groups and the timing impulses should be thoroughly magnetized on the magnetic film, up to saturation. The crosstalk from the control signal track to the adjacent soundtrack ought to be not greater than −70 dB in this case, with appropriate audio evaluation, which however should be possible with the great distance between the two tracks, by means of magnetic shielding in the multitrack head.

*2.4. Evaluation of the Time Information During Synchronous Cutting*

For reading and decoding on the cutting table, indentical information is available from the picture film and from the magnetic film. The picture film can be scanned with a light slit optical system, similar to photographic soundtrack scanning, but in this case the timing impulse required for the decoding must be generated by a sprocket drum driven by the film. The combination of the light slit optical system and the sprocket drum to form a unit construction should be attempted for the sake of saving space. The amplitude of the signals produced in such a scanning device is independent of the running speed of the film, and could be evaluated down to a standstill. In order to obtain the same results in the case of magnetic film, the time track has to be checked with a flux-dependent magnetic head. Since the head must differentiate between only three levels, a head with a resonance generator, which is not readily used in general applications because of its poor efficiency, can be provided for this purpose, by optimum dimensioning of the split poles. With these prerequisites, the same apparatus could be introduced for decoding and time indicating, for picture and sound.

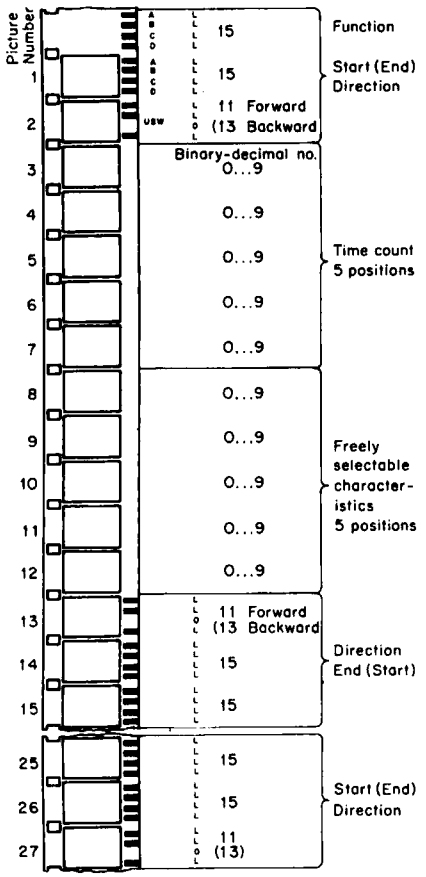


**Fig. 6. Arrangement of the code.**

*2.5. Breakdown of the Binary Marking System for Picture and the Sound.*

For the marking of the time information, in one-second steps for a production time of a maximum of ten hours, 5 decades of numbers are necessary: namely hours, tens of minutes, single minutes, tens of seconds and single seconds. In consideration of this coding, markings of a length of five picture frames, corresponding to about 4 cm of the magnetic tape become necessary. However, since five times the length is available in each second, other freely codable numbers could be recorded. If another five number positions are provided for this purpose, the same decoding and time indicating unit could be used as for the time information. However, recording of this additional information is sensible only on the film side, since with the use of several cameras with one sound recorder the possibility of recognition is given only from the camera side. The recording of the entire coding information would then require only 16 pictures per second, if the binary 15 is used as the code number for the on-off functions, and the binary 11 is used as forward-backward information. The code proposal according to Fig. 6 should also represent a favorable compromise between the information content and the required expenditure, with respect to partial automated editing.

# standards and recommended practices

## SMPTE Recommended Practices Approved

On February 3, 1972, the Society's Board of Governors approved three SMPTE Recommended Practices: RP 27.3-1972, Specifications for Safe Action and Safe Title Areas Test Pattern for Television Systems, RP 27.4-1972, Specifications for Operational Test Pattern for Checking Jitter, Weave and Travel Ghost in Television Projectors, and RP 27.5-1972, Specifications for Mid-Frequency Response Test Pattern for Television.

These were developed by the Television Committee as part of a series of precision patterns. A Subcommittee report describing this work was published in the December 1967 *Journal*.

