committee. Therefore, documents will be circulated to the 16mm and 8mm Committee for review and voting on a technical basis only. Some of the documents will be slightly modified, reflecting technical changes since the last ballot.

Subcommittee reports were received concerning the revision of PH22.159.1, Specifications for Super-8 Motion-Picture Film Cartridge and Cartridge-Camera Fit. Considerable progress has been made to resolve this question and it is likely that a revised draft will be submitted for ballot prior to the next meeting of the Committee.

The Subcommittee concerned with a revision of PH22.159.4, Dimensions and Characteristics of the Take-up Core Drive for Super-8 Motion-Picture Film Camera Cartridges, has also been active and hopes to submit a draft prior to the ISO/TC36 meeting in December 1973.

There was no report concerning the study of 16mm motion-picture image steadiness, nor on the revision and up-dating of nontheatrical equipment.

Mr. Farmer reported on the activities of PH 7 Committee and Mr. Bunchez reported on the work of the Ad Hoc Committee concerned with a universal leader.

G. H. GORDON
Chairman

standards and recommended practices

Proposed SMPTE Recommended Practices

Four Proposed SMPTE Recommended Practices are published here for a trial period and public review.

RP 41, Evaluation of Color Films Intended for Television, is a revision of the earlier issue, only insofar as it has been expanded to specify the technique of using a screen with a surround illumination which provides a standard correlate of the ambient field-of-view of the television screen. The necessary conditions for examining prints for television broadcast are a relatively small picture of a specified color and luminance, surrounded by a relatively large field of the same color at a lower luminance.

The following three proposals are new and should be examined by all concerned:

RP 52, Evaluation of Screen Luminance and Color in Review Rooms Used for Color Television Films, specifies a means for field evaluation of projection screen color and luminance.

RP 53, Scene-Change Notching for Printing 35mm Motion-Picture Film, specifies the commonly used edge notch in laboratory practices.

RP 54, Edge Numbering on 16mm Release Prints, recommends that edge numbering of 16mm prints be done in accordance with American National Standard PH22.83-1972.

Approved International Standard

Published here is a recently approved International Standard, ISO 2863-1973, Cinematography — Motion-Picture Camera Cartridge, 8mm Type S Model II — Run Length of Film — Dimensions and Specifications. It is entirely in accord with U.S.A. practices and an American National Standard in preparation by the Society's 16 and 8mm Committee. A complete copy of this and all International Standards is available from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

Comments on the proposals should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to March 1, 1974. 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*

PROPOSED

SMPTE RECOMMENDED PRACTICE

RP 41
Revision of
RP 41-1970

Evaluation of Color Films Intended for Television

Introduction

The television monitor and the home receiver present relatively small pictures and are usually viewed with other illuminated objects present. Television programming is usually a succession of separate segments presented contiguously. These differences from theatrical viewing and programming call for a different preview condition. The necessary conditions are a relatively small picture of a specified color and luminance, surrounded by a relatively large field of the same color at a lower luminance. The large, visible surround serves two important functions. It provides (1) a standard correlate of the ambient field of view of the television screen, which has a marked effect on the apparent contrast of the picture, and (2) a constant adaptation field against which to refer the color balance of the picture when making judgments of color balance.

The small picture simulates more closely the size and appearance of a television screen, and permits the use of a relatively large surround. This recommended practice differs from RP 41-1970 chiefly in that the concept of a visible surround, which in RP 41-1970 is noted only as an appendix item, becomes an integral part of the recommended practice. The screen luminance is also increased, so that the projected picture corresponds more closely to the luminance of television picture monitors.

This recommended practice conforms closely to practices in other countries. In Canada, CTP 1-1968, Viewing Rooms for Evaluation of 16 mm Color Film for Television, describes such a viewing room. Practices in the European Broadcasting Union are given in Tech 3091-E, Viewing Conditions for the Appraisal, by Means of Optical Projection, of Colour Films Intended for Television Presentation, First Edition, September 1970. Both documents appear in the February 1971 Journal of the SMPTE with examples of implementation.

1. *Scope*

This recommended practice is intended to define the necessary conditions for the color and luminance of open-gate screen illumination, the color and luminance of the surround illumination, the relative size of the surround and screen, and the level of ambient illumination to permit critical evaluation of color balance and contrast of films intended for television use. Such a viewing situation is particularly useful in the selection of the optimum color balance of prints. Because a relatively small screen is specified, such a projection room will not accommodate large audiences. A variation of this practice is recommended which will accommodate large audiences, but which is less critical for quality judgments.

