In addition to the collection of Eric Berndt, complimentary collections of Sol Lesser and the Litton Collection will be on display. Two large reproductions of magic lanterns will be included in the display. Each lantern will contain a modern projector which will show slides of camera and projection equipment used over the years. A narration to accompany the slides will be given by Gregory Peck.

Equipment Exhibit

Space for the Equipment Exhibit for the 106th Conference was practically sold out within two weeks after the booths had been offered for sale. The announcement was made by Exhibit Chairman Warren Strang, Hollywood Film Co., Hollywood. This enthusiastic response, Mr. Strang commented, is an indication of the spectacular growth of equipment in the motion-picture and television fields.

The Exhibit will open Monday evening, September 29, with an open house sponsored by the exhibitors. Everyone bearing conference registration badges or exhibit passes will be welcome.

An Equipment Papers and Demonstration Session will be held Wednesday, October 1, when many exhibitors will present descriptions and demonstrations of their new products. The session will be conducted in the same manner as the regular topic sessions on the Conference Program.

On the last day of the Exhibit the winner of the SMPTE Exhibit Award will be announced. The award will go to the company having the most imaginative, effective and best presented exhibit.

standards and recommended practices

Approved USA Standard

On May 5, 1969, the United States of America Standards Institute approved a new USA Standard, PH22.61-1969, Specifications for 35mm Sound-Focusing Test Films, Photographic Type, which is in fact a reaffirmation of the earlier issue modified editorially. This revision also incorporates the technical material originally published in PH22.62-1960, which has been withdrawn.

Inasmuch as compliance with USA Standards is purely voluntary, this standard will become truly effective only when broad publicity is given to its existence. USASI and SMPTE would appreciate any personal influence to promote the use of the standard where such action is appropriate and proper. Copies of the standard may be obtained for a nominal fee from the United States of America Standards Institute, 10 E. 40th St., New York, NY 10016.

USA Standards Reaffirmed

On May 5, 1969, the United States of America Standards Institute, taking the recommendation of the SMPTE Engineering Committees and the USASI Standards Committee PH22, reaffirmed without change the following standards:

PH22.51-1961, Intermodulation Tests for 16mm Variable-Density Photographic Sound Prints (published in July 1961 *Journal*);

PH22.88-1963, Dimensions of Magnetic Striping of 8mm Motion-Picture Film, Perforated IR-1500 (published in June 1963 *Journal*);

PH22.101-1963, Dimensions of Magnetic Striping of 16mm Motion-Picture Film, Perforated 2R-3000 (published in June 1963 *Journal*); and

PH22.136-1963; Dimensions of Magnetic Striping of 16mm Motion-Picture Film, Perforated 8mm, 2R-1500 (published in June 1963 *Journal*).

Draft USA Standards

Three draft USA Standards are published here for a trial period and public review. Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters before September 30, 1969. The proposals have also been submitted to the appropriate USA Standards Committees. Consequently, all comments received through *Journal* publication will be reviewed prior to the conclusion of action by these committees.

PH22.43, Flutter Test Film, 16mm 3000-Cycle Photographic Type, and C98.4, Speed of 2-In Tape for Quadruplex Video Magnetic Tape Recording, are both reaffirmations of the technical content of the previous issues but have been editorially modified to facilitate their use.

C98.3, Electrical Characteristics of Audio Record One for 2-In Quadruplex Video Magnetic Tape Recording at 15 and 7.5 In/s, now specifies that the characteristic will have a time constant of 35/2000 microsecond which is a departure from the NAB specification.

Proposed Recommended Practices

Two proposed Recommended Practices are published here for a trial period and public review. Proposed SMPTE Recommended Practice RP 14, Plotting Data from Sensitometric Strips Exposed on Type 1b2 (Intensity Scale) Sensitometers, and proposed SMPTE Recommended Practice RP 15, Calibration of Densitometers Used for Black-and-White Photographic Density Measurement, are substantially reaffirmations of the earlier issues modified editorially.

