Camera Operation, PH22.48-1955, to facilitate its use.)

Since jump and weave are undesirable characteristics of the projector and are magnified at high magnification, it is recommended that the image be projected with the greatest magnification which will produce a sufficiently bright image for the viewer.

Jump and weave are usually caused by using a test film which is a positive background with all copy white. This film stock used has high resolution and is perforated on both edges at a time, so that the steadiness in respect to its perforations. Film obtained from the Society of Motion Picture and Television Engineers.