2. *Color and Luminance of Open-Gate Screen*

2.1 Although it is recognized that ultimate reproduction of white in the television system will be at D_{6500}, a screen chromaticity and spectral distribution approximately that of a black body at 5400 ± 400 K shall be used.

2.2 This screen color results from chromatic distribution of the projector light and of the screen reflectance. (See Appendix A1.1)

2.3 To facilitate the illumination of a visual surround, it may be desirable to use a screen of low reflectance, or one with directional properties. (See Appendix A1.2.)

2.4 The luminance of the screen, measured according to American National Standard Screen Luminance and Viewing Conditions for 16 mm Review Rooms, PH22.100-1967, shall be 40 ± 4 footlamberts (137 ± 13.7 candelas per square meter). This luminance will produce, with a film conforming to that specified in SMPTE Recommended Practice RP 46-1972, Density of Color Films and Slides for Television, in the gate, a white luminance of about 20 fL (68 cd/m²) which corresponds approximately to peak white luminance of color television monitors.

2.5 The luminance at a distance of 5 percent of the screen width from the side edges of the screen shall be 90 ± 10 percent of the center luminance.

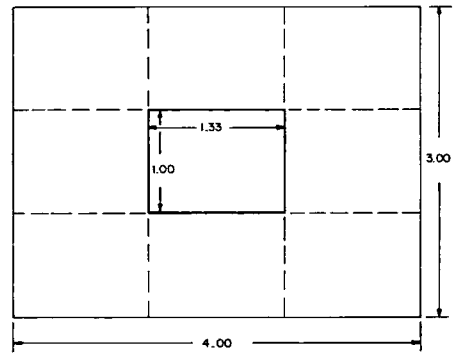
2.6 If a directional screen is used, the viewing audience shall be restricted to that area from which the luminance tolerance is operative.

2.7 A reference illuminated screen, described in Proposed SMPTE Recommended Practice RP 52, Evaluation of Screen Luminance and Color in Review Rooms Used for Color Television Films, may be used to verify or correct the luminance of the projection screen.

3. *Screen Dimensions*

3.1 The viewing screen shall be of such size that the viewing audience may be seated at a distance from the screen equal to 4 to 6 times the screen height. Its size shall be sufficiently small so that a visible surround area of approximately 8 times the screen area is possible (see figure).

3.2 The ratio of screen width to screen height shall be 1.33:1.



Relative Proportions of Screen and Surround

4. *Viewing Distance*

Observers preferably shall be placed so as to view the screen from a distance equal to 4 to 6 times the screen height.

5. *Light Surround*

5.1 Light surround is defined as the light, visible to the observer, which surrounds but does not include the central screen area.

5.2 The area of the light surround shall be preferably at least 8 times the screen area (see figure).

5.3 The luminance of the light surround shall be approximately 1/10 the open-gate screen illumination. (See Appendix A2.1.)

5.4 The color of the light surround shall match that of the open-gate screen illumination. (See Appendix A2.2.)

5.5 The color and luminance of the surround may be verified by comparison with the reference illuminated screen specified in Proposed SMPTE Recommended Practice RP 52.

6. *Ambient Conditions*

6.1 The level of light other than screen illumination and surround shall be such as to be insignificant in comparison to them.

6.2 Light falling on the screen which is reflected to the viewing position shall be low enough so that the unlighted projection screen measures less than 1 fL (3.4 cd/m²). To achieve this, walls should be of low reflectance.

6.3 The viewing room decor preferably should give a generally neutral impression, without dominant colors being employed.

7. *Review Room for Large Audiences*

7.1 When the audience exceeds 10 to 15 persons, it becomes necessary to use a large screen. A large screen makes it impractical to obtain an illuminated surround having eight times the area of the screen. The following recommendations for viewing films in a darkened theater are given with the caution that elimination of the lighted surround reduces the viewer's sensitivity in making judgments of color balance and density, and also affects judgment of contrast. (See Appendix A3.1.)

7.2 Luminance level of the open screen for darkened room viewing shall be 16 ± 2 fL (55 ± 7 cd/m²), measured within the standard observing area with the projector operating with no film in the aperture. (See Appendix A3.2.)

7.3 Spectral distribution of the reflected light from the screen illuminated by the open-gate projector should approximate the spectral distribution of a black body at a color temperature of 5400 ± 400 K. (See Appendix A3.3.)

7.4 The luminance and color of the open-gate screen may be evaluated by comparison with a reference illuminated screen, as described in Proposed SMPTE Recommended Practice RP 52.

