

Table 1

Dimensions	Millimeters	
	Minimum	Maximum
A <sub>b</sub> Control track bottom edge	23.54	23.64
A <sub>t</sub> Control track top edge	23.94	24.04
B <sub>b</sub> Audio 1 track bottom edge	24.34	24.44
B <sub>t</sub> Audio 1 track top edge	25.14	25.24
C <sub>b</sub> Audio 2 track bottom edge	22.34	22.44
C <sub>t</sub> Audio 2 track top edge	23.14	23.24
F <sub>b</sub> Audio 3 track bottom edge	0.16	0.24
F <sub>t</sub> Audio 3 track top edge	0.96	1.04
G Center of video tape	12.70	ref
J Position of audio heads	232.2	232.8
K <sub>b</sub> Full video width bottom edge	1.18	1.18
K <sub>t</sub> Full video width top edge	22.19	22.19
L <sub>b</sub> Video width (180°) bottom edge	1.82	ref
L <sub>t</sub> Video width (180°) top edge	21.55	ref
N Video track pitch	0.200	ref
O Video track width	0.156	0.164
P Position of control track head	2.845	2.875
Q <sub>a</sub> Switch point distance video 2 track	82.096	82.121
Q <sub>b</sub> Switch point distance video 1 track	5.523	5.533
S Distance between control track head gap and center edit pulse at 180° switch point	0.040	ref
e <sub>0</sub> Scanning angle (helix angle)	14.434°	10°
e <sub>1</sub> Video track angle (525/60)	14.288°	

*Specifications for Operational Alignment  
Test Pattern for Television*



Page 1 of 4 pages

1. **Scope**  
This practice describes the format, dimensions, and optical densities for a test pattern transparency to be used as an operational alignment tool for television systems.

2. **Purpose**  
The purpose of this practice is to provide a simplified test pattern to facilitate day-to-day operational checks and adjustments of focus, resolution response, mid-band streaking, astigmatism, field uniformity, scanning size, linearity, and interlace in live and film television systems.

3. **Description**

3.1 **Pattern.** A reproduction of the test pattern is shown in Fig. 1.

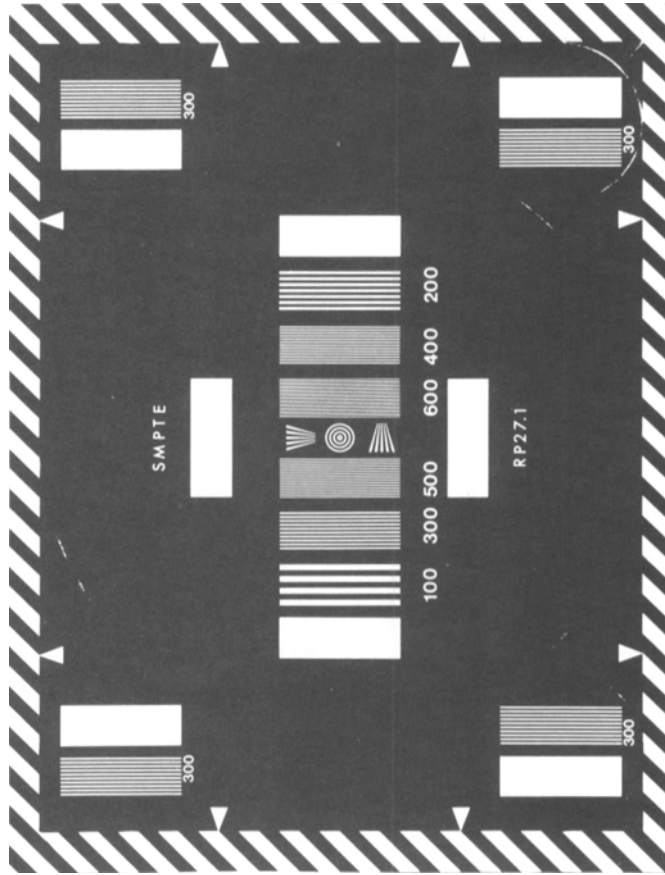


Fig. 1  
Reproduction of Test Pattern

3.2 Background. The background of the test pattern is black to minimize interference when evaluating the television waveform display. (See 5.2.)

3.3 White Bars. White bars of equal size are located on each side, above and below the central spatial frequency bursts and in each of the four corners. The bars are provided to establish a white level to evaluate the white signal uniformity of the system. The two bars located above and below the central spatial frequency bursts are also used to evaluate mid-band streaking.