## SMPTE Recommended Practices Reaffirmed

On February 3, 1972, the Society's Board of Governors, taking the recommendation of the SMPTE Engineering and Standards Committees, reaffirmed without change SMPTE Recommended Practices RP 23-1967, Reinforcement of 70mm Positive Splices and RP 24-1967, Dimensions for 16mm Motion-Picture Camera Spindles, which were published in the July 1967 *Journal*.

Copies of these and other SMPTE Recommended Practices may be obtained from Society Headquarters upon request. — A.E.A.

# SMPTE RECOMMENDED PRACTICE — RP 27.3–1972

## *Specifications for Safe Action and Safe Title Areas Test Pattern for Television Systems*



1. *Scope*

This Recommended Practice specifies the format, dimensions and optical densities for a test pattern in accordance with SMPTE Recommended Practice RP 8-1968, Safe Action and Safe Title Areas for Television Transmission.

2. *Purpose*

This Recommended Practice specifies a test pattern which indicates the safe action image area within which all significant action must take place and the safe title image area within which the more important information must be confined to ensure visibility of the information on the majority of home television receivers.

3. *Format*

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

3.2 Area Limit Markings. Dashed lines having the shape and dimensions shown in the figures and table shall be provided to indicate the boundaries of the safe action and title areas.

3.3 Arrows and Border. The eight boundary arrows and border define the edge of the test pattern area and the scanned area.

3.4 Pattern Identification. The identification number of this document shall appear on the pattern as specified in the figures.

4. *Dimensions*

4.1 Test Pattern. The dimensions of the test pattern shall be as shown in Fig. 2 and the table in percentages of frame height and reproduced with a tolerance of ± 2 percent of the frame height.

4.1.1 The area identification marks shall be positioned symmetrically on the centerlines of the image area as specified in 4.4 within ± 2 percent of the respective dimension.

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 Category 3 dimensions, as specified in American National Standard Dimensions and Optical Specifications of Test Slides and Transparencies for Television, PH22.144-1965 (Reaffirmed 1969).

4.2.2 35mm test films shall have image dimensions in accordance with American National Standard Dimensions for Television Image Area on 35mm Motion-Picture Film, PH22.95-1963 (Reaffirmed 1969).

4.2.3 16mm test films shall have image dimensions in accordance with American National Standard Dimensions for Television Image Area on 16mm Motion-Picture Film, PH22.96-1963 (Reaffirmed 1969).