Appendix

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

A1. *Screen and Projector Characteristics*

A1.1 The desired color may be obtained using an arc source in the projector. The high intensity carbon arc usually operates at close to 5400 K. The xenon arc will operate closer to 6000 K when fresh, and may change toward 5000 K with age. Another method is to use a blue photometric filter such as the proper thickness of Corning Filter No. 5900 with a projector having a tungsten source, changing its nominal color of about 3500 K to 5400 K.

Color temperature may be verified most easily by comparison with a known reference of 5400 K (see Proposed SMPTE Recommended Practice RP 52) or by measurement using a spectroradiometer. Two- or three-color color temperature meters may not give reliable results with xenon illumination or other sources which depart from black-body spectral quality.

A1.2 The choice of screen material will depend on projection illumination available and the method chosen to provide surround illumination. If the projection source is tungsten, filtered to 5400 K by a supplementary filter over the lens, only a directional, high-gain screen will provide sufficient open-gate screen luminance. If the source is a xenon arc capable of a beam output of the order of 100 lumens, a matte white screen can be used. If 500 lumens are available, a 20-percent reflection gray screen can be used. Both the 20-percent matte gray screen and the directional high-gain screen make it possible to achieve the desired black level on the unlighted screen, in the presence of some ambient light. This practice does not preclude the use of rear projection screens, provided uniformity of illumination can be achieved.

For aesthetic reasons, a screen mask may be desired. If used, it should preferably be black, and not more than three or four inches wide.

A2. *Light Surround*

A2.1 The level of surround luminance ideally should approximate average picture luminance. This is most frequently about ⅛ to ¼ the picture white luminance, although it can vary widely, so a value of 1/10 the open screen luminance is one valid compromise. This level (of about 4 fL [13.7 cd/m²]) may be measured directly, or it may be checked relative to screen luminance by placing a 1.0 density neutral, nonscattering filter over the projection lens. This attenuates the screen luminance by the factor of 10, allowing a visual match with the surround.

Alternatively, the low-level setting of the reference illuminated screen specified in Proposed SMPTE Recommended Practice RP 52, can provide a visual reference for the surround.

The uniformity and shape of the surround field is not critical so long as the area surrounding the screen (8X screen area) is in the desired luminance range.

A2.2 It is important that the surround match the screen for color. The use of the 1.0-density filter over the projector, permitting a visual match of screen with surround, is the easiest and most accurate way to verify such a match. It is necessary, however, that the filter used introduce no color. A filter of evaporated metal, such as Inconel, can fill this requirement.

Surround illumination may be obtained in several ways. It can be a transilluminated panel. Front illumination can be used, providing the screen itself is not lighted. This can be achieved by placing the screen in a plane in front of the surround plane, with surround lights behind the screen. It can also be achieved by projecting surround light with specular optics, masking out the screen area. Or, it can be achieved if a directional, high-gain screen is used, by proper placement of overhead light, using readily available fluorescent tubes operating at 5500 K.

A2.3 When problems in room design prevent achievement of the full surround format and geometry, some compromise in uniformity of surround illumination and in centering of the screen in the surround area may still permit the essential performance of this review room.

A3. *Compatibility*

A3.1 Experiments have established that the same color balance and density for prints is preferred under the larger screen, darkened room condition as under the smaller screen, lighted-surround condition. However, it is possible, because of visual adaptation, for an observer in the darkened room to judge as acceptable some prints which would be recognized as less acceptable or unacceptable in the presence of the lighted surround.

A3.2 The luminance level of the review room for large audiences is the same as that previously specified for 16 mm and 35 mm review rooms (American National Standard Screen Luminance and Viewing Conditions for 16 mm Review Rooms, PH22.100-1967, and American National Standard Screen Luminance and Viewing Conditions for 35 mm Review Rooms, PH22.133-1969 (R-1963)).

A3.3 This spectral distribution is the same as that specified for 35 mm review rooms (ANSI PH22.-133-1969). This ensures that the color balance of both 16 and 35 mm films intended for television shall be similar.

A3.4 Although these preview room recommendations are intended to enable a viewer to predict the suitability of a film for television use, these recommendations are not intended to simulate television display exactly.

A3.5 Use of a Subjective Reference Test Film as a visual reference is recommended (J. M. Waner and E. P. Ancona, Jr., "SMPTE Color Television Subjective Reference Test and Slides," Jour. SMPTE, 75: 218-220, March 1966 and "SMPTE Color Television Subjective Reference Test Films and Slides," Jour. SMPTE, 76: 686-688, July 1967). Since these films are color and density balanced for this recommended practice, they should provide a valid comparison reference.

PROPOSED

SMPTE RECOMMENDED PRACTICE

RP 52

Evaluation of Screen Luminance and Color in Review Rooms Used for Color Television Films

1. *Scope*

This recommended practice specifies a means for field evaluation of projection screen apparent color and luminance as specified in SMPTE Recommended Practice RP 41, Evaluation of Color Films Intended for Television.