Proposed SMPTE Recommended Practice RP 6, Reference Carrier Frequencies and De-Emphasis Characteristics for 2-In Quadruplex Video Magnetic Tape Recording, reflects an addition to Section 4: Practice LBC is included for reference purposes only. Practice LBC is considered to be obsolescent and is not recommended for new color recordings. RP 6-1967 was published in the December 1966 *Journal*.

Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to September 30, 1969. If no adverse criticism is received by this date, the Proposed Recommended Practices will be submitted to the SMPTE Board of Governors for final approval.

Withdrawal of USA Standards

On May 5, 1969, the United States of America Standards Institute approved the withdrawal of the following two USA Standards, PH22.62-1960, 9-Kilocycle Sound Focusing Test Film for 35mm Motion-Picture Sound Reproducers, has been withdrawn because the technical data has been incorporated in the revision of PH22.61, published here.

PH22.126-1961, 16mm Multi-Azimuth Test Film. Magnetic Type, was withdrawn due to the fact that the test film described has never been manufactured and is considered to be impractical to produce. The Sound Committee is now preparing a Recommended Practice describing a similar test film which could be supplied by the SMPTE. The Standard was published in the November 1961 issue of the *Journal*.

ALEX E. ALDEN

USA Standard

Specifications for 35mm Sound-Focusing Test Films, Photographic Type

USAS PH22.61-1969

Revision of PH22.61-1963

Approved May 5, 1969
Sponsor: Society of Motion Picture and Television Engineers, Inc.

1. Scope

This standard describes test films that may be used for focusing the optical systems in 35mm motion-picture sound reproducers.

2. Test Films

2.1 The test films shall be of two types, as follows:

Type A—A film with a 9-kHz record to be used by manufacturers and laboratories, for precise adjustment of the sound-focusing system.

Type B—A film with a 7-kHz record to be used when simpler instruments are available or when lower quality is adequate, for quick adjustment of the sound-focusing system.

2.2 The film shall be a print from an original negative and shall contain a sinusoidal, variable-area record recorded at 1 dB below 100 percent modulation. The variation in amplitude shall be not more than ± 0.25 dB.

2.3 The azimuth of the sound record shall be perpendicular to the direction of film travel within ± 3 min of arc.

2.4 The sound record shall comply with USA Standard Dimensions of Photographic Sound Record on 35mm Motion-Picture Prints, PH22.40-1967.

3. Film Stock

The film stock used shall be of the low-shrinkage, safety type, cut and perforated in accordance with USA Standard Dimensions for 35mm Motion-Picture Film, KS-1870, PH22.36-1964.

4. Identification

Each film of Type A shall be marked PH22.61-9 kHz Focusing. Each film of Type B shall be marked PH22.61-7 kHz Focusing. This marking shall be printed lengthwise in the central portion of the film and the spacing between consecutive titles shall be approximately 12 in.

5. Film Length

The film shall be supplied in minimum lengths of 50 ft.

NOTE 1: The 9 kHz test film (Type A) is not recommended for theater use because the reproducing amplifiers ordinarily installed in theaters normally have low-pass filters which cut off below 9 kHz.

NOTE 2: Test films made in accordance with this standard are available from the Society of Motion-Picture and Television Engineers.

Draft USA Standard Specifications for

16mm 3-kHz Flutter Test Film Photographic Type

PH22.43

Revision of PH22.43-1961

1. Scope

This standard specifies a 3-kHz sound test film for use in determining the presence of flutter in 16mm sound motion-picture projectors.

2. Test Film

2.1 The test film shall have an originally-recorded, direct-playback positive variable-area sound record in accordance with USA Standard Photographic Sound Record on 16mm Prints, PH22.41-1957, and developed in a high-contrast developer to a minimum density of 1.20.

2.2 The recorded frequency shall be 3 kHz ± 25 Hz with a film rate of 24 perforations per second (approximately 36 ft per minute).

2.3 The modulation of the recording shall be 80 ± 5 percent. The output level of the film shall be constant within ± 0.25 dB. (This is equivalent to an amplitude tolerance of ± 0.0015 in. when recording variable-area sound records with a nominal amplitude of 0.055 in.)

