

5. L. G. Daignault, "Pollution Control in the Photoprocessing Industry through Regeneration and Reuse," *J. Appl. Phot. Eng.*, 3: No. 2, Spring 1977.
6. Konrad Dorfner, *Ion Exchangers - Properties and Applications*, second printing 1973, Ann Arbor Science Publishers, Inc., P.O. Box 1425, Ann Arbor, Mich., 1962, pp. 8-14.
7. C. B. Neblette, *Photography: Its Materials and Processes*, 6th ed., p. 457, D. Van Nostrand Co., Inc., Princeton, N.J., 1962.
8. "Chemical Composition of Photographic Processing Solutions," Eastman Kodak Publication No. J-47, Rochester, N.Y. Dept. 454, May 1973.

Standards & Recommended Practices

Approved SMPTE Recommended Practices

On 29 October 1978, the Society's Board of Governors approved two new SMPTE Recommended Practices: RP 82-1978, Specifications for 16-mm Projector Alignment and Screen Image Quality Test Film; and RP 89-1978, Dual-Program Audio for 2-in Quadriplex Video Magnetic Tape Recording at 15 and 7.5 in/s.

SMPTE Recommended Practices are available from Society Headquarters for \$1.50 each.

Approved International Standard

The International Organization for Standardization (ISO) recently approved an International Standard, the technical content of which is published here for your information.

ISO 3775-1978, Cinematography — Printed 8-mm Type S Image Area on 16-mm Motion-Picture Film Perforated 8-mm Type S (1-3) — Position and Dimensions, is in agreement with American National Standard PH22.181-1973, Location of Super 8 Printed Area on 16-mm Motion-Picture Film, Perforated Super 8 (1-3).

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Meeting Announcement: Evaluation Update of America's Voluntary Standards System

The American National Standards Institute will hold a meeting on 22 March 1979 at the International Inn, Washington, D.C. Topics to be discussed are: Opportunities for Government/Private Sector Cooperation on Standards; Regulatory Trends and Challenges; Application of Voluntary Standards: Pluses and Minuses; and Implementation of International Standards. For more information contact: Communications Department, American National Standards Institute, 1430 Broadway, New York, NY 10018, (212) 354-3320.

SMPTÉ RECOMMENDED PRACTICE RP 82-1978

Specifications for 16-mm Projector Alignment and Screen Image Quality Test Film



Page 1 of 5 pages

Introduction

This test film is designed to provide the same degree of performance evaluation for 16-mm projection systems that is presently available for 35-mm projection systems utilizing SMPTÉ Recommended Practice on Specifications for 35-mm Projector Alignment and Screen Image Quality Test Film, RP 30-1971 (R1977). It is also intended as an engineering tool to permit quantitative measurements of projector adjustments that affect the visual image.

1. Scope

- 1.1 This practice describes the artwork and dimensions for constructing a test chart to be used as the original subject for the manufacture of the test film.
- 1.2 The practice also describes the types of photographic materials and densitometry necessary to manufacture the film.

2. Description

- 2.1 The test pattern on the film shall be as shown in Figs. 1 and 2.
- 2.2 The background checkerboard pattern provides a 50-percent transmission of the incident radiant energy which is more nearly consistent with the projection performance of an average release print. The pattern also provides a quick reference for overall image focus and quality.

