13th Annual SMPTE Television Conference

2–3 February 1979, St. Francis Hotel, San Francisco

The 13th Annual SMPTE Television Conference in San Francisco will again have an informative and exciting two days of papers encompassing the subjects: Production and Post-Production Operating Experience with One-Inch Videotape; Digital Video Effects and Computer Animation; Microprocessors in Video Editing and Machine Control Systems; and Digital Video Recording.

Program Chairman Carlos Kennedy, Ampex Corp., is planning presentations from the major television networks, manufacturers, and users of equipment relating to the above subjects. Among those participating will be representatives from many foreign countries, who are expected to round out this timely program.

For the enjoyment of those attending, the local arrangements committee, under Don Lincoln, KPIX-Westinghouse, is planning a wine and cheese get-together on Friday evening. Also, a post-conference tour of the surrounding countryside, with visits to several of the well known wineries, has been planned by Charles E. Anderson of Ampex.

An Equipment Exhibit, related to the paper subjects, will be open on Friday and Saturday, 2 and 3 February.

The Advance Program for the Conference will be published in the January *Journal*. For further information please contact SMPTE Headquarters, (914) 472-6606.

Standards & Recommended Practices

Proposed SMPTE Recommended Practices

Three Proposed SMPTE Recommended Practices are published here for a trial period and public review: RP 90, Specifications for Magnetic-Type Audio Level and Multifrequency Test Film for 16-mm Sound Reproducers; RP 6, Recorded Carrier Frequencies and Pre-emphasis Characteristics for 2-in Quadruplex Video Magnetic Tape Recording for 525-Line/60-Field Television Systems; and RP 23, Reinforcement of 70-mm Positive Splices.

On the recommendation of the Committee on Audio Recording and Reproduction Technology, the Standards Committee has agreed that all documents specifying test materials be developed as SMPTE Recommended Practices rather than as American National Standards. In keeping with this action, Proposed SMPTE Recommended Practice RP 90 will replace American National Standards PH22.132-1963 and PH22.140-1964, which have been withdrawn. RP 90 reflects a change from a 35- to 70-microsecond characteristic to conform to international standardization. It also establishes program level at +10 dB (185 nWb/m) and reference level at 0 dB (58.5 nWb/m). Multifrequency (M16-MF) and signal level (M16-SL) test films conforming to this practice are available from Society Headquarters.

A pilot signal has been added and the recording chain defined in the proposed revision of RP 6.

RP 23 reflects a change in the total tape thickness and is not applicable to all types of splices.

Approved International Standard

The International Organization for Standardization (ISO) recently approved an International Standard, the technical content of which is published here for your information. ISO 490-1978, Cinematography — Magnetic Stripes and Magnetic Recording Head Gaps for Sound Record on 16-mm Motion-Picture Film Perforated Along One Edge (Type 1) — Positions and Width Dimensions, is in complete agreement with American National Standards PH22.87-1966 (R1977) and PH22.112-1977.

This material is reproduced with permission from the ISO and is copyrighted by the American National Standards Institute, 1430 Broadway, New York, NY 10018, from which complete copies are available.

Proposed Withdrawal of American National Standard

On the recommendation of the Committee on Laboratory Services Technology, the Standards Committee has approved the withdrawal of American National Standard Dimensions for 35-mm Motion-Picture Film Splices, PH22.178-1971, because the subject matter does not warrant national standardization. The specifications are being transformed into an SMPTE Recommended Practice.

Comments on the proposed practices and withdrawal should be addressed to Alex E. Alden, Manager of Engineering Services, at Society Headquarters prior to 1 February 1979. The proposed withdrawal has been submitted to American National Standards Committee PH22. All comments received through *Journal* publication will be reviewed before the conclusion of committee action. If no adverse criticism is received on the proposed practices, they will be submitted to the Executive Committee for Standards Approval for final approval. — *Alex E. Alden, Manager of Engineering Services.*

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 90

Specifications for Magnetic-Type Audio Level and Multifrequency Test Film for 16-mm Sound Reproducers

1. *Scope*

This practice specifies an audio frequency test film to be used for adjusting the sensitivity and the frequency response of 16-mm motion-picture magnetic sound reproducers operating at 36 ft (11 m) per minute.

2. *Test Film Signal*

2.1 Frequencies. The sound record on the film shall be an original recording which will reproduce at the frequencies specified in Sec. 3 when the linear speed of the film is 24 perforations per second or approximately 36 ft per minute (7.2 in or 18.3 cm per second).