3.4 Spatial Frequency Bursts. All spatial frequency bursts are calibrated in television lines per picture height and are located in the central portion of the test pattern and at each of the four corners. The central bursts are arranged with the highest line numbers nearest the center of the pattern where optical and electrical performance is maximum. The spatial frequency bursts located in each of the four corners are horizontally positioned so that they do not overlap each other when viewed on a waveform monitor triggered at a horizontal rate.

3.5 Electrical Alignment. A bull's-eye pattern is located at the center of the test pattern to facilitate pickup tube beam alignment.

3.6 Horizontal and Vertical Wedges. Horizontal and vertical wedges are located near the center of the test pattern to facilitate beam alignment for minimum astigmatism. The horizontal wedge can also be used to check scanning interlace.

3.7 Circles and Diagonal Lines. Circles and diagonal lines are provided to check system geometry. They have clear density to minimize interference when evaluating the television waveform display. (See 5.4.)

3.8 Boundary Arrows and Black-and-White Border. The eight boundary arrows and black-and-white border provide a check on system centering, scanning size, and equipment clamp performance. (See 5.3.)

3.9 Pattern Identification. The identification number of this document shall appear on the slide in the area specified in Fig. 2.

3.10 Manufacturer's Identification. Identification of the manufacturer shall appear on the slide mount outside the pattern area.

4. Format

4.1 Dimensions. The dimensions of the test pattern shall be as shown in Figs. 2 and 3. All dimensions are in percentage of picture height. One hundred percent picture height is equal to the outside di-

ameter of the largest circle. No dimensions, dimension lines, or centerlines are to appear on the final product.

4.2 Image Size. The size of the area inside the black-and-white border, as indicated by the eight boundary arrows, shall be as follows:

35-mm test films shall have dimensions in accordance with American National Standard for Motion-Picture Film (35-mm) — Television Image Area, ANSI PH22.95-1984. 16-mm test films shall have dimensions in accordance with American National Standard Dimensions for Television Image Area on 16-mm Motion-Picture Film, ANSI PH22.96-1982.

4.3 Black-and-White Border. Height and width dimensions of the black-and-white border shall be as follows:

For 35- and 16-mm motion-picture films, the black-and-white border shall extend to the dimensions of the negative image as specified by Style A in American National Standard for Motion-Picture Film (35-mm) — Camera Aperture Images, ANSI/SMPTE 59-1989; and American National Standard for Motion-Picture Film (16-mm) — Camera Aperture Image and Usage, ANSI/SMPTE 7-1988.

4.4 Corner Circles. Each of the four corner circles shall be located so that its outside diameter is tangent to the perimeter of the pattern in its respective corner.

4.5 Diagonal Lines. Diagonal lines shall be drawn between opposing corners as shown in Fig. 2 and shall not intersect any of the pattern elements.

4.6 Line Widths. Line widths for the circumference of the five circles and the diagonal lines shall be  $0.50 \pm 0.05$  percent.

4.7 Spatial Frequency Burst. Each spatial frequency burst width "W" is nominally equal to 6 percent of picture height plus one additional half cycle of white to provide a burst pattern which starts and ends with a white half cycle. The ratio of the width of the black half cycle to the width of the white half cycle shall be  $1.00 \pm 0.05$ . A tabulation of the nominal dimensions in terms of picture height is listed in the table.

Line Number	Line Width in Percent of Picture Height	Burst Width "W" in Percent of Picture Height
100	1.00	7.00
200	0.50	6.50
300	0.33	6.33
400	0.25	6.25
500	0.20	6.20
600	0.17	6.17