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



*Approved February 1972*





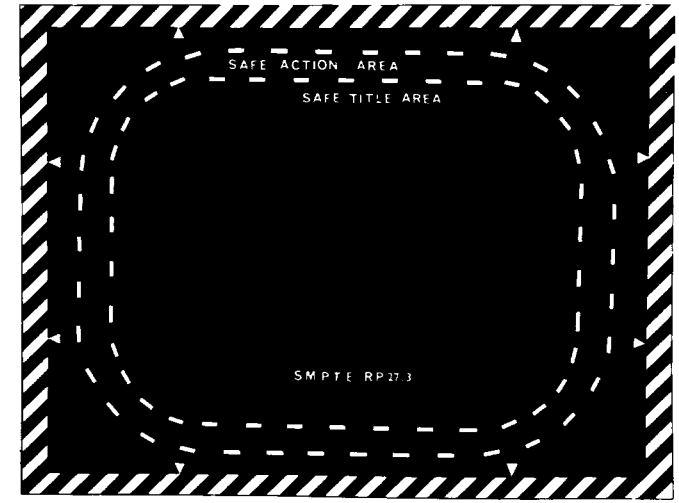


**Figure 1**
**Reproduction of Test Pattern**

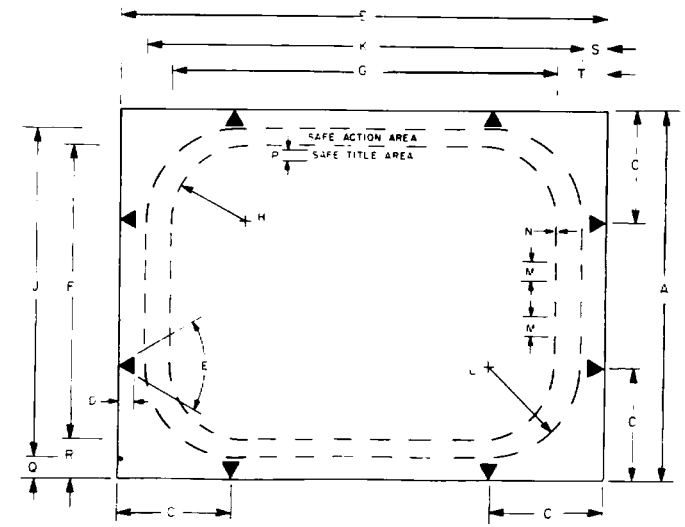


**Figure 2**
**Dimensional Drawing of Test Pattern**

| | Dimensions | Percent | Inches 2x2 | 35mm | 16mm |
|---|---|---|---|---|---|
| A | Scanned image height | 100.0 | 0.843 | 0.594 | 0.276 |
| B | Scanned image width | 133.3333 | 1.124 | 0.792 | 0.368 |
| C | Position of arrow | 30.0 | 0.253 | 0.178 | 0.083 |
| D | Arrow length | 4.0 | 0.034 | 0.024 | 0.011 |
| E | Arrow shape in degrees | | 40.0 | 40.0 | 40.0 |
| F | Height of safe title area | 80.0 | 0.674 | 0.475 | 0.221 |
| G | Width of safe title area | 106.0 | 0.894 | 0.630 | 0.293 |
| H | Corner radius, safe title area | 21.0 | 0.177 | 0.125 | 0.058 |
| J | Height of safe action area | 90.0 | 0.759 | 0.535 | 0.248 |
| K | Width of safe action area | 120.0 | 1.012 | 0.715 | 0.331 |
| L | Corner radius, safe action area | 24.0 | 0.202 | 0.143 | 0.066 |
| M | Length and spacing of lines | 5.0 | 0.042 | 0.030 | 0.014 |
| N | Width of line | 0.5 | 0.004 | 0.003 | 0.0014 |
| P | Height of letters | 2.5 | 0.021 | 0.015 | 0.007 |
| Q | Vertical position of action area | 5.0 | 0.042 | 0.030 | 0.014 |
| R | Vertical position of title area | 10.0 | 0.084 | 0.059 | 0.028 |
| S | Horizontal position of action area | 6.67 | 0.056 | 0.040 | 0.018 |
| T | Horizontal position of title area | 13.33 | 0.112 | 0.079 | 0.037 |

4.3.1 Height and width dimensions of the black-and-white border for 2x2 in slides are specified in ANSI PH22.144-1965.

4.3.2 For 35mm motion-picture films, the black-and-white border shall extend to the dimensions specified by Style A in American National Standard Dimensions of 35mm Motion-Picture Camera Aperture Images, PH22.59-1966.

4.3.3 For 16mm motion-picture films, the black-and-white border shall extend to the dimensions specified in American National Standard Dimensions of 16mm Motion-Picture Camera Aperture Image, PH22.7-1964 (Reaffirmed 1969).

4.4 Line Width. The line width of the area limit marks shall be 0.050 ± 0.05 percent of picture height.

4.5 Lettering. The lettering shall be bold and of a style and size shown in the figures.

5. *Optical Densities*

5.1 Optical Densities. All optical densities shall be measured in accordance with American National Standard Method of Determining Transmission Density of Motion-Picture Films, PH22.27-1960 (Reaffirmed 1969).

5.2 Background. The black background shall have a density greater than 1.9.

5.3 The density of the dashes, arrows and lettering shall be between 0.3 and 0.4.

NOTE: The emulsion position shall correspond to the one normally used for the specific format.



# SMPTE RECOMMENDED PRACTICE

# RP 27.4–1972

## *Specifications for Operational Test Pattern for Checking Jitter, Weave and Travel Ghost in Television Projectors*



1. *Scope*

This Recommended Practice specifies the format, dimensions and optical densities for a test pattern transparency to be used as an operational tool for measurement of television film projector image stability.