- 2.3 The resolution charts are modified high-contrast NBS Resolution Charts with a luminance ratio of 100:1 which have been trimmed to exclude low-order resolution below 34 lines per millimeter (see Fig. 3).
- 2.4 The wedge steps placed on each side and above and below the center resolution chart are designed to measure quantitatively vertical image unsteadiness and horizontal weave. The actual length of the wedges and their placement around the center resolution chart are not critical, but the total width of the wedge shall equal the size of one background square, and each step shall be 0.2 percent of the total width of the wedge. (One square equals 1 percent of the image height.)
- 2.5 The diamond patches are to be inserted as a densitometric control in the exposure and processing of the original test film.
- 2.6 The test chart shall be photographed as a 16-mm camera original on a film manufactured in accordance with American National Standard Dimensions for 16-mm Motion-Picture Film Perforated IR, PH22:109-1974. The film shall be capable of a modulation transfer of at least 80 percent at 80 lines per millimeter when exposed to a high-contrast resolution chart at a reduction ratio of 25:1 and then properly processed. In preparation, the film shall be used in such equipment and with such procedures as will maintain optimum resolution and steadiness.
- 2.7 The chart shall be photographed with a camera aperture as specified in American National Standard Dimensions of 16-mm Motion-Picture Camera Aperture Image, PH227:1976.
- 2.8 The test film shall be produced as a 16-mm camera original.