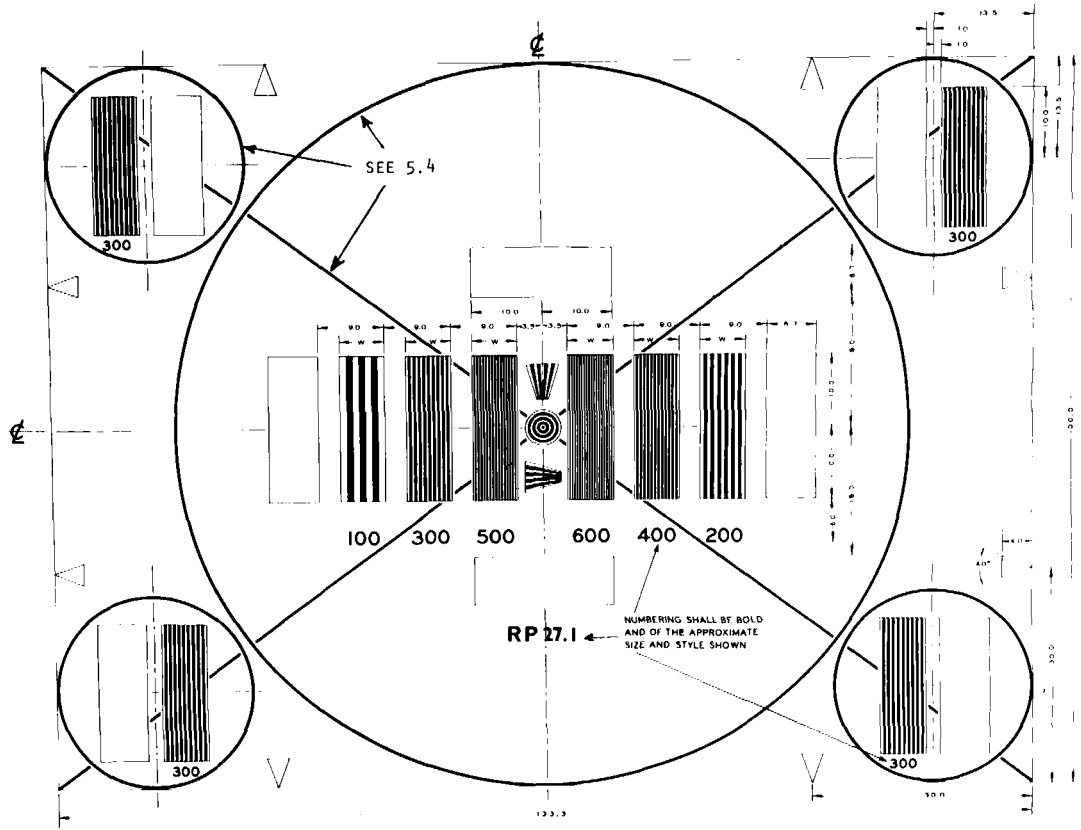


Fig. 2 Dimensional Drawing of Test Pattern

5. Optical Densities

- 5.1 Optical Densities. All optical densities shall be measured in accordance with American National Standard for Photography — Density Measurement — Geometric Conditions for Transmission Density, ANSI PH2.19-1986.
- 5.2 Background. The black background shall have a density greater than 1.9.
- 5.3 White Bars and Boundary Arrows. The eight white bars and boundary arrows shall be nominally clear.
- 5.4 Circles, Diagonal Lines, and Lettering. Circles, diagonal lines, and lettering shall be nominally clear.
- 5.5 Bursts, Wedges, Bull's-Eye, and Border. Spatial frequency bursts, wedges, bull's-eye, and black-and-white border shall have a black density greater than 1.9 and the white shall be nominally clear.

NOTE 1: Silver-image films scatter light such that the effective density in the specular optical system of the television film chain is increased by an average factor of 1.35 over that measured in diffuse light. For dye images, this light-scatter factor (Callier Q) is approximately 1.0. Inasmuch as it is common practice to reproduce this test pattern on photographic silver film, it should not be used for accurate adjustment of color telecine gain and black level.

NOTE 2: Test material conforming to this practice is available from the Society of Motion Picture and Television Engineers.

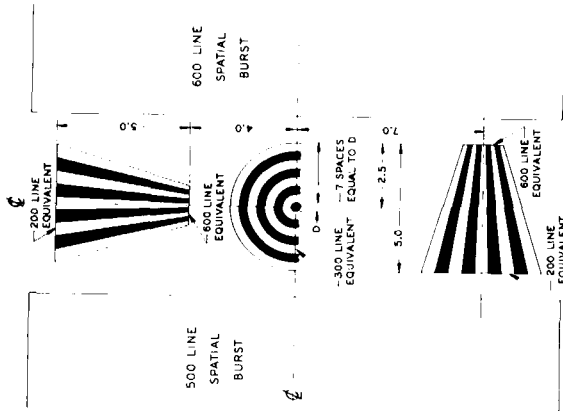


Fig. 3 Enlargement of Central Portion of Fig. 2

SMPTE RECOMMENDED PRACTICE

Specifications for Operational Registration Test Pattern for Multiple-Channel Television Cameras



1. Scope

Format, dimensions, and optical densities are specified for a test pattern transparency to be used as an operational alignment tool for multiple-channel color television cameras.