2. *Equipment*

2.1 The screen color and luminance shall be evaluated by comparison with a translucent rear-illuminated screen of the color designated in RP 41.

2.2 The comparator shall be capable of being adjusted to three luminance levels without changing the color: 4, 16 and 40 footlamberts (14, 55 and 137 candelas per square meter).

2.3 The described instrument shall have a screen no smaller than 10 x 10 inches (25 x 25 cm). It shall have a voltmeter and a manually operated voltage control or shall be so constructed as to vary no more than 1 fL (3.4 cd/m²) with a 10-volt variation in the feed line.

2.4 A set of four viewing filters shall be part of the equipment. The filters are for the purpose of defining the limits of tolerance specified in RP 41, and shall be so designed that one increases color temperature, one decreases color temperature, and the other two are of a color on the green-magenta axis, essentially perpendicular to the black body locus on the CIE Chromaticity Diagram, and of such density as to change the color coordinates by one half the amount of the first two named filters (see Appendix).

3. *Calibration*

The described comparator shall be calibrated against a laboratory standard source of 5400 K color temperature and spectral distribution. It shall match the standard within a tolerance limit of ± 10 mired and ± CC.025G.

4. *Operation*

4.1 In practice, the comparator is placed adjacent to the projection screen and compared while the projector is running with no film. For film review rooms, luminance is set at 16 or 40 fL (55 or 137 cd/m²), depending upon which screen condition is desired (see RP 41).

If the screen does not match the comparator luminance, the projector luminance level shall be adjusted to match.

If the color still does not match, viewing the comparator screen through the yellow or blue filter held far enough from the eye to cover only the comparator field will give an evaluation as to the limits of tolerance of color temperature specified in RP 41. Use of the green or magenta filters will give an evaluation as to the permissible deviation from the black body locus.

4.2 The 4 fL (14 cd/m²) luminance level may be used as a luminance and color reference for the surround illumination specified in RP 41. It may also serve as an adaptive color reference during projection.

Appendix

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

In the writing of RP 41, difficulties in measurement of screen color temperature and luminance became apparent. Particularly with increased use of xenon arcs, heat-rejecting mirrors and other optical equipment altering the spectral distribution of illumination, it is becoming necessary also to evaluate the light in terms of its observed deviation from the black-body locus. Correlated color temperature is no longer a sufficient specification although, as yet, there is no standard specification of tolerance for deviation. The green and magenta filters specified in this practice provide a means for evaluating the magnitude of the deviation. Since it is easier for nontechnical people to visualize color differences when displayed, rather than by description in terms of color temperature, printer light points or filter packs by name only, it was suggested that a visual reference might suffice. Subsequently, it was determined that an illuminator similar to that specified in American National Standard Direct Viewing of Photographic Color Transparencies, PH2.31-1969, would be of value.

The instrument is a color and luminance reference; it is not intended to measure spectral distribution or to give an accurate measurement of the difference between screens. Its purpose is solely to determine readily the suitability of a given projection condition for use in evaluation of films for color television. The instrument would serve equally well for evaluation of projection conditions for theatrical color films where the same standards of color and luminance apply.

Filters suitable for defining limits of tolerance are the Wratten Photometric Series 81 and 82. CC-M and CC-G. 81A lowers 5400 K to 4940 K and 82A raises 5400 K to 5980 K. As shown on the CIE Chromaticity Diagram, CC05M and CC05G are approximately the correct magnitude, although they do not change the CIE color coordinates exactly perpendicular to the black body locus.

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 53

Scene-Change Notching for Printing 35 mm Motion-Picture Film

1. *Scope*

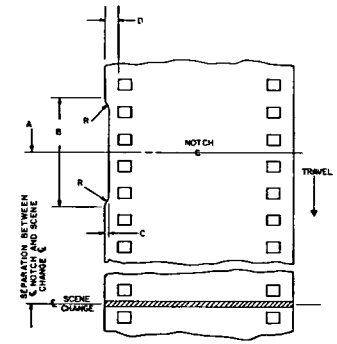
This recommended practice specifies the dimensions and location of a scene-change notch for actuating the printer light-change mechanism when printing 35 mm motion-picture film.

2. *Dimensions and Location*

2.1 The dimensions and location of the scene-change notch shall be as given in the figure and table.

2.2 The scene notch centerline shall be 4.5 in (114 mm) after the scene change with respect to the direction of film travel through the printer.

2.3 For forward and backward printing, a second notch placed in accordance with 2.1 may be added to the opposite edge of the film, and (observing the change in direction of travel) the centerline distance between the two notches shall be two times Dimension A.



