Table 2
Dimensions Common to Spools in Table 1

	Dimensions	Inches	Millimeters
A	Keyway depth	0.30 $^{-0.04}_{-0.00}$	7.6 $^{+1.0}_{-0.0}$
B	Keyway width	0.12 $^{+0.02}_{-0.00}$	3.0 $^{+0.5}_{-0.0}$
C	Side of square spindle hole	0.317 $^{+0.006}_{-0.000}$	8.05 $^{+0.15}_{-0.00}$
D	Spindle hole diameter	0.317 $^{+0.006}_{-0.000}$	8.05 $^{-0.15}_{-0.00}$
F	Film slot (See 4.1)	0.03 $^{-0.03}_{-0.00}$	0.8 $^{-0.8}_{-0.0}$
H_1	At periphery	0.632 $^{-0.014}_{-0.000}$	16.05 $^{+0.36}_{-0.00}$
H_2	Distance between flanges at spindle holes	0.630 min	16.00 min
J	Overall thickness at spindle holes	0.73 $^{+0.00}_{-0.02}$	18.5 $^{+0.0}_{-0.5}$
P	(See Note 5)	0.020 max	0.51 max

4. Specifications

4.1 Dimension F represents a slot in the spool core for attaching film. Its sides shall be straight, parallel, and 0.028 to 0.059 in (0.71 to 1.50 mm) apart. It is permissible for the slot sides to diverge in the center portion of the slot. Any divergence shall not be greater than one half the width of the slot.

4.2 Dimension J is the thickness of the spool within the K diameter zone, which is centered on the spindle hole axis of each flange.

4.3 The eccentricity of the core with respect to the spindle hole axis shall not exceed a total radius variation (total indicator reading) of 0.030 in (0.76 mm) for all spool sizes.

NOTE 1: The Style 2 configuration of spindle holes is recommended as the preferred standard for future design.

NOTE 2: Flanges shall be opaque and their inner surfaces shall have a low-reflectance characteristic.

NOTE 3: If the spool or spool hub is made from plastic or other dimensionally unstable material, spindle hole Dimensions C and D shall be adjusted so that at least the minimum dimension is maintained throughout the normal use range of temperature and humidity.

NOTE 4: Rivet heads or other fastening devices, which extend beyond the outer surface of the flange, shall lie outside the K diameter zone but within the boundaries defined by the Volume of Rotation Diagram (i.e., 0.770 in [19.56 mm] max).

NOTE 5: A reference plane of rotation for each flange is defined by a plane perpendicular to the axis of the spindle and coincident with the surface of a flat 0.590 in (14.99 mm) diameter support in contact with flange and centered on the spindle hole axis of the flange. Dimension P is the distance measured outwardly from this reference plane of rotation to the farthest plane of rotation generated by any point on the flange outside the K diameter zone when the spool is rotated on an accurate, tight-fitting spindle.

NOTE 6: The maximum effective thickness of spools (including all the characteristics mentioned in Note 5) outside the K diameter zone has not been stated because it is a function of a spool's specific J value between the 0.590 in (14.99 mm) diameter reference zones on each flange. The largest such overall effective thickness, however, will be J max + 2P max = 0.770 in (19.56 mm).

NOTE 7: There may be other cutouts or holes in the hub area of the flanges within the limits of Dimension K, provided the spool remains nominally in dynamic balance.

SMPTE RECOMMENDED PRACTICE — RP 19–1987

Specifications for 8-mm Type R Registration Test Film

1. *Scope*

1.1 This practice specifies the subject material and the dimensions and location of the subject material for an 8-mm Type R test film of high accuracy to assist the user in achieving several quantitative visual tests. (See Appendix A1.)

1.2 The film can be used to test motion-picture projectors and printers.

2. *Dimensions*

The dimensions and location of the target areas shall be as specified in the figures. The patterns in Figs. 3 and 4 appear in the five circular areas of the test pattern shown in Figs. 1 and 2.