2. Purpose

This practice specifies a test pattern designed to provide a television picture suitable for aligning, adjusting, and checking multiple-channel color cameras for combined optical, mechanical, and electrical registration.

3. Format

- 3.1 Pattern. A reproduction of the test pattern is shown in Fig. 1.
- 3.2 Grid. The horizontal and vertical black lines of the grid produce a uniformly-spaced grid dividing the picture area into 18 squares vertically and 24 squares horizontally. Half dimensions have been added near the edges of the pattern where registration is most difficult to achieve.
- 3.3 Circles and Diagonals. Circles and diagonal black lines are provided to center the pattern on the camera tubes and check alignment.

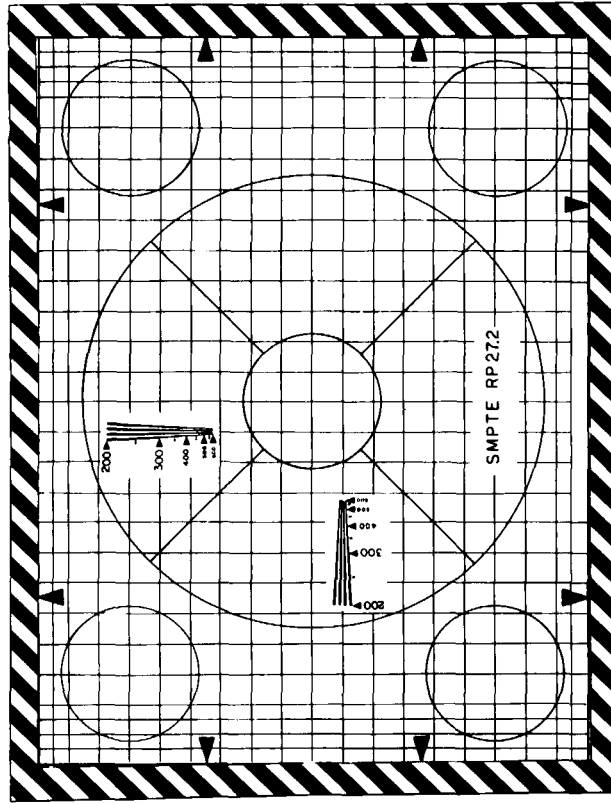


Fig. 1 Reproduction of Test Pattern

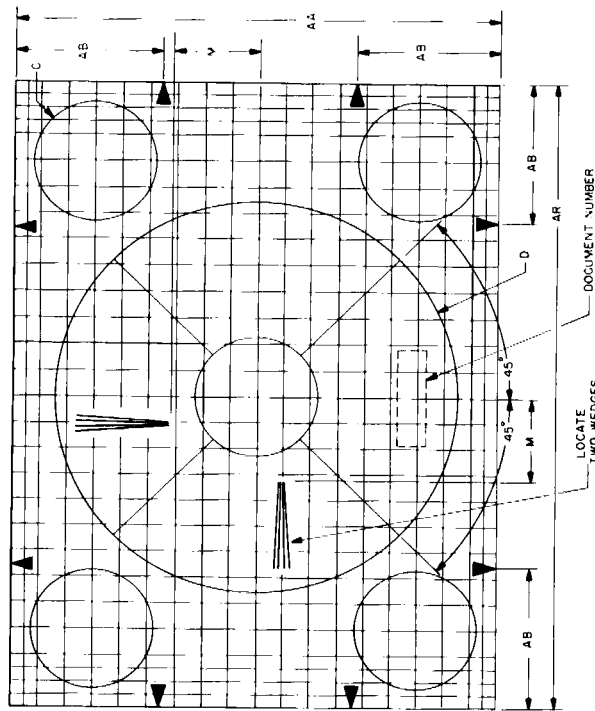


Fig. 2  
Location of Boundary Arrows, Circles, Wedges and 45° Lines

- 3.4 Resolution Wedges. Vertical and horizontal wedges are provided for checking optical and electrical focus and to aid registration.
- 3.5 Arrows and Border. The eight boundary arrows and black-and-white border define the edge of the test pattern area and the scanned area.
- 3.6 Pattern Identification. The identification number of this document shall appear on the pattern as specified in Fig. 2.