2. *Purpose*

2.1 This Recommended Practice specifies a test film to facilitate day-to-day operational checking of travel ghost, weave, and jitter in 35mm and 16mm television projectors.

2.1.1 Jitter Steps. The steps at the top and bottom of the pattern are used for measuring picture jitter vertically.

2.1.2 Weave Steps. The steps at the right and left of the pattern are used for measuring picture weave horizontally.

2.1.3 Central Window. The central window or rectangular area in the center of the pattern shall be used for measurement of jitter and weave with a grating pattern or a line selector on an oscilloscope.

3. *Format*

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

3.2 Window Configuration. The windows shall be staggered so that any trailing or travel ghosts due to the projector shutter opening early or late can be seen above or below the windows.

3.3 Pattern Identification. The identification number of this document shall appear on the projected image in the area specified in the figures.

4. *Dimensions*

4.1 Test Pattern. The dimensions of the test pattern shall be as shown in Fig. 2 and the table in percentages of frame height and reproduced with a tolerance of ± 2 percent of the frame height.

4.1.1 Tolerances. The camera shall be capable of producing an image positioned in relation to the perforations within ± 0.025 percent of picture height for 35mm and ± 0.05 percent of picture height for 16mm film.

4.2 Test Film. The test film shall be a camera original film photographed on high-definition, positive motion-picture stock made in accordance with American National Standard Dimensions for 35mm Motion-Picture Film, KS-1870, PH22.36-1964 (Reaffirmed 1969), and American National Standard Dimensions for 16mm Motion-Picture Film, 2R-3000, PH22.5-1964 (Reaffirmed 1969).