2.4 The total rms flutter of the sound recorder shall not exceed 0.07 percent and the flutter amplitude at any single flutter rate shall not exceed 0.05 percent (as defined in USA Standard Method for Determining Flutter Content of Sound Recorders and Reproducers, Z57.1-1954).

3. Film Stock

The film stock shall be of the low-shrinkage safety type, cut and perforated in accordance with USA Standard Dimensions for 16mm Motion-Picture Film, 1R-3000, PH22.12-1964.

4. Identification

Each film shall be marked "PH22.43-3kHz." This marking shall be printed lengthwise in the picture area and the spacing between consecutive titles shall be approximately 12 in.

5. Film Length

The film shall be supplied in 100-ft lengths.

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

THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY

Draft USA Standard

Electrical Characteristics of Audio Record One for 2-In. Quadruplex Video Magnetic Tape Recording at 15 and 7.5 In./s

C98.3

Revision of C98.3-1963

1. Scope

This standard specifies the electrical characteristics of Audio Record One for 2-in. quadruplex video magnetic tape recording at 15 and 7.5 in./s., as defined in USA Standard Dimensions of Video, Audio and Tracking Control Records on 2-In. Video Magnetic Tape, C98.6-1965.

2. Electrical Characteristics

2.1 Recording Characteristics. Recordings shall be made in such a manner that the proper reproducing characteristics are as defined in 2.2.

2.2 Reproducing Characteristics. The output voltage of an "ideal" reproducing head (see Note), shall pass through an amplifier whose output voltage shall fall with increasing frequency at a rate of 6 dB per octave, except as modified by the following equalizations:

2.2.1 The voltage attenuation of a single resistance-capacitance high-pass filter having a time constant of 2,000 μs.

2.2.2 The inverse of the voltage attenuation of a single resistance-capacitance low-pass filter having a time constant of 35 μs.

NOTE: An "ideal" reproducing head is defined as a reproducing head, the losses of which are negligible. With a normal ferromagnetic head, this means that the gap is short and the arc of contact with the tape is long compared to the relevant wavelengths, and the losses in the material of the head are small. With the reproducing heads used in practice, an equalization to compensate for the head losses must be added to the replay amplifier.

Draft USA Standard

Speed of 2-In. Tape for Quadruplex Video Magnetic Tape Recording

C98.4

Revision of C98.4-1963

1. Scope

This standard specifies the nominal rates of travel of 2-in. wide magnetic tape for quadruplex video magnetic tape recording.

2. Primary Nominal Rate of Tape Travel

The primary nominal rate of tape travel shall be 15 in./s (38.1 cm).

3. Secondary Nominal Rate of Tape Travel

The secondary nominal rate of tape travel shall be 7.5 in./s (19.05 cm).

NOTE: The absolute tape speed is outlined in USA Standard Dimensions of Video, Audio and Tracking Control Records on 2-In. Video Magnetic Tape, C98.6-1965.

PROPOSED

SMPTE RECOMMENDED PRACTICE

RP 14

(Revision of RP 14-1964)

*Plotting Data from Sensitometric Strips Exposed on Type Ib2 (Intensity Scale) Sensitometers**

1. *Scope*

1.1 The purpose of this recommended practice is to specify the relationship of the spacings of the exposure scale (horizontal co-ordinate) of graph paper on which sensitometric data are plotted and the corresponding increments of the logarithm of exposure in the sensitometer when the exposure modulator is a step tablet.

2. *Exposure Method*

2.1 In a Type I b (intensity scale) sensitometer, the most common method of modulating the illumination falling upon the sample employs a step tablet. The exposure is made with the emulsion of the sample in contact with the modulator except for a thin, transparent acetate cover which protects the modulator against abrasion and foreign matter. The opening and closing of a shutter admits light for the required period of time. Step tablets may be cast with gelatin containing dyes or colloidal carbon or, alternatively, may be produced photographically by suitable exposure and development of film or plates.

2.2 With a step tablet as the exposure modulator, the illumination reaching the sample is dependent upon the transmittance of the various steps of the modulator. This assumes uniformity of illumination. Density, being the common logarithm of the reciprocal of the transmittance, is a more convenient method for specifying the light-stopping power of the segments of the modulator. Density may be measured with a densitometer calibrated in reference to USA Standard Diffuse Transmission Density, PH2.19-1959.