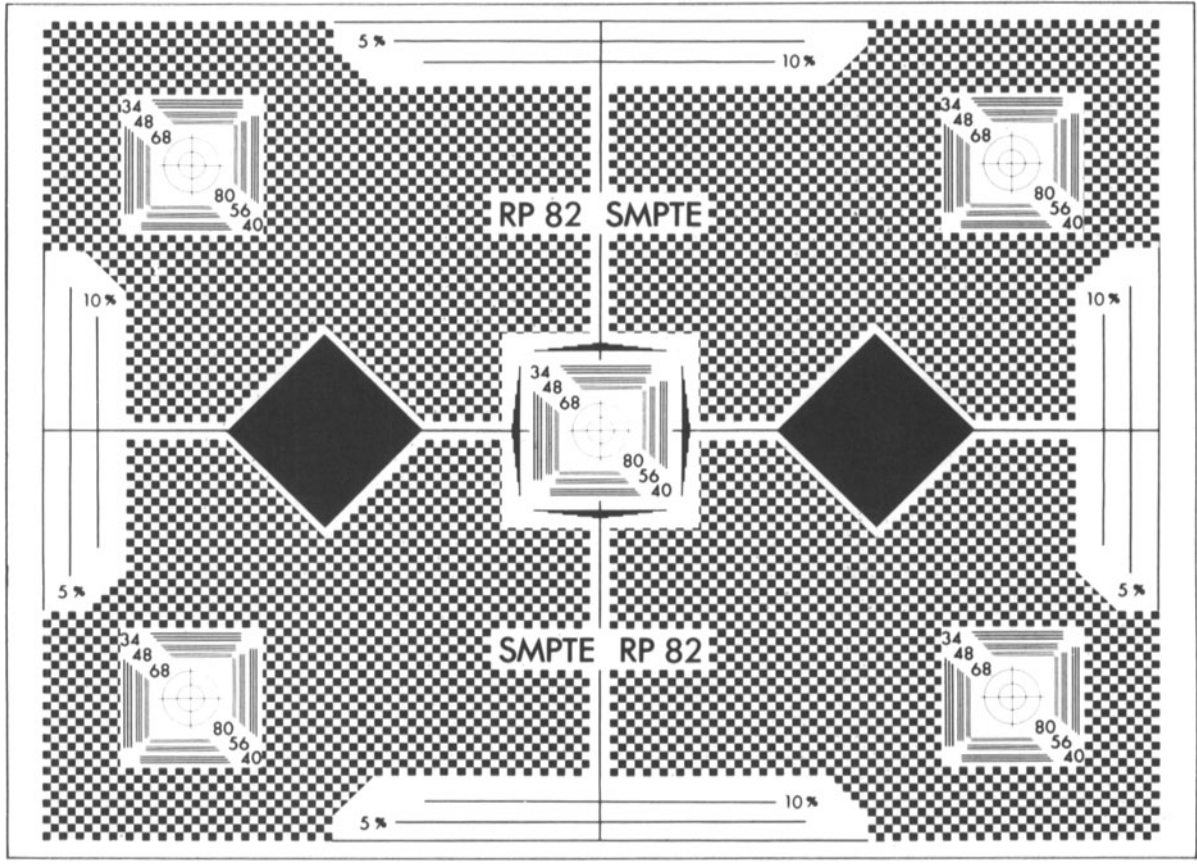


Fig. 1

Approved 29 October 1978

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Dimensions	Inches	Millimeters
A	0.380 ± 0.002	9.65 ± 0.05
B	0.284 ± 0.002	7.21 ± 0.05
C	0.10 nom	2.5 nom
D	0.05 nom	1.3 nom
E	0.0475 nom	1.206 nom
F	0.0085 ± 0.0005	0.211 ± 0.013
G	0.0190 ± 0.0005	0.483 ± 0.013
H	0.0071 ± 0.0005	0.180 ± 0.013
J	0.0142 ± 0.0005	0.361 ± 0.013
K	0.04 nom	1.0 nom
L	0.05 nom	1.3 nom
M	0.06 nom	1.5 nom
N	0.07 nom	1.8 nom
O*	0.00284	0.0721
P*	0.00057	0.0145

*Derived from Sec. 2.4.

3. Dimensions

- 3.1 The dimensions of the original test chart shall be 25X the dimensions listed in Fig. 2. (This requirement is necessary because the NBS Resolution Test Charts are designed for a 25X reduction.)
- 3.2 The original or 1:1 copy of the NBS Resolution Test Charts shall be cropped as specified in Fig. 3. The modification shall be similar to that illustrated in Fig. 4.
- 3.3 The modified NBS Resolution Test Charts shall be placed on the original test chart as specified by the dimensions in Fig. 2.

- 3.4 The gray patches shall be at least the dimensions specified in Fig. 2 in order to be readable in current 1-mm aperture densitometers after a 25X reduction.
- 3.5 The checkerboard background on the test chart shall contain 100 squares vertically and 134 horizontally.
- 3.6 The horizontal and vertical lines indicating 5- and 10-percent reductions in image length or height shall be placed on the test target in accordance with the dimensions specified in Fig. 2.

NOTE: A test film conforming to this practice is available from the Society of Motion Picture and Television Engineers.