*Approved February 1972*

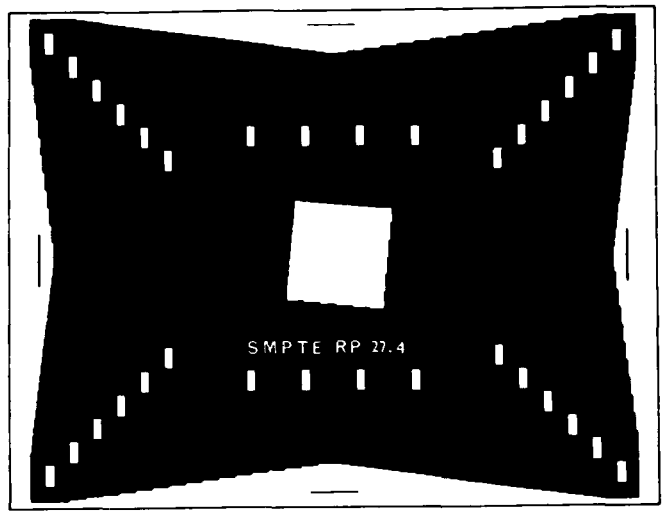


**Figure 1**
**Reproduction of Test Pattern**

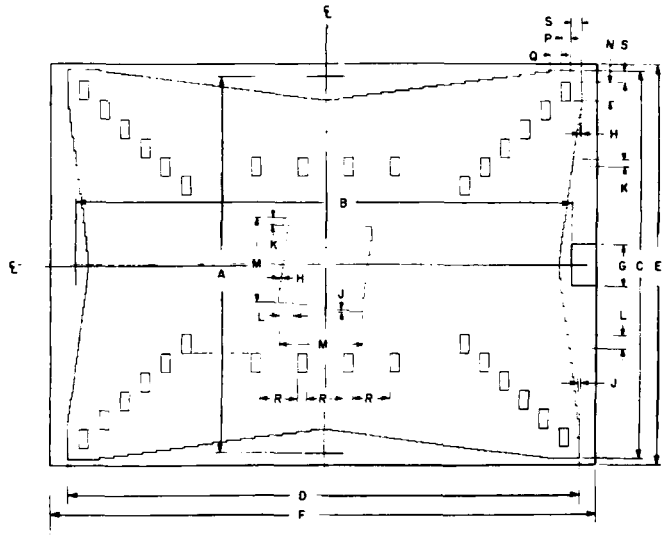


***Figure 2***
**Dimensional Drawing of Test Pattern**





| | Dimensions | Percent | Inches 35mm | Inches 16mm |
|---|---|---|---|---|
| A | Scanned area height | 100.00 | 0.594 | 0.276 |
| B | Scanned area width | 133.3333 | 0.792 | 0.368 |
| C | Projector image height | | 0.612 | 0.285 |
| D | Projector image width | | 0.816 | 0.380 |
| E | Camera image height | | 0.631 | 0.295 |
| F | Camera image width | | 0.868 | 0.404 |
| G | Line length | 11.25 | 0.067 | 0.031 |
| H | Half-step width | 0.25 | 0.0015 | 0.0007 |
| J | Full-step width | 0.50 | 0.003 | 0.0014 |
| K | Half-step length | 1.875 | 0.011 | 0.005 |
| L | Full-step length | 3.75 | 0.022 | 0.010 |
| M | Central window height and width | 22.50 | 0.134 | 0.062 |
| N | Window height | 5.00 | 0.030 | 0.014 |
| P | Window width | 2.50 | 0.015 | 0.007 |
| Q | Window spacing in diagonal row | 3.00 | 0.018 | 0.008 |
| R | Window spacing in horizontal row | 10.00 | 0.059 | 0.028 |
| S | Location of corner windows | 3.00 | 0.018 | 0.008 |

4.2.1 The camera shall be capable of producing an image in accordance with Style A dimensions specified in American National Standard Dimensions for 35mm Motion-Picture Camera Aperture Images, PH22.59-1966, and American National Standard Dimensions of 16mm Motion-Picture Camera Aperture Image, PH22.7-1964 (Reaffirmed 1969).

4.3 Projected and Transmitted Areas. The projected image area is represented by the outside dimensions of the jitter and weave steps. The television transmitted area is represented by the lines inside the jitter and weave steps. The areas shall be in accordance with American National Standard Dimensions for Television Image Area on 35mm Motion-Picture Film, PH22.93-1963 (Reaffirmed 1969), and American National Standard Dimensions for Television Image Area on 16mm Motion-Picture Film, PH22.96-1963 (Reaffirmed 1969).

5. *Optical Densities*

5.1 Optical Densities. All optical densities shall be measured in accordance with American National Standard Method of Determining Transmission Density of Motion-Picture Films, PH22.27-1960 (Reaffirmed 1969).

5.2 Background. The background shall have a density greater than 1.9.

5.3 Windows and Surround Area. The density of the windows and surround area shall be between 0.3 and 0.4.

NOTE: The emulsion position shall correspond to the one normally used for the specific format.

# SMPTE RECOMMENDED PRACTICE — RP 27.5–1972

## *Specifications for Mid-Frequency Response Test Pattern for Television*



1. *Scope*

This Recommended Practice specifies the format, dimensions and optical densities for a test pattern to be used as an operational check of the mid-frequency response of a television system.

2. *Purpose*

2.1 This Recommended Practice specifies a test pattern which is suitable for the following operational checks of a television system:

(a) Performance of video amplifier circuitry under conditions that can occur at average signal levels corresponding to predominantly light and predominantly dark scenes.

(b) Operational setup and adjustment of video amplifier mid-frequency amplitude and/or delay distortion (phase response) controls.

2.2 Usage. When incorporated into a test film, Type A (black bars on a white background) shall be shown for a minimum duration of 7 seconds followed by Type B (white bars on a black background) for a minimum duration of 7 seconds.

2.2.1 The test pattern will show mid-frequency response defects of amplitude and/or phase as either black or white horizontal streaks following transition from white to black or black to white.

2.2.2 The test pattern will detect amplifier or clamp circuit faults, as indicated by streaks of black or white polarity extending across the entire television picture at points corresponding to the mid-frequency bars of the test pattern.

3. *Format*

3.1 Pattern. A reproduction of the test pattern is shown in Figs. 1 and 2.

3.2 Bar Width. The four bars shall have horizontal dimensions corresponding to half-wave pulses at frequencies of 15 kHz, 30 kHz, 100 kHz and 300 kHz, respectively.