2.2 Distortion. The total harmonic distortion of the recorded signals shall not exceed 1 percent.

2.3 Sound Record. The location and dimensions of the recorded sound record shall be in accordance with American National Standard Position, Dimensions and Reproducing Speed of 200-Mil Magnetic Sound Records on 16-mm Motion-Picture Film, PH22.97-1975. The sound record may also be recorded so that it extends from one edge of the film to the other, except for 0.005 ± 0.003 in (0.13 ± 0.08 mm) at the sprocket holes and film edges.

2.4 Signal Fluctuation. The signal levels shall not fluctuate more than ± 0.5 dB within the test section lengths.

2.5 Flutter. The weighted peak flutter of the sound record shall not exceed ± 0.07 percent when measured in accordance with American National Standard Method for Measurement of Weighted Peak Flutter of Sound Recording and Reproducing Equipment, ANSI/IEEE Std 193-1971.

2.6 Azimuth. The azimuth of the sound record shall be 90° ± 5′ to the reference edge of the film.

2.7 Signal Identification. Each test section and segment shall be preceded by voice announcements identifying the content. Voice announcements shall be recorded at a level approximately equal to the reference frequency level. (See Sec. 3.1.)

3. *Test Sections*

3.1 Reference Level. A frequency of 400 Hz ± 2 percent shall be recorded ahead of the Frequency Response Section, having an rms short circuit flux per unit track width of 58.50 ± 10 nanowebers per meter, for a duration of approximately 30 seconds.

3.2 Program Level. A frequency of 400 Hz ± 2 percent shall be recorded at the end of the Frequency Response Section, having an rms short circuit flux per unit track width of 185 ± 10 nanowebers per meter, for a duration of 50 seconds.

3.3 Frequency Response. The following test segment frequencies in hertz ± 2 percent shall be recorded in the order given:

400 reference level / 15 000 / 12 500 / 10 000 / 8000 / 6300 / 5000 / 3150 / 2000 / 1000 / 500 / 315 / 200 / 100 / 50 / 400 program level

3.3.1 Recorded Levels. With constant sine-wave signal applied to the input of the recording system, the relative characteristic in effective values of the short circuit magnetic flux versus frequency shall decrease with increasing frequency proportionately to the impedance of a parallel combination of a capacitance and a resistance having a time constant of $\tau = 70\ \mu s$.

The characteristic defined above is obtained by the following calculation:

$$N \text{ (in decibels)} = -20 \log \sqrt{1 + 4\pi^2 f^2 \tau^2}$$

where f is the frequency in hertz and τ is the time constant in seconds.

3.3.2 Flux Level Variation. The film flux level at each frequency from 50 Hz through 8 kHz shall be within ± 0.5 dB and each frequency from 10 kHz through 15 kHz shall be within ± 1.0 dB of the value specified in Sec. 3.3.1.

3.3.3 Duration. The duration of frequency response test segments shall be approximately 10 seconds, except for the 15-kHz tone which shall be approximately 30 seconds.

THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY

FLUX LEVEL AND RELATIVE LEVELS VERSUS FREQUENCY

Frequency (Hz)	Short Circuit Flux (nWb/m)	Relative Level (dB)
400 Reference Level	58.50	0.00
15 000	8.91	— 16.35
12 500	10.63	— 14.82
10 000	13.17	— 12.96
8000	16.24	— 11.14
6300	20.16	— 9.26
5000	24.59	— 7.53
3150	34.76	— 4.52
2000	44.60	— 2.36
1000	54.37	— 0.64
500	58.01	— 0.08
315	58.84	+ 0.05
200	59.17	+ 0.09
100	59.34	+ 0.12
50	59.40	+ 0.13
400 Program Level	185.00	+ 10.00

4. *Film Stock*

4.1 The film stock shall be full-coat, splice-free, of the low-shrinkage, safety type in compliance with American National Standard Specifications for Motion-Picture Safety Film, PH22.31-1967 (R-1973).

4.1.1 Test films made on triacetate base shall be cut and perforated in accordance with long-pitch dimensions specified in American National Standard Dimensions for 16-mm Motion-Picture Film Perforated 1R, PH22.109-1974.

4.1.2 Test films made on polyester base shall be perforated in accordance with short-pitch dimensions specified in ANSI PH22.109-1974.

4.2 The film stock shall be conditioned for 10 days at 20°C ± 3° (68°F ± 5.4°) at a relative humidity of 50 ± 10 percent prior to recording.