2.3 The I b (intensity scale) sensitometer exposure modulator shall have step-to-step increments of 0.15 diffuse transmission density, Type V1-b. As modulators vary somewhat from this 0.15 increment, it may be necessary to adjust the step reference points on the exposure axis (horizontal co-ordinate) of the sensitometric graph paper to represent the actual densities of each step in the tablet. (Single step departures of the order of 0.015, or less, from the ideal 0.15 density increment, when known, would not be considered significant. However, cumulative errors, especially those which occur in the same direction, are significant and can lead to erroneous results. See Appendix.)

3. *Method of Correction*

3.1 The steps of the exposure modulator shall be measured with a densitometer reading in diffuse transmission density, Type V1-b, specified in USA Standard PH2.19-1959. Such densities are normally shown on the calibration chart accompanying each new step tablet.

3.2 If such a calibration chart is not available, the step tablet should be removed carefully from the sensitometer and from its removable protective cover, if any, and each step read on a densitometer. (See 3.1 above.)

3.3 Unless the step tablet modulator conforms to the following specifications, the sensitometric density data shall be plotted against the actual rather than the nominal densities of the step tablet:

(1) The density increment between any two adjacent steps shall be 0.150 ± 0.015 density.

(2) The departure of any steps from its nominal density value shall not exceed 0.02 density or 2 percent of its density value, whichever is greater. The nominal value is defined as the density of the lowest density step plus 0.15 times the number of steps above the lowest density step.

(3) Linearity. No individual step shall depart from the best linear fit through all the steps by more than a density of 0.02.

4. *Method for Plotting Actual Densities of the Step Tablet Modulator*

4.1 For laboratories using graph paper where the scale of the horizontal co-ordinate is as long or longer than the scale of the vertical co-ordinate: most laboratories carry a supply of printed graph sheets for the plotting of sensitometric data. These sheets normally carry a density scale on the vertical co-ordinate and a numbered "step" scale or log exposure reference on the horizontal co-ordinate. It is suggested that the density scale be cut off a graph sheet and placed along the horizontal co-ordinate of a second sheet. The scale of the first sheet should be oriented as shown in the Appendix.

* Loyd A. Jones, "Photographic sensitometry," Part I, *Jour. SMPE, 17:* 491-553, Oct. 1931; Part II, *Jour. SMPE, 17:* 695-742, Nov. 1931; Part III, *Jour. SMPE, 18:* 54-89, Jan. 1932; Part IV, *Jour. SMPE, 18:* 324-355, Mar. 1932.

4.2 The density readings of the exposed and processed sample may now be plotted against the actual step tablet densities.

4.3 For laboratories using graph paper where the horizontal co-ordinate is shorter than the vertical co-ordinate: on graph sheets where the horizontal co-ordinate carries 7½ equal divisions between each "step" or log exposure reference, each division represents 0.02 density of the sensitometer step tablet and may be used as reference to plot the densities of the step tablet against the densities of the exposed and processed sample.

4.4 Where there is no scale on the horizontal co-ordinate between each "step" or log exposure reference, a scale may be drawn to divide the space between each reference into 7½ equal parts. Each part will represent 0.02 density of the sensitometer step tablet. This scale may be moved up the sheet opposite the various density readings of the exposed and processed sample so as to locate the step tablet densities versus the processed sample densities.

5. *Care of the Modulator*

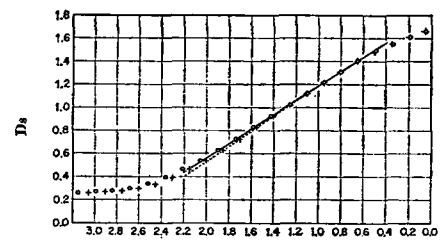
5.1 Step tablets are very delicate. To prevent damage, it is customary to protect the tablet with a thin, transparent acetate cover. The surface of the cover should be inspected from time to time to ensure that it is clean and free from abrasion. The acetate cover should be renewed when necessary to ensure that the diffuse transmission densities of the modulator steps are not affected by dirt or abrasion on the cover.