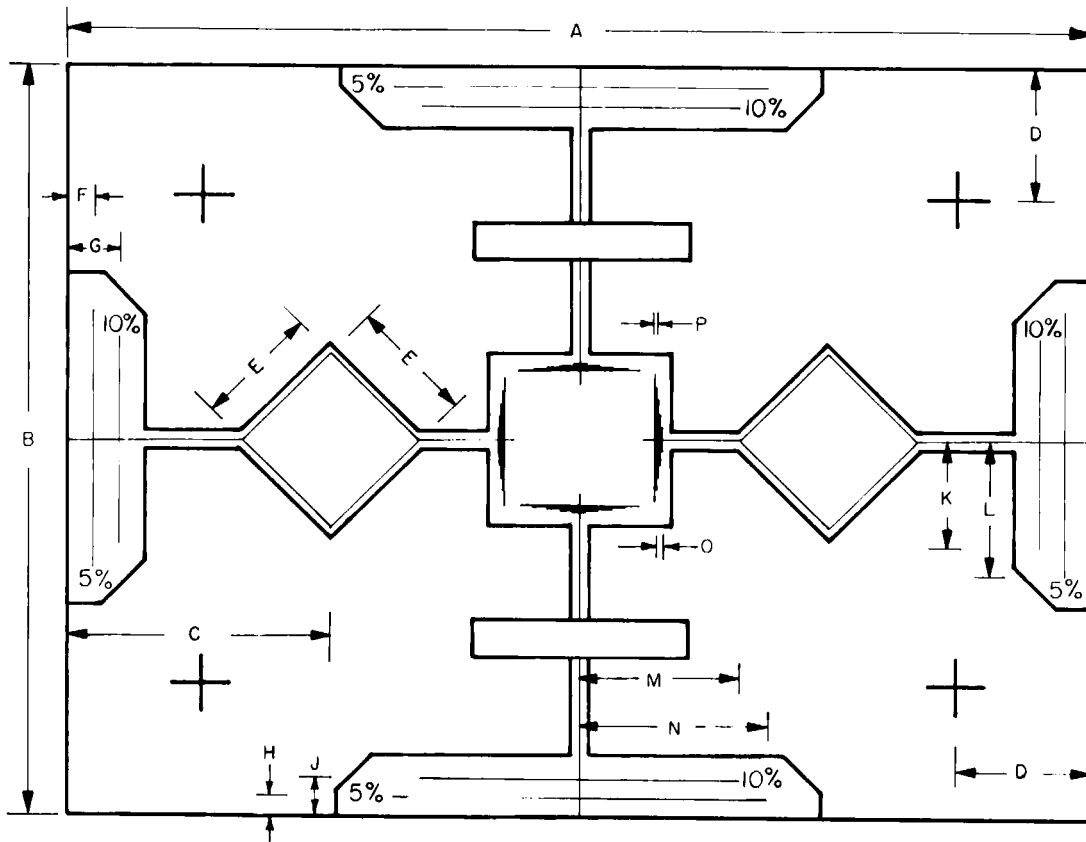
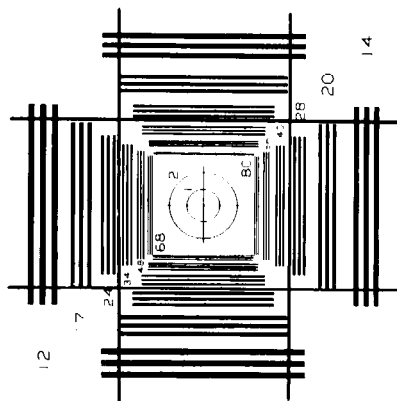


Fig. 2



NBS
RESOLUTION TEST CHART

Fig. 3

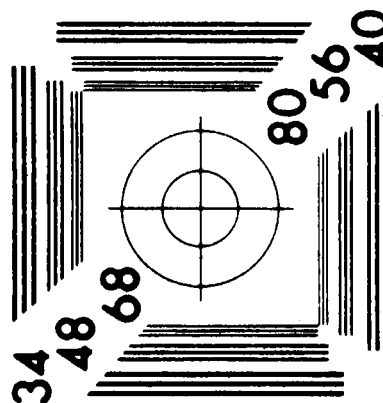


Fig. 4

Appendix

(The Appendix is not a part of this SMPTE Recommended Practice, but is included for information purposes only.)

A1. It has been found that producing test films with resolution at 80 lines per millimeter requires careful selection of the materials and equipment used, and careful control of the operations. Inasmuch as a measuring tool should be better than the system it is designed to measure, it is desirable that the test film meet the specifications detailed herein, although normal theatrical program release prints will not usually meet these specifications.

A2. The camera used to photograph the high-contrast test target must have a lens of suitable design and correction to provide an image of sufficient resolution to allow a modulation transfer of at least 80 percent at 80 lines per millimeter on the processed film image over the entire field. The camera mechanism must provide steady images, preferably ensured by pin registration.

A3. Image densities referred to in this Appendix are intended for a more precise definition of one system shown to be applicable, and are measured in accordance with American National Standard Conditions for Diffuse and Doubly Diffuse Transmission Measurements (Transmission Density), PH2.19.1976. See

lection of a film for producing the test film must take into consideration the requirements of Sec. 2.6.

A study of many film products indicates that a high-contrast, panchromatic film is applicable but, for adequate control of line widths, resolution, etc., there must be careful control of both exposure and processing. Quality control may be achieved conveniently by inserting a gray patch having a density of about 0.94 on the film when all the conditions have been met. For a reflective target and for film processed as recommended to a 1b control gamma of 3.3, this has been achieved with a gray patch having a reflectance of 32 percent. For a transmission target, a gray area of a different density may be needed to provide the identical test films.