4.3 The film shall be recorded and packaged within the temperature and humidity limits specified in Sec. 4.2. The recorded film shall be packaged in a metal can and sealed either with a low-moisture permeability plastic tape or a fabric tape having a moisture barrier.

5. *Identification*

Each test film shall be identified by a suitable identification marking.

6. *Calibration*

6.1 Flux. The short circuit flux on the test film shall be determined by means of the calibrated short-gap ferromagnetic core reproducer technique. This technique is described in American National Standard Method of Measuring Recorded Flux of Magnetic Sound Records at Medium Wavelengths, ANSI/IEEE Std 347-1972.

6.2 Level. The signal level measurements specified in Sec. 2.4 shall be measured with a standard volume indicator conforming to American National Standard Volume Measurements of Electrical Speech and Program Waves, ANSI/IEEE Std 152-1953 (R1976).

6.3 Full-Width Recording. If the test film is recorded so that the record extends from one edge to the other, the recording shall be monitored and checked for accuracy only over a 200-mil area, as designated by ANSI PH22.97-1975.

NOTE: An audio level test film and a multifrequency test film, made in accordance with this practice on polyester base and recorded from one edge of the film to the other, are available from the Society of Motion Picture and Television Engineers.

PROPOSED

SMPTE RECOMMENDED PRACTICE

RP 6
Revision of RP 6-1967

Recorded Carrier Frequencies and Pre-emphasis Characteristics for 2-in Quadruplex Video Magnetic Tape Recording for 525-Line/60-Field Television Systems

1. *Scope*

1.1 This practice specifies parameters of the recorded information essential to the interchange of 2-in quadruplex video magnetic tape recording of NTSC color and monochrome signals for 525-line/60-field television systems. The parameters include video pre-emphasis characteristics and recorded carrier frequencies for all recording practices and video pilot specifications for Practice SHBP.

1.2 Practices defined are:

1.2.1 Practice SHBP. This practice is suitable for color and monochrome signals. A video pilot signal is added to the recorded information to be used as a playback reference.

1.2.2 Practice HB. This practice is suitable for color and monochrome signals.

1.2.3 Practice LBM. This practice is suitable only for monochrome signals. (It is considered to be obsolescent and is included for reference purposes only.)

1.2.4 Practice LBC. This practice is suitable for color and monochrome signals. (It is considered to be obsolescent and is included for reference purposes only.)

2. *Recording Chain*

2.1 A recording chain consisting of elements specified by this practice will contain, in order of signal flow, the following elements:

2.1.1 Video processing and signal generating circuits used only for Practice SHBP.

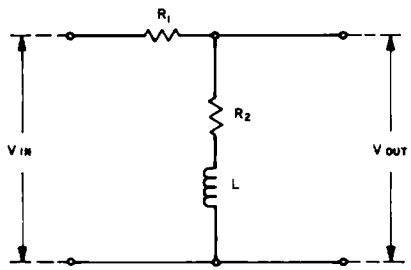
2.1.2 A video pre-emphasis network.

2.1.3 A linear frequency modulator having constant deviation with respect to the modulating video frequencies.

2.1.4 An amplifier of the frequency-modulated carrier to provide alternating-current drive to the pole tips.

3. *Pre-emphasis*

3.1 Pre-emphasis is defined by the frequency and phase characteristics of a network as shown in the figure. Accuracy of pre-emphasis time constants shall be maintained by including source and load impedances (not shown) in the calculation of circuit values.



$$\tau_1 = \frac{L}{R_1 + R_2}$$

$$\tau_2 = \frac{L}{R_2}$$

$$\frac{V\,out}{V\,in} = \left(\frac{j\omega\tau_2 + 1}{j\omega\tau_1 + 1}\right)\left(\frac{\tau_1}{\tau_2}\right)$$

Video Pre-emphasis Characteristic Circuit

3.2 Time constant values specifying the pre-emphasis network for each practice are listed in the table below:

	SHBP	HB	LBM	LBC
Time constant τ_1 (nanoseconds)	333.3	240	26.1	31.7
Time constant τ_2 (nanoseconds)	2500	600	132	240
Tolerance	± 0.25%	Not specified	Not specified	Not specified

4. *Recorded Carrier Frequencies*

Carrier frequencies corresponding to reference video levels shall be as indicated in the table below:

	SHBP	HB	LBM	LBC
Peak White (MHz)	10.7	10.0	6.8	6.5
Blanking (MHz)	9.9	7.9	5.0	5.79
Sync Tip (MHz)	9.58	7.06	4.28	5.5
Tolerance (MHz)	± 0.02	± 0.05	± 0.05	± 0.05

5. *Head Current*

5.1 The amplitude vs frequency characteristic of the recording current applied to the head shall produce a recording such that reproduced video, with no reproduce equalization changes, is the same as the following reference recording.