4. Dimensions

- 4.1 Test Pattern. The dimensions of the test pattern shall be as shown in Figs. 2 through 5, in percentages of frame height and reproduced with a tolerance of  $\pm 0.1$  percent of the frame height.
- 4.2 Image Size. The size of the scanned area as indicated by the eight boundary arrows shall be as follows:
  - 4.2.1 2x2 in test slides shall have dimensions as specified in American National Standard for Television — Image Areas and Mounts for Slides and Opaques, ANSI/SMPTE 94-1985.

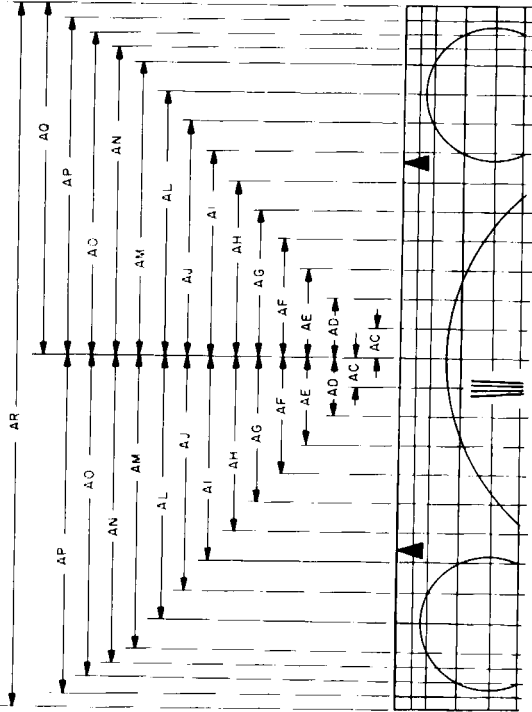


Fig. 4  
Location of Vertical Grating Lines

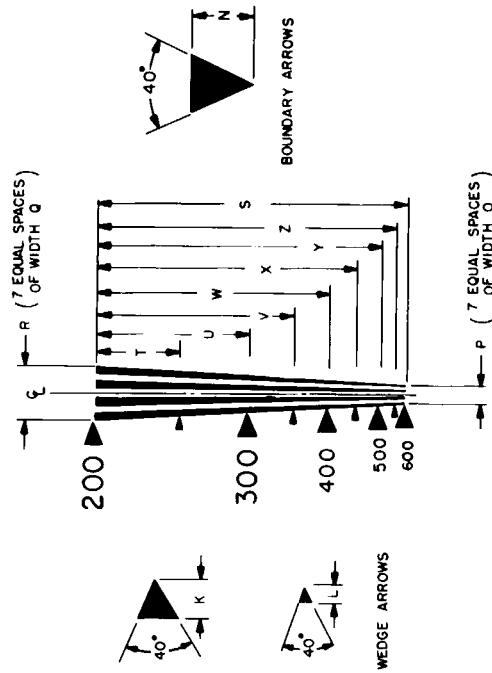


Fig. 5  
Wedge Detail and Boundary Arrows

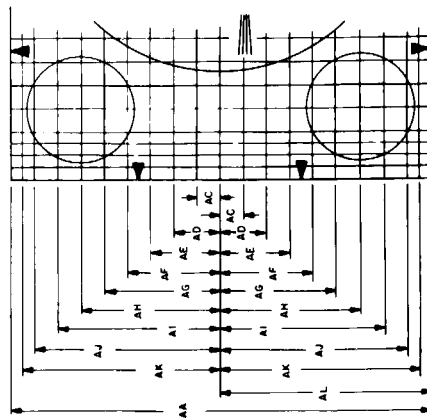


Fig. 3  
Location of Horizontal Grating Lines

**SMPTE RECOMMENDED PRACTICE**

*Method for Measuring 35- and 70-mm Shutter Efficiency*

Dimensions	Percentage	8x10	Inches	35-mm	16-mm
AA	100.00000	6.500	2x2	0.8430	0.2760
AB	30.00000	1.890		0.02529	0.00228
AC	5.55556	0.350		0.0468	0.0153
AD	11.11111	0.700		0.0937	0.0307
AE	16.66667	1.050		0.1405	0.0460
AF	22.22222	1.400		0.1873	0.0613
AG	27.77778	1.750		0.2342	0.0767
AH	33.33333	2.100		0.2810	0.0920
AI	38.88889	2.450		0.3278	0.1073
AJ	44.44444	2.800		0.3747	0.1227
AK	47.22222	2.975		0.3981	0.1303
AL	50.00000	3.150		0.4215	0.1380
AM	55.55556	3.500		0.4683	0.1533
AN	58.33333	3.675		0.4917	0.1610
AO	61.11111	3.850		0.5151	0.1687
AP	63.88889	4.025		0.5386	0.1763
AQ	66.66667	4.200		0.5620	0.1840
AR	133.33333	8.400		1.1240	0.3680
C	25.00000	1.575		0.2108	0.0690
D	83.33333	5.250		0.7025	0.2300
K	1.00000	0.063		0.0084	0.0027
L	0.50000	0.032		0.0042	0.0014
M	17.77777	1.120		0.1499	0.0491
N	4.00000	0.252		0.0337	0.0110
O	1.667	0.011		0.0014	0.0005
P	1.667	0.074		0.0098	0.0032
Q	0.50000	0.032		0.0042	0.0014
R	3.50000	0.221		0.0295	0.0097
S	20.00000	1.260		0.1686	0.0552
T	6.00000	0.378		0.0506	0.0166
U	10.00000	0.630		0.0843	0.0276
V	12.8571	0.810		0.1084	0.0355
W	15.00000	0.945		0.1264	0.0414
X	16.6667	1.050		0.1405	0.0460
Y	18.00000	1.134		0.1517	0.0497
Z	19.0909	1.203		0.1610	0.0527

- 4.2.2 35-mm test films shall have image dimensions in accordance with American National Standard for Motion-Picture Film (35-mm) — Television Image Area, ANSI PH22.96-1984.