3.3 Types. The test pattern is produced in two types: Type A, black bars on a white background and Type B, white bars on a black background.

3.4 Arrows and Border. The eight boundary arrows and border define the edge of the test pattern area and the scanned area.

3.5 Pattern Identification. The identification number of this document shall appear on the pattern as specified in the figures.

4. *Dimensions*

4.1 Test Pattern. The dimensions of the test pattern shall be as shown in Fig. 3 and the table in percentages of frame height and reproduced with a tolerance of ± 2 percent of the frame height.

4.1.1 The bars shall be positioned symmetrically on the vertical centerline of the image area within ± 2 percent of the respective dimension.

4.2 Image Size. The size of the scanned area as indicated by the eight boundary arrows shall be as follows:



*Approved February 1972*





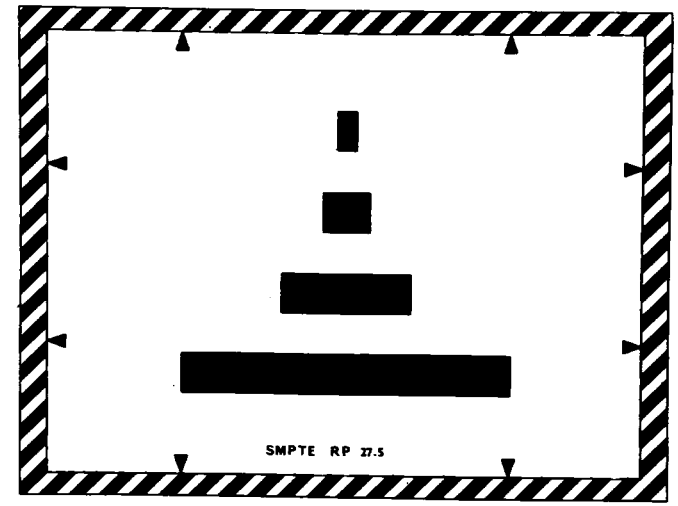


**Figure 1**
**Reproduction of Test Pattern Type A**

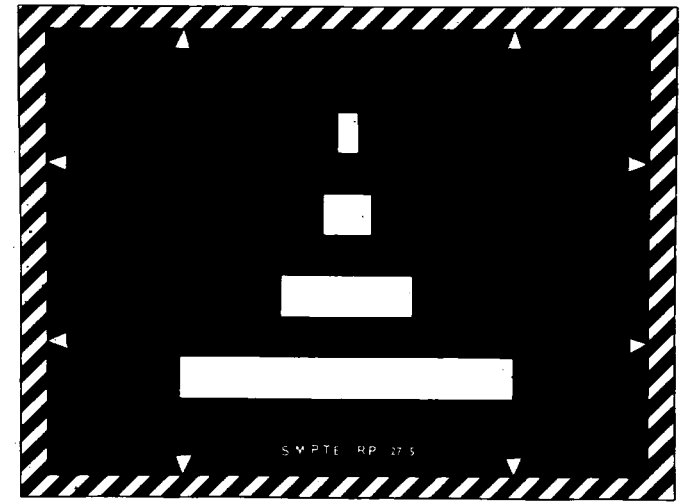


**Figure 2**
**Reproduction of Test Pattern Type B**

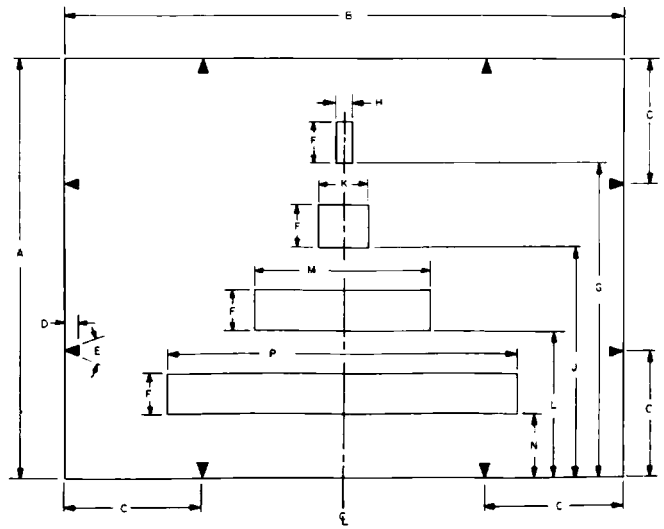


**Figure 3**

**Dimensional Drawing of Test Pattern**

| | Dimensions | Percent | Inches 2x2 | 8x10 | 35mm | 16mm |
|---|---|---|---|---|---|---|
| A | Scanned image height | 100.0 | 0.843 | 6.30 | 0.594 | 0.276 |
| B | Scanned image width | 133.3333 | 1.124 | 8.40 | 0.792 | 0.368 |
| C | Position of arrow from corner | 30.0 | 0.253 | 1.890 | 0.178 | 0.083 |
| D | Arrow length | 4.0 | 0.034 | 0.252 | 0.024 | 0.011 |
| E | Arrow shape in degrees | | 40.0 | 40.0 | 40.0 | 40.0 |
| F | Height of bars | 10.0 | 0.084 | 0.630 | 0.059 | 0.028 |
| G | Position of 300-kHz bar | 75.0 | 0.632 | 4.725 | 0.446 | 0.207 |
| H | Width of 300-kHz bar | 4.2 | 0.035 | 0.26 | 0.025 | 0.012 |
| J | Position of 100-kHz bar | 55.0 | 0.464 | 3.465 | 0.327 | 0.152 |
| K | Width of 100-kHz bar | 12.7 | 0.107 | 0.800 | 0.075 | 0.035 |
| L | Position of 30-kHz bar | 35.0 | 0.295 | 2.205 | 0.208 | 0.097 |
| M | Width of 30-kHz bar | 42.0 | 0.354 | 2.646 | 0.249 | 0.116 |