5.2 The reference recording is made with a flat amplitude-vs-frequency current drive to a head with metal pole tips.

6. *Practice SHBP*

6.1 All recordings made using this practice shall have a video pilot signal added to the video information prior to the frequency-modulation process.

6.2 Monochrome television signals shall have a psuedo-burst added to sync tip and horizontal blanking interval for the purpose of identification and pilot generation. (See Sec. 6.6.)

6.3 Unless otherwise indicated, all parameter specifications show relationships among pilot, burst, and video information prior to pre-emphasis. The point of insertion of generated signals into the video information path is not specified.

6.4 Pilot Band Protection Filtering. In order to ensure that no spurious components from the input video signal are recorded in the pilot frequency band, a band-reject filter shall be placed in the video signal path prior to addition of the pilot signal. Attenuation of all components within ± 100 kHz of the pilot frequency shall be 16 dB or greater.

6.5 Pilot specifications:

6.5.1 The pilot frequency shall be exactly 1.5 times the color subcarrier or pseudo-burst frequency of the video information to be recorded.

6.5.2 The pilot phase shall be such that positive- or negative-going zero crossings of pilot coincide with the negative-going zero crossings of the R-Y color component signal. Tolerance of zero crossing coincidence shall be ± 2.3 nanoseconds for color signals. Phase and tolerances are unspecified for monochrome signals.

6.5.3 Amplitude of the pilot is defined by a measurement in the FM spectrum at the output of the modulator to reduce tolerance errors associated with the input video signal.

With no chroma signal present (except burst), the amplitude of the first order pilot sidebands shall be 24 db ± 0.2 dB below the amplitude of the unmodulated carrier. (This pilot amplitude corresponds to a peak-to-peak video pilot level equal to 1/6 of the sync tip to peak white level of a full amplitude video signal.)

6.5.4 The amplitude of any spurious components shall be at least 30 dB below the pilot level.

6.6 Pseudo-burst specifications for monochrome signal only.

6.6.1 The pseudo-burst shall start 0.4 μs ± 0.2 μs after the 50-percent amplitude point of the leading edge of sync. The start of pseudo-burst is defined by the zero crossing that precedes the first half cycle of subcarrier that is 50-percent or greater of the pseudo-burst amplitude.

6.6.2 The pseudo-burst shall end 7.8 μs ± 0.4 μs after the 50-percent amplitude point of the leading edge of sync. The end of the pseudo-burst is defined by the zero crossing that follows the last half cycle of subcarrier that is 50-percent or greater of pseudo-burst amplitude.

6.6.3 The 10 to 90 percent rise and fall times of pseudo-burst envelope shall be less than 0.5 μs. The leading edge of sync, 10 to 90 percent points, shall contain no burst.

6.6.4 The amplitude of the pseudo-burst shall be 40 IRE units ± 4 IRE units.

6.6.5 The amplitude of any spurious components shall be at least 33 dB below the pseudo-burst level. DC components produced by insertion of the pseudo-burst into the video signal shall be less than ± 1 IRE unit.

6.6.6 The frequency of the pseudo-burst shall be 3.58 MHz ± 0.02 MHz. Rate of change of the frequency of the pseudo-burst shall be less than 1 kHz per second.

PROPOSED

SMPTE RECOMMENDED PRACTICE

RP 23
Revision of RP 23-1967

Reinforcement of 70-mm Positive Splices

Introduction

Splices on 70-mm projection prints have, in certain instances, failed during projection. To prevent costly damage to the print, projectionists and others involved in distribution and exhibition have suggested that splices be reinforced.

1. *Scope*

This practice specifies that a transparent material shall be employed to reinforce splices on 70-mm projection prints.

2. *Materials*

Pre- or post-perforated transparent polyester tape with pressure-sensitive adhesive is preferred. Total tape thickness, including adhesive, shall not exceed 0.0026 in (0.066 mm).

3. *Application*

The tape shall be applied to the emulsion side of the film to avoid masking the magnetic sound tracks. For optimum results, the reinforcement should extend to both edges, or just short of both edges, of the film to include the perforation area. Although tape width is not critical, it has been determined that tape 0.750 in (19.05 mm) wide, which includes two perforations on each side of the splice, will adequately reinforce the splice and yet not be objectionable during projection.