A4. If constructing an original reflecting test chart with a negative image is desirable, it should be pointed out that negative NBS Resolution Test Charts are unavailable. However, they can be manufactured from an original positive by a competent graphic arts studio familiar with the requirements of size and resolution.

SMPTE RECOMMENDED PRACTICE

Dual-Program Audio for 2-in Quadruplex Video Magnetic Tape Recording at 15 and 7.5 in/s

RP 89-1978



1. Scope

This recommended practice specifies the location, frequency response, operating level, and mechanical separation of the simultaneously-recorded information on 2-in quadruplex video magnetic tape operating at 15 and 7.5 in/s (see Note).

2. Location of Program Audio Tracks

The dimensions defining the transverse location of the dual-program audio tracks shall be as specified in the figure and table. The dual audio tracks are an alternative to the audio 1 (program audio) track defined in American National Standard Dimensions of Video, Audio and Tracking Control Records on 2-in Video Magnetic Tape Quadruplex Recorded at 15 and 7.5 in/s, C98.6-1973. All other track dimensions and the mechanical separation of the simultaneously-recorded information of the video and audio records are unchanged from the dimensions specified in ANSI C98.6-1973.

3. Frequency Response and Operating Level

The frequency response and operating level shall be as specified in American National Standard Frequency Response and Operating Level of Recorders and Reproducers for Audio Record One

for 2-in Quadruplex Video Magnetic Tape Operating at 15 and 7.5 in/s, C98.3-1973.

4. Use of Tracks for Stereo

If the two tracks are used for stereo recording, the left channel shall be recorded on the track closest to the reference edge of the tape.

5. Program Audio Head Position

In addition to the required dimensions for the mechanical separation of the simultaneously-recorded information of the video and audio records, the record/reproduce gaps of the two program audio heads shall lie on a common straight line.

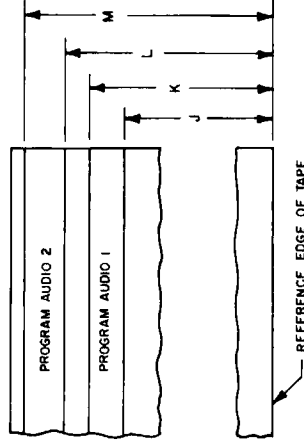
6. Program Audio Head Phasing

When the same signal is recorded on the two tracks, the two recorded tracks shall be so phased that when the two tracks are reproduced with a full-track head they will be additive.

7. Monaural Recording

If there is to be only one program recorded, both program tracks shall be utilized.

NOTE: Current technology restricts this practice to applications such as stereo where cross-talk is not a limitation.

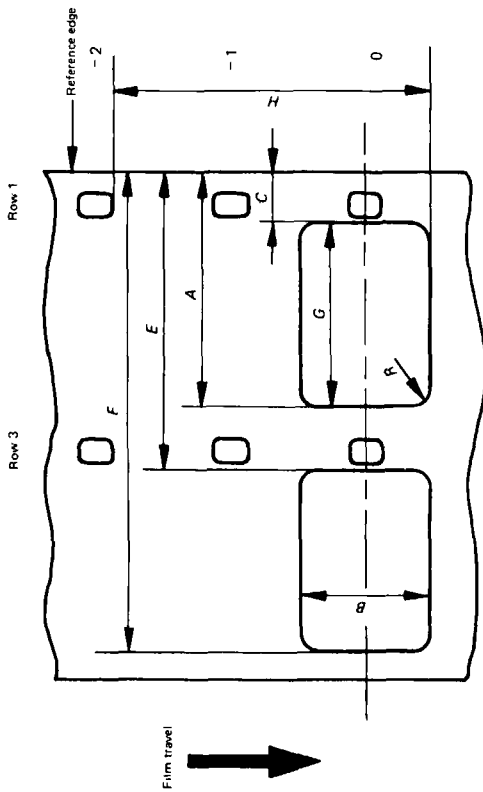


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
J	1.920	1.928	48.77	48.97
K	1.945	1.951	49.40	49.56
L	1.965	1.971	49.91	50.06
M	1.988	1.996	50.50	50.70