FILM AS VIEWED EMULSION UP

Dimensions	Inches	Millimeters
A	4.500 ± 0.012	114.30 ± 0.30
B	1.000 ± 0.012	25.40 ± 0.30
C	0.047 $^{+\ 0.000}_{-\ 0.007}$	1.19 $^{+\ 0.00}_{-\ 0.18}$
D	0.079 nom	2.01 nom
R	0.500 $^{+\ 0.000}_{-\ 0.060}$	12.70 $^{+\ 0.00}_{-\ 1.52}$

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 54

Edge Numbering on 16 mm Release Prints

1. *Scope*

This recommended practice covers the size, type and frequency of numbers placed on 16 mm release prints. The purpose of these numbers is usually to determine specific locations on multiple-copy release prints of the same subjects.

2. *Specifications*

2.1 The size, type and location of the numbers shall be as specified in American National Standard Specifications for Location and Spacing of Edge Numbers on 16 mm Motion-Picture Film, PH22.83-1972.

2.2 The frequency of the numbers for release print use shall be 40 frames, with each number increasing one digit from a 0000 start at the head of the print consecutively to the end of the print. In this manner, the numbers represent a footage scale on the print.

Note: Other numbers may appear on the release prints. These numbers may be at different intervals than 40 frames, may differ in sequence and magnitude, and have no relation to the function of footage numbers for release print footage purposes.

THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY

Cinematography — Motion-picture camera cartridge, 8 mm Type S Model II — Run length of film — Dimensions and specifications

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the camera run length of film supplied in an 8 mm Type S Model II film camera cartridge of 15 m (50 ft) nominal capacity, and the length of film returned to the customer. Its purpose is to provide a uniform basis for the operation of the film metering mechanisms in cameras.

2 REFERENCES

ISO 1700, *Cinematography — 8 mm Type S motion-picture raw stock film — Cutting and perforating dimensions.*

ISO 1787, *Cinematography — Camera usage of 8 mm motion-picture film perforated Type S.*

ISO 3025, *Cinematography — Motion-picture camera cartridge, 8 mm Type S Model II — Film load position.*[1]

ISO . . ., *Cinematography — Location and area of the image formed by the camera aperture and maximum area available for projection for 8 mm Type S motion-picture film.*[2]

ISO . . ., *Cinematography — Camera cartridge, 8 mm Type S Model II — Slots and projection for film speed, cartridge hole and projection for film identification and colour balancing filter — Dimensions and positions.*[2]

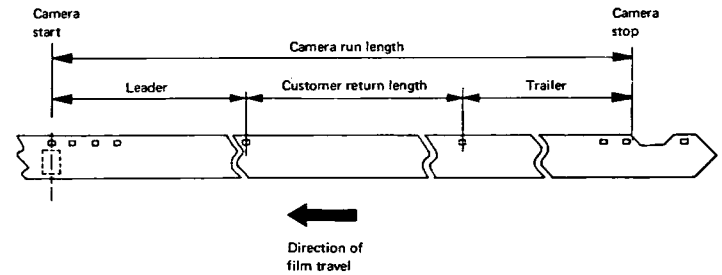
ISO . . ., *Cinematography — Motion-picture camera cartridge, 8 mm Type S Model II — Cartridge fit and take-up core drive — Dimensions and specifications.*[2]

3 SPECIFICATIONS

3.1 The camera run length of the film can vary between 3 670 perforation pitches (15,5 m or 51 ft) and 3 710 perforation pitches (15,7 m or 51.5 ft). The overall length of the film in the cartridge is to be determined by the manufacturer to provide for the camera run length specified.

NOTE — A nominal perforation pitch, based on 72 pitches per foot, of 4,234 mm (0.166 7 in) is assumed for all specifications of the number of perforation pitches in a given film length.

3.2 The processed film returned to the customer shall consist of at least 3 600 pitches (15,24 m, 50.0 ft), the customer return length. The customer return length is that part of the camera run length available for subject matter. It shall commence following a leader of approximately 35 pitches, 148 mm (5.8 in) measured from the frame in the camera aperture as the cartridge is supplied by the manufacturer, and end about 35 pitches, 148 mm (5.8 in), short of the final frame of the camera run length as limited by the perforation cut-out (see Appendix).



NOTE — The start of the film should have a suitable visual marking in the frame area. The end of the film should have the perforations cut out over a length of two pitches minimum, so that the film will stop in the camera aperture. The cutout also gives the user a visual confirmation that all film has been exposed.

1) At present at the stage of draft.

2) In preparation.