4. *General*

Proprietary items are available that fulfill the requirements of this practice.

THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY

Cinematography — Magnetic stripes and magnetic recording head gaps for sound record on 16 mm motion-picture film perforated along one edge (Type 1) — Positions and width dimensions

1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard specifies the location and width of the magnetic striping on 16 mm motion-picture film perforated along one edge (Type 1) with picture, slit and perforated in accordance with ISO 69.

1.2 This International Standard also specifies the location and width of the magnetic recording head gaps in systems using a magnetic stripe on 16 mm motion-picture film.

2 REFERENCES

ISO 69, *Cinematography – 16 mm motion-picture raw stock film – Cutting and perforating dimensions.*

ISO 359, *Cinematography - Projectable image area on 16 mm motion-picture prints – Dimensions and location.*

ISO 1188, *Cinematography – Recording characteristic for magnetic sound record on 16 mm motion-picture film – Specifications.*

ISO 4243, *Cinematography – Picture image area and photographic sound record on 16 mm motion-picture release prints – Positions and dimensions.* [1]

3 LOCATION AND WIDTH OF MAGNETIC STRIPING

3.1 The location and width of the magnetic striping shall be as shown in the figure and table 2.

3.2 The magnetic striping shall be on the side of the film toward the lamp of the projector arranged for direct projection on a reflection-type screen.

3.3 If the magnetic sound stripe increases the thickness of the film by more than 0,005 mm, a balance stripe shall be applied to equalize effectively the thickness of the two edges of the film. The balance stripe should have essentially the same thickness and shall have the same composition as the sound record stripe.

3.4 The thickness of the magnetic sound stripe and of the balance stripe shall not exceed 0,020 mm (0.000 8 in).

4 LOCATION AND WIDTH OF GAPS OF MAGNETIC HEADS

4.1 The location and width of gaps of the recording magnetic heads shall be as shown in the figure and table 2.

4.2 The effective gaps in the magnetic heads shall be at an angle of $90^\circ \pm 10'$ to the longitudinal axis of the film travel.

5 FILM PROJECTION SPEED

The recording should be made in accordance with ISO 1188 so that the sound record will reproduce properly at the projection speeds indicated for the applications specified in table 1.

6 LONGITUDINAL PICTURE-SOUND DISPLACEMENT

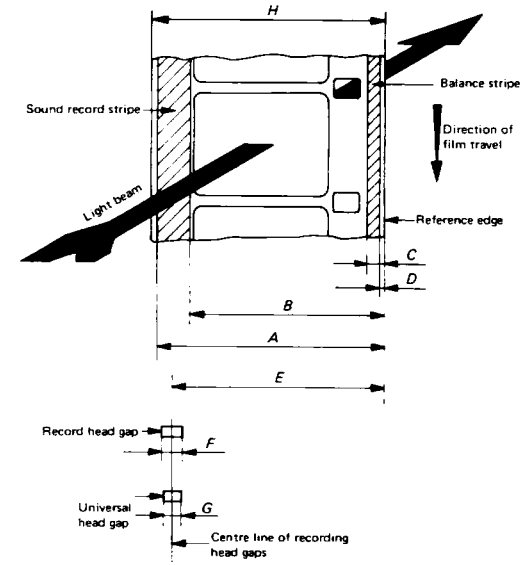
The magnetic sound record on the film shall precede the centre of the corresponding picture by a distance of 28 ± 1 frames, and preferably 28 ± 1/2 frames.

TABLE 1

Application	cm/s	ft/min	Frames or perforations per second
A Primary standards			
1) Cinematography	18,3	36	24
2) Television			
– for 50 Hz supplies	19,05	37.5	25
– for 60 Hz supplies	18,3	36	24
B Secondary standards			
(non-professional use)	13,716	27	18*

* It is recognized that some equipment is available and in use which operates at 16 frames per second.

1) At present at the stage of draft.



FIGURE

TABLE 2

Dimension	mm	in
A min.	15,80	0.622
B	$13{,}25\ ^{0}_{-0.15}$	$0.522\ ^{0}_{-0\,006}$
C	$0{,}80\ ^{0}_{-0.15}$	$0.031\ ^{0}_{-0\,006}$
D max.	0,15	0.006
E	14,55 ± 0,05	0.573 ± 0.002
F	2,35 ± 0,10	0.092 ± 0.004
*G**	2,15 ± 0,10	0.085 ± 0.004
H ref.	15,95	0.628

* When it is desired to employ a single head for the dual function of recording and reproducing, the universal head dimensions shall apply.