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Cinematography — Printed 8 mm Type S image area on 16 mm motion-picture film perforated 8 mm Type S (1-3) — Position and dimensions



Dimension	mm	in
A	7.16 min.	0.282 min.
B _{min} *	4.14	0.163
C	1.47 max.	0.058 max.
E	9.45 max.	0.372 max.
F	15.14 min.	0.596 min.
G	5.79 ref.	0.228 ref.
H**	9.96 : 0.05	0.393 : 0.002
R	0.13 max.	0.005 max.

* See note 5 in 3.2.
** See note 2 in 3.2. and the annex.

ANNEX

A.1 If prints are made with a step printer, the registration device should be in the -2 perforation, or that perforation which corresponds to the -2 perforation when the final print stage is reached, to obtain maximum benefit of cancellation as films are projected in accordance with ISO 1781, which specifies the -2 position for projected films.

A.2 The parenthetical numerals have been added to the title of this International Standard to specify how the rows of perforations are placed on the film. This designation is necessary only when the film stock is wider than its end use and more than one combination of perforation rows is possible. The perforation rows are numbered starting at the reference edge, which is the edge nearest to that row of perforations which is retained in the slitting operation.

3.2 Dimensions B, G, H and R apply to all images. The differences in values from the reference edge, dimensions A, C, E and F establish the minimum area to be printed. For convenience, and to avoid unnecessary addition and subtraction in applying this International Standard, a reference dimension has been supplied for a typical width of the image area.

NOTES

- The reduction ratio of prints made from 16 mm negatives or reversal originals shall be approximately 1.8 : 1.
- To provide understanding in the design and use of printers, the dimensions specified in the figure and table provide an image ideally centred vertically on the perforation, with a reference dimension of 7.90 mm (0.311 in) from the positioning perforation to the horizontal centre line of the intended image.
- When film having a perforation pitch of 4.227 mm (0.1664 in) is printed, dimension H must be reduced by the change of average perforation pitch and processing shrinkage to ensure the appropriate dimension for H in release prints.
- The "film travel" shown in the figure is to aid in illustrating the -2 perforation and position the 8 mm print and the direction of motion in the projector for the resulting 8 mm print if the figure is as seen from the light source in a projector used for direct front projection (see the annex).
- If photographic sound is to be applied to the print, it is necessary to restrict the value for dimensions A and F to avoid intrusion into the sound-track area. A suggested value of 0.038 mm (0.0015 in) more than the minimum value may be used until the values are established.
- Dimension B is a minimum. In practice, the value used must be such that the frame line between pictures is opaque or double exposed in the final print intended for projection.

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the position and size of the 8 mm Type S printed picture areas for negative/positive and reversal printing on 16 mm motion-picture film perforated 8 mm, Type S, 2R-4, 234 (1667) and 2R-4, 227 (1664), in position 1 and 3.

2 REFERENCES

- ISO 1781, *Cinematography — Projector usage of 8 mm Type S motion-picture film for direct front projection.*
- ISO 1785, *Cinematography — Location of the printed image area for printing to 8 mm Type S on 16 mm motion-picture film perforated 8 mm Type S, 1-4.*
- ISO 1787, *Cinematography — Camera usage of 8 mm motion-picture film perforated Type S.*
- ISO 2966, *Cinematography — Motion-picture film 16/8S (1-3) and (1-4) — Cutting and perforating dimensions.*
- ISO 3645, *Cinematography — Image area produced by 8 mm Type S motion-picture camera aperture and maximum projectable image area — Positions and dimensions.*

3 DIMENSIONS

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