- 4.2.3 16-mm test films shall have image dimensions in accordance with American National Standard Dimensions for Television Image Area on 16-mm Motion-Picture Film, ANSI PH22.96-1982.
- 4.3 Black-and-White Border. The dimensions of the black-and-white border shall be as follows:
- 4.3.1 The dimensions (AA and BA) of the black-and-white border for 2x2 in slides are specified as the transmitted image in ANSI/SMPTE 94-1985.
- 4.3.2 For 35-mm motion-picture films, the black-and-white border shall extend to the dimensions specified by Style A in American National Standard for Motion-Picture Film (35-mm) — Camera Aperture Images, ANSI/SMPTE 59-1989.
- 4.3.3 For 16-mm motion-picture films, the black-and-white border shall extend to the dimensions specified in American National Standard for Motion-Picture Film (16-mm) — Camera Aperture Image and Usage, ANSI/SMPTE 7-1988.
- 4.4 Line Widths. The width of the grid lines, the circles, and the diagonals shall be  $0.167 \pm 0.011$  percent of the scanned image height.
- 4.5 Resolution Wedges. The resolution portion of the pattern is shown in detail in Fig. 5. The tolerance of the nominal dimensions of the lines of the wedge shall be  $\pm 0.01$  percent of the scanned image height.
- 4.5.1 The nominal dimensions of the wedge shall be as illustrated in Fig. 5.
- 4.5.2 At any given television line number, the ratio of the width of the black half cycle to that of the white half cycle shall be  $1.00 \pm 0.05$ .
5. Optical Densities
- 5.1 Optical Densities. All optical densities shall be measured in accordance with American National Standard for Photography — Density Measurement — Geometric Conditions for Transmission Density, ANSI PH2.19-1986.
- 5.2 Background. The white background shall be nominally clear.
- 5.3 Grid lines, circles, diagonals, arrows, and lettering shall have a density greater than 1.9.
- 5.4 Resolution Wedges and Black-and-White Border. The resolution wedges and black-and-white border shall have a black density greater than 1.9 and the white shall be nominally clear.
- NOTE 1: The emulsion position shall correspond to the one normally used for the specific format.
- NOTE 2: Test material conforming to this practice is available from the Society of Motion Picture and Television Engineers.