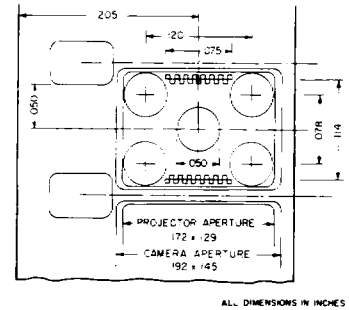

Fig. 1

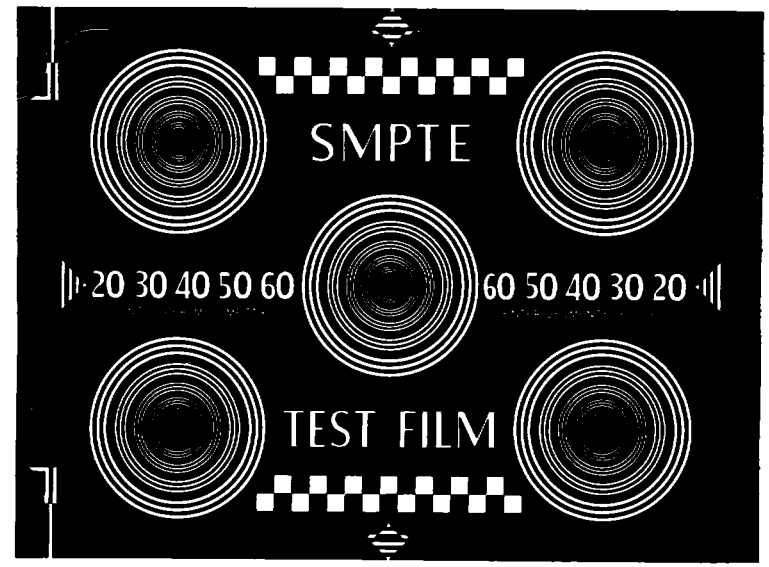

Fig. 2

Revision of RP 19-1982
Approved September 25, 1987

3. *Description*

3.1 The test film shall be produced as a camera original film photographed on high-contrast, high-definition, positive-type motion-picture stock made in accordance with American National Standard Dimensions for 16-mm Motion-Picture Film Perforated 8-mm Type R, 2R, ANSI PH22.17-1982.

3.2 The diffuse density of the background area shall be 1.80 ± 0.10.

3.3 The camera and projector image areas shall be in accordance with American National Standard for Motion-Picture Film (8-mm Type R)—Camera Aperture Image, ANSI PH22.19-1983 and American National Standard for Motion-Picture Film (8-mm Type R)—Projectable Image Area, ANSI/SMPTE 234-1987.

3.4 The resolution targets shall be photographed in a magnification which results in the concentric rings reading in lines per millimeter on the film (20, 30, 40, 50, and 60). The rosette in the center shall indicate a measurement from 60 to 240 lines per millimeter. (See Appendix A6.)

Note: A test film made in accordance with this practice is available from the Society of Motion Picture and Television Engineers.

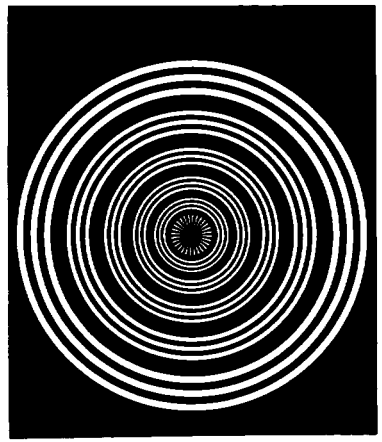

Fig. 3

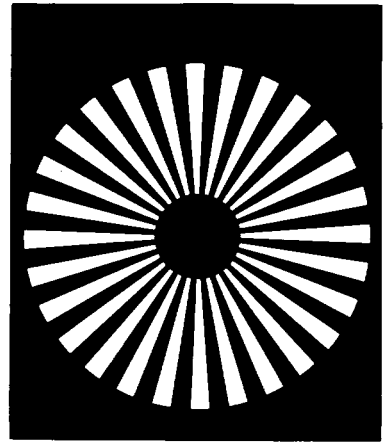

Fig. 4

Appendix

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

A1. Visual Tests. The following quantitative visual tests can be performed:

Tests	*Projector*	*Printer*		
		Contact Continuous	Step	Optical Step
Steadiness (jump and weave)	X	X*	X	X
Aperture alignment	X	X	X	X
Double-exposure alignment		X	X	X
Shutter adjustment (travel ghost)	X			X
Framing accommodation	X			X
Focus	X			X
Resolution	X	X	X	X
Field flatness	X	X	X	X

* The perforation pitch of the test film is not optimum for continuous contact printers and its value for this purpose may be limited.

A2. Magnification. If the image of the test film target is projected to 30 x 40 in (762 x 1016 mm), it will be enlarged 230 times.

A3. Jump and Weave. The triangular areas in the centers of the vertical and horizontal framelines can be used to measure jump and weave and aperture misalignment. Each line in these areas is 0.001 in (0.03 mm) wide. The lines are spaced 0.001 in (0.03 mm) apart.

A4. Aperture Centering and Size. The inner rectangle represents the nominal projectable area.

A5. Travel Ghost. The white blocks are 0.005 in (0.13 mm) square and will quickly indicate travel ghost caused by incorrect shutter adjustment. They also provide a quick check on the ability to frame above and below center position. Travel ghost is a blurring effect seen on the screen and evidenced by vertical tails or light streaks added to the projected images of the more transparent areas on the test film. It is caused by the projector shutter being out of synchronism with the intermittent mechanism. If the ghost is above the blocks, the shutter closes late; if the ghost is below the blocks, the shutter opens early.

A6. Resolution. Resolving power in lines per millimeter can be read directly from the test target to the limit permitted by the film stock used. Resolution targets are spaced one in the center and one in each of the four corners. The outside diameter of the target on the film is 0.050 in (1.27 mm) and will fill the area covered by an average microscope using a 10X objective. (See 3.4.)

A7. Field Flatness. Side-to-side out-of-focus is determined from the difference in softness of the sides. Quantitative differences can be determined from resolution charts. Circle charts at the middle of the field permit quick focus adjustment and detection of in- and out-of-focus effects.