5.2 While the density of step tablets normally changes little over periods ranging up to two years, it is suggested that they be checked for density from time to time.

Appendix

(The Appendix is not a part of this SMPTE Recommended Practice, but is included to facilitate its use.)

The graph paper described in this recommended practice is in accordance with SMPTE Recommended Practice RP 22-1966, Specifying Graph Paper Used in Inter-Laboratory Exchange of Plotted Sensitometric Data. In plotting sample density against actual step tablet density, the density scale along the horizontal co-ordinate is equivalent to the log E scale; e.g., 0.02 density equals 0.02 log E. Following this procedure, comparisons of plotted sensitometric data can be made with the knowledge that any observed differences cannot be attributed to differences in the plotting method.



Legend

---x---x Curve showing sample densities versus modulator densities assumed to have consecutive ideal increments of 0.15

——o——o— Curve showing same sample densities versus actual modulator densities for a modulator not meeting the criterion of 3.3 (2)

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 15

(Revision of RP 15-1964)

Calibration of Densitometers Used for Black-and-White Photographic Density Measurement

1. *Scope*

1.1 The purpose of this recommended practice is to specify the means to be employed in the calibration of densitometers utilized in the measurement of diffuse transmission densities.

1.2 This practice applies to densitometers utilized for the measurement of processed black-and-white photographic films and plates or cast colloidal carbon tablets.

2. *Types of Densitometers*

2.1 In general, only those densitometers which conform to the geometric and spectral conditions specified by USA Standard Diffuse Transmission Density, PH2.19-1959, are capable of giving accurate readings of USA Standard diffuse transmission density for all types of black-and-white photographic materials.

2.2 If a nonconforming densitometer is to be used with a given type of photographic material, it may be calibrated from reference samples composed of the same material. In this way, any densitometer may be calibrated to read "USA Standard Diffuse Transmission Density," Type V1-b or Type P2-b, on any single type of photographic material to a degree of accuracy commensurate with the stability and reproducibility of the instrument itself. In general, a new calibration must be made to obtain accurate readings on a different material when a nonconforming densitometer is used.

3. *Reference Specimen*

3.1 A reference specimen shall be a calibrated gray scale which is stored with special care and used at intervals of three months, more or less, as a primary reference against which to control the working specimens. (See 4.1.)

3.2 A densitometer conforming to the geometric and spectral conditions specified in USA Standard PH2.19-1959, for either Type V1-b or Type P2-b, and measuring in USA Standard diffuse transmission density, shall be used to calibrate the reference specimen. (Calibrated reference specimens are sold by manufacturers of densitometers, sensitometers and film.)

3.3 The reference specimen shall have a range of diffuse transmission densities from below 0.06 to 3.0 or greater.

3.4 The density variation within each step or within each specified calibration area shall be 0.01 or less. (Care should be exercised in selecting reference specimens. They should be free from dirt spots and abrasions. The step or calibration area should be large enough to accommodate the largest aperture used for measuring the specimen and to allow for normal specimen-positioning variations. Good optical density stability is essential for reference specimens. In general, this can be accomplished by keeping the processed specimen two months or longer under normal laboratory lighting and temperature conditions before calibrating the specimen.)

3.5 A calibration chart shall accompany each reference specimen, giving the diffuse transmission densities of each step. It shall be noted on the calibration chart whether the diffuse transmission densities listed are USA Standard diffuse visual densities Type V1-b or USA Standard diffuse printing densities Type P2-b (USA Standard PH2.19-1959). Each reference specimen and corresponding calibration chart shall be identified by a code or serial number. The chart shall also show the type of film of which the reference specimen is made.

3.6 Each step of each of three reference specimens shall then be measured carefully on the laboratory densitometer to be controlled. The step-by-step measurements of one specimen shall be compared to the calibration chart values for that specimen, and the deviations* plotted versus the calibration chart values. Measurements of each of the other specimens shall also be compared to corresponding calibration values, and the deviations plotted upon the same chart (Appendix). This procedure establishes the correlation among reference specimens.