1. Scope
- This practice specifies the method and factors to be considered when measuring and reporting the comparative shutter efficiency (remaining useful light) of 35- and 70-mm projectors.
2. Purpose
- The purpose of this practice is to provide guidelines for the evaluation of projector-shutter performance, either in an operating movie theater or in a test laboratory.
3. General Method
- The general test method is to arrange test equipment for light measurements and take two readings in each point of the pattern described in 5.2, the first with the shutter in normal operation and the second with the shutter stationary, in the full open position.
4. Test Instruments
- 4.1 The meters employed must be linear over the range of the readings to be taken, and not sensitive to shutter frequency.
- 4.2 In a theater, the usual test equipment is a precision foot-candle meter which is calibrated.
- 4.3 In a test laboratory, the usual test equipment is a precision foot-candle meter which is calibrated.
5. Test Set-Up and Pattern
- 5.1 The test instrument described above is to be mounted in a fixed manner, i.e., the foot-candle meter should be on a sturdy tripod, or the foot-candle meter mounted in a fixed mount or pole so that the test location of the reading is identical in the two cases specified in Sec. 3.
- 5.2 The test pattern should be the nine-point group as specified in American National Standard for Audio-Visual Systems — Front Projection Equipment — Method for Measuring Screen Illumination, ANSI PH7.201-1983. This is recommended so that efficiency is different, but important, regions of the screen can be determined.
6. Calculations
- 6.1 Test readings are to be taken at each of the nine points, first with the shutter fixed open (see Appendix A2), and then immediately with the shutter in normal running condition.
- 6.2 Divide the second reading for each point (shutter running) by the first reading for the same point (shutter fixed open). The result is a percentage of shutter efficiency for that point. The nine points must be considered separately, so that variations can be found. For simplicity, the nine readings can be averaged completely, or into three groups — the left three, the center three, and the right three — and reported as an average percentage of shutter efficiency.

**Appendix**

(This Appendix is not part of the SMPTE Recommended Practice, but is included for information only.)

- A1. With standard and generic projector shutters functioning in the 30% range (two-bladed shutters), it is expected that all results will fall in the range of 40 to 60%. Results over 55% and below 45% should be considered suspect and be double-checked.
- A2. Note that operation of a projector without film in the gate and with the shutter in a stationary open position may allow sufficient heat build-up in the lens system to endanger the lens. Therefore, it is recommended that this condition be allowed for only a few seconds at a time, and that measurements be made very quickly under such conditions.

Edge Identification of Leader and Picture for 35-mm Release Prints

Page 1 of 2 pages

1. Scope

This practice specifies the content and location of information to appear on the edge of 35-mm release prints. As continuous platters become more prevalent, projectionists sometimes fail to resplice the leader on the appropriate reel, or resplice it on the incorrect reel. This practice provides enough information in the program area for independent reel identification and to identify the type of sound track on the print.

2. Identification

- 2.1 Content. The identification shall include at least the title of the program, the type of sound track, and the specific reel number. Inclusion of the projection aspect ratio is desirable.
- 2.2 Location. The identification shall appear at least twice on each reel of the release print:

- In the program, 6 to 8 feet after the head leader
- In the program, 6 to 8 feet before the tail leader
- A similar identification shall appear in the leader on each reel of the release print.

The identification shall appear between the perforations and the edge of the film on the sound-track side of the release print, as shown in Fig. 1.

3. Laboratory Procedure

The processing laboratory shall place the identification as described in 2.1 and 2.2 on the sound-track negative before printing (see Fig. 2). The information is then printed on every reel during the release printing operation. In the event that a laboratory has some other system in current use (such as color coding), it is recommended that the marking as indicated in this practice be added.

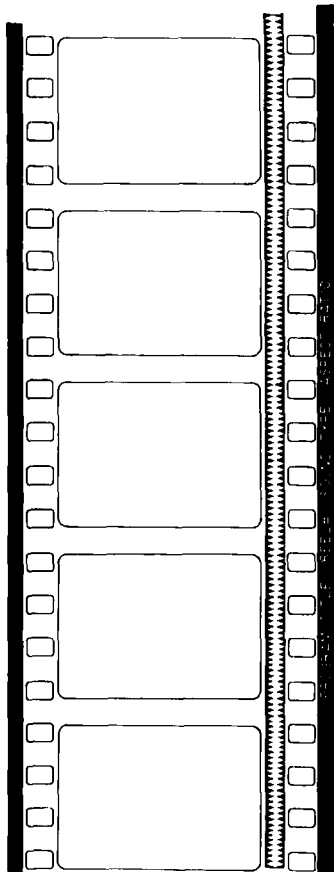


Fig. 1 Release Print

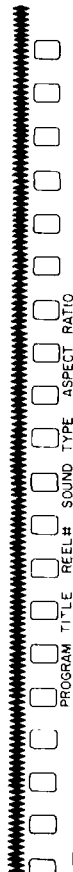


Fig. 2 Sound-Track Negative