A8. Striping. The user may apply magnetic record and balance stripes to this film by post-process means. If this is done, the dimensions of the film image should be checked to determine if change has been produced by the striping process. It is anticipated that striping will not affect significantly the performance of the test film. However, the user is cautioned that the proximity of the film image to the limiting aperture may be altered due to striping thickness. Also, the frictional characteristics of the test film may be changed, which could affect film transport in the user's apparatus.

SMPTE RECOMMENDED PRACTICE — RP 20–1987

Specifications for 16-mm Registration Test Film

1. *Scope*

1.1 This practice specifies the subject material and the dimensions and location of the subject material for a 16-mm test film of high accuracy to assist the user in achieving several quantitative visual tests. (See Appendix A1.)

1.2 The film can be used to test motion-picture projectors and printers.

2. *Dimensions*

The dimensions and location of the target areas shall be as specified in the figures. The patterns in Figs. 3 and 4 appear in the nine circular areas of the test pattern shown in Figs. 1 and 2.

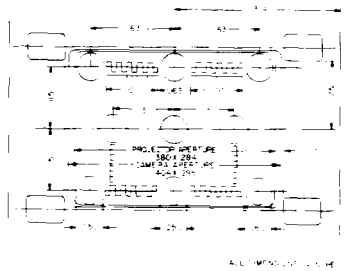

Fig. 1

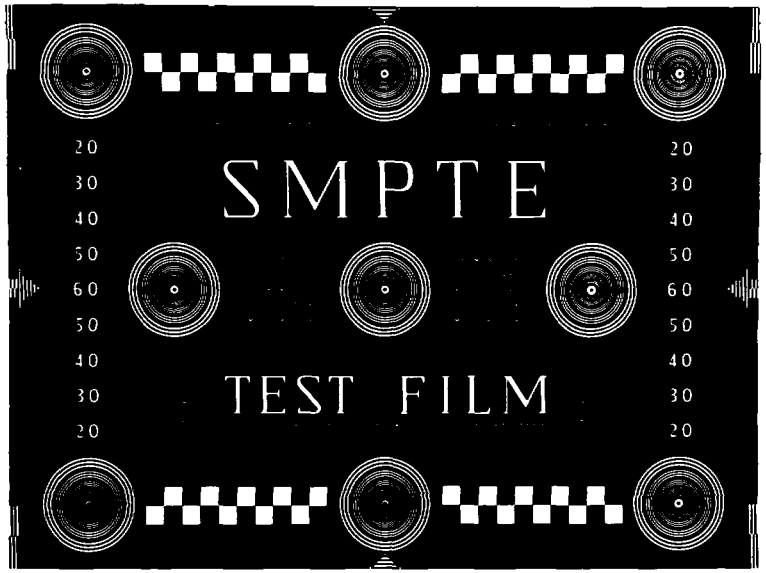

Fig. 2

Revision of RP 20-1982
Approved September 25, 1987

3. *Description*

3.1 The test film shall be produced as a camera original film photographed on high-contrast, high-definition, positive-type motion-picture stock made in accordance with American National Standard for Motion-Picture Film (16-mm)—Perforated 2R, ANSI/SMPTE 110-1986.

3.2 The diffuse density of the background area shall be 1.80 ± 0.10.

3.3 The camera and projector image areas shall be in accordance with American National Standard for Motion-Picture Film (16-mm)—Camera Aperture Image, ANSI PH22.7-1983, and American National Standard for Motion-Picture Film (16-mm)—Projectable Image Area, ANSI/SMPTE 233-1987.

3.4 The resolution targets shall be photographed in a magnification which results in the concentric rings reading in lines per millimeter on the film (20, 30, 40, 50, and 60). The rosette in the center shall indicate a measurement from 60 to 240 lines per millimeter. (See Appendix A6.)

Note: A test film made in accordance with this practice is available from the Society of Motion Picture and Television Engineers.

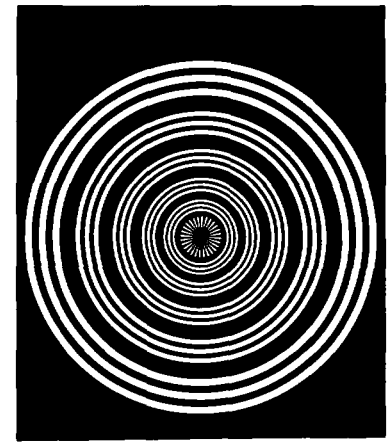

Fig. 3

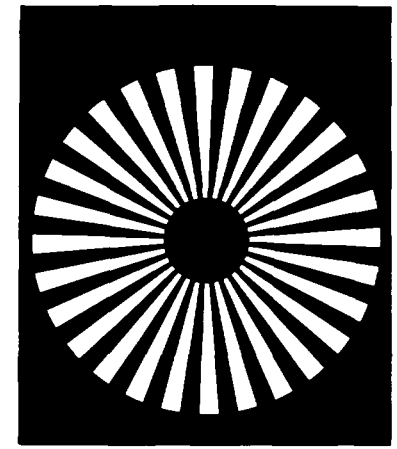

Fig. 4