* If, during the procedure, deviations in excess of the tolerances shown in 5.2 are obtained, the densitometer first could be recalibrated according to Section 5 and the procedure repeated. However, correlation curves obtained from a densitometer out of calibration (but operating properly) are valid.

3.7 The procedure in 3.6 shall be repeated on the same densitometer at three-month intervals. If the correlation among reference specimens remains the same, it can be assumed that the specimens have not deteriorated. (Even if used once a week for calibration, seasoned (see 3.4 footnote) reference specimens, when properly handled, might be expected to remain in good condition for about a year.)

3.8 If the trimonthly check reveals that one specimen no longer correlates with the others, it shall be discarded. If the trimonthly check shows that the samples have maintained their original correlation but all three deviation curves have shifted, it may be assumed that the instrument calibration has changed. (However, it is remotely possible that all reference specimens have deteriorated equally.)

4. *Working Specimen*

4.1 A working specimen shall be a calibrated gray scale which is used for the routine calibration of densitometers and measured for correct density against the reference specimens at intervals of three months, more or less.

4.2 For routine checking of the densitometer, it is not advisable to use the reference specimens. For this purpose, working specimens of the same material shall be used once they have been related directly or indirectly to the reference specimens.

4.3 The working specimen can be directly related to the reference specimens by deviating initial average of replicate readings of the working specimen from those of a reference specimen calibration curve (3.6). These deviations, when plotted, shall constitute a working specimen calibration curve. The tolerances shown in 5.2 shall apply to the step values assigned to the working specimen.

4.4 The following alternate technique may be used in place of that outlined in 4.3: a working specimen may be selected and the step densities read on a densitometer which has been newly calibrated by means of the reference specimens. When this working specimen is subsequently used to check densitometer calibration, the instrument shall duplicate the original readings within a tolerance of ± 0.01 from density 0.00 to 2.0 and within ± 0.02 above a density of 2.0 (These tolerances apply to electronic physical densitometers such as the Westrex or Eastman Electronic densitometer. Other densitometers may require wider tolerances. See note after 5.2.) If this tolerance is exceeded in the same direction by three successive steps in one calibration check or by one step on three successive calibration checks, the instrument shall be evaluated with reference specimens. If this evaluation shows the instrument to be in calibration, the new density values shall be assigned to the working specimen, or the working specimen shall be replaced by a new one. If, however, the reference specimen confirms that the instrument is out of calibration, it shall be recalibrated, as in Section 5.

5. *Densitometer Calibration*

5.1 The reference specimen shall be placed in the densitometer to be calibrated in the manner specified in USA Standard PH2.19-1959; i.e., the emulsion side of the reference specimen shall face the receiver, except that if the incident radiation is diffuse, the emulsion side of the specimen shall face the diffuser. (Reference specimens should be handled with care to prevent density changes resulting from abrasions, fingerprints or foreign materials such as grease or film-cleaning compounds.)

5.2 The values of diffuse transmission density of the type desired indicated by the densitometer under test shall agree with the values shown on the calibration chart accompanying the reference specimen. For routine sensitometric applications, tolerances may be allowed as follows:

Density	*Tolerance*
0.0 to 1.0	± 0.01
1.0 to 2.0	± 0.015*
2.0 to 3.0	± 0.02
3.0 to 4.0	± 0.03

Each individual densitometer will vary about its basis level. The amount of variation will depend upon the type and condition of the instrument. Precision or repeatability of individual densitometers will determine the need for and degree of replication of measurements. A statistical method for controlling this variability is outlined in the SMPTE book, "Control Techniques in Film Processing."

5.3 A densitometer which gives measured values with the reference specimen in excess of the tolerance in 5.2 shall be taken out of service for repair or adjustment. Alternatively, a correction table or chart may be utilized to permit adjustment of the measured values in accordance with the calibration chart.

5.4 If the densitometer under test is of the non-conforming type, its scope may be evaluated by measuring samples which vary in scattering power and spectral selectivity and comparing these results with those obtained by the standard method.

* It is impossible to read thousandths of a density point on all but the most precise instruments. This figure is given as a tolerance based on the statistical average of several readings.