| N | Position of 15-kHz bar | 15.0 | 0.126 | 0.945 | 0.089 | 0.041 |
| P | Width of 15-kHz bar | 84.0 | 0.708 | 5.292 | 0.499 | 0.232 |





4.2.1 2x2 in test slides and 8x10 in transparencies shall have Category 3 dimensions, as specified in American National Standard Dimensions and Optical Specifications of Test Slides and Transparencies for Television, PH22.144-1965 (Reaffirmed 1969).

4.2.2 35mm test films shall have image dimensions in accordance with Section 3.3 of American National Standard Dimensions for Television Image Area on 35mm Motion-Picture Film, PH22.95-1963 (Reaffirmed 1969).

4.2.3 16mm test films shall have image dimensions in accordance with Section 3.3 of American National Standard Dimensions for Television Image Area on 16mm Motion-Picture Film, PH22.96-1963 (Reaffirmed 1969).

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

4.3.1 Height and width dimensions of the black-and-white border for 2x2 in slides and 8x10 in transparencies are specified in ANSI PH22.144-1965.

4.3.2 For 35mm motion-picture films, the black-and-white border shall extend to the dimensions specified by Style A in American National Standard Dimensions of 35mm Motion-Picture Camera Aperture Images, PH22.59-1966.

4.3.3 For 16mm motion-picture films, the black-and-white border shall extend to the dimensions specified in American National Standard Dimensions of 16mm Motion-Picture Camera Aperture Image, PH22.7-1964 (Reaffirmed 1969).

5. *Optical Densities*

5.1 Optical Densities. All optical densities shall be measured in accordance with American National Standard Method of Determining Transmission Density of Motion-Picture Films, PH22.27-1960 (Reaffirmed 1969).

5.2 Test Pattern Type A

5.2.1 The background density shall be between 0.3 and 0.4.

5.2.2 The density of the bars, arrows, and identification shall be between 1.9 and 2.0.

5.3 Test Pattern Type B

5.3.1 The background density shall be greater than 1.9.

5.3.2 The density of the bars, arrows, and identification shall be between 0.3 and 0.4.

NOTE: The emulsion position shall correspond to the one normally used for the specific format.