A small working group consisting of Messrs. F. Scobey and C. Leone will draft a revision to the standard for the universal leader to include a sound leader section.

In view of the need to identify clearly the current practice for specifying the emulsion position on 16mm prints, Mr. Reichard will investigate and recommend for committee consideration a revision of the standard PH22.10, Specifications for Projector Usage of 16mm Motion-Picture Film.

1 November 1978

J. J. EHRENBERG
Chairman

Committee on Audio Recording and Reproduction Technology

The extensive agenda prepared by Mr. I. R. Allen, the chairman of the committee, which held its meeting on 31 October 1978, included reports and discussions on the following subjects:

Mr. R. G. Hufford summarized the work of the Study Group on Audio Production and Post-Production for Motion Picture and Television Entertainment Programming, comprised solely of the directors of sound departments of Hollywood-based studios.

(1) Since its inception in March 1975, this group is attempting to gather appropriate production material from the major studios to make up a theater test film having examples of well-recorded scenes from current motion picture releases.

(2) The group agreed at the last meeting that an American National Standard on the recording characteristic of magnetic sound records for 35mm motion-picture film should be developed in accordance with the international standard, ISO 1189-1978, which specifies a 35μs characteristic.

(3) A paper entitled, "Improvement in Theatre Sound: A Guide for Exhibitors" prepared by the Inter-Society Technical Group consisting of representatives from MPAA (Motion Picture Association of America, Inc.),NATO (National Association of Theatre Owners), SMPTE and TEA (Theatre Equipment Association) has been reviewed.

Mr. Allen reported that work on the following subjects is continuing —

(1) Testing of polyester and tri-acetate bases, with the test material to be supplied by the SMPTE.

(2) Preparation of a draft Recommended Practice for photographic and magnetic three- and four-track 35mm multi-frequency test films being supplied by the SMPTE.

The Chairman also reported that although the proposed standard, "Measurement and Characteristics of Electro-Acoustic Response of Motion-Picture Control Rooms and Indoor Theatres (PH22.202) was approved by the Standards Committee, a small working group under the Chairmanship of Mr. Hecker will review the technological progress and the practical aspects of implementing the proposed standard.

At the request of Mr. J. Mosely, a new study group will be formed to evaluate potential difficulties caused by projector weave and lateral jump in sound reproduction. A second group will be asked to define terms used frequently by the SMPTE such as channel, track, sound, audio etc. It was noted that these terms are often intermixed even in the same documents.

Mr. Sohma of Japan gave a technical description and provided documentation of multi-channel sound as it was introduced in Japan during September 1978, showing its potential for dual language and stereo reproduction.

31 October 1978

IOAN ALLEN
Chairman

Standards & Recommended Practices

Draft American National Standards

Two Draft American National Standards are published here for a trial period and public review: PH22.201, Dimensions of Type W Camera Aperture Image on 16-mm Motion-Picture Film for Enlargement; and PH22.202, Measurement and Characteristics of Electro-Acoustic Response of Motion-Picture Control Rooms and Indoor Theaters.

Both proposals are new documents and agree with international standardization. Type W is the international term for super 16.

Comments should be addressed to Alex E. Alden, Manager of Engineering Services, at Society Headquarters before 1 March 1979. The proposals have been submitted to American National Standards Committee PH22. Consequently, all comments received through *Journal* publication will be reviewed prior to conclusion of action by that committee — *Alex E. Alden, Manager of Engineering Services.*

Working Group Prepares for Initial Field Tests of Digital Interface Hardware

The SMPTE Working Group for Standardization of Digital Control of Television Equipment has held several meetings, with good progress towards development of digital interface standards for television broadcast equipment.

Industry-wide participation in the initial field testing of manufacturers' hardware is planned for the summer of 1979.

Anyone interested in participating in this program may contact the working group chairman:

Mr. Robert W. McAll
Vital Industries
34 Autumn Lane
Hicksville, New York 11801
(Telephone: 516/735-0055)

Draft American National Standard

Dimensions of Type W Camera Aperture Image on 16-mm Motion-Picture Film for Enlargement

PH22.201

1. Scope

1.1 This standard specifies the dimensions of the image area produced by Type W camera aperture on 16-mm motion-picture film intended for enlargement to 35-mm motion-picture film with an aspect ratio of 1.66:1. It also specifies the position of the image relative to the reference edge of the film and to the perforations.

1.2 The standard further specifies the dimensions and location of the image area on 35-mm duplicate negatives and the enlargement ratio in optical printing from 16-mm originals.

2. Dimensions

2.1 The dimensions shall be as given in the figures and tables and shall apply to measurements of the aperture image as formed on freshly exposed and processed film.

2.2 The angle between the vertical edges of the aperture image and the reference edge of the film shall be $0^\circ \pm \frac{1}{2}^\circ$.

2.3 The angle between the horizontal edges of the aperture image and the reference edge of the film shall be $90^\circ \pm \frac{1}{2}^\circ$.

3. 35-mm Internegatives and Duplicate Negatives

The enlargement ratio for printing 35-mm internegatives and duplicate negatives shall be 1.78:1. The dimensions and location of the image area on 35-mm internegatives shall be as shown in Fig. 2 and Table 2.

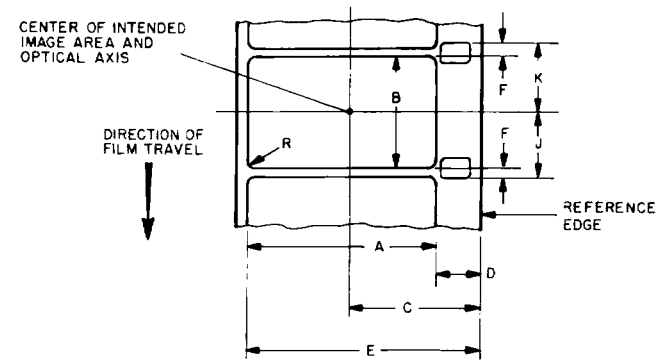

Fig. 1
Image Area on 16-mm Type W Negative or Original

Film as Seen from inside Camera Looking toward Camera Lens; Emulsion Away from Observer

Dimensions	Millimeters		Inches	
A	12.52	ref	0.4929	ref
B	7.42	$+0.15$ -0.00	0.2921	$+0.0059$ -0.0000
C	9.15	ref	0.3602	ref
D	2.95	max	0.1161	max
E	15.37	min	0.6051	min
F	0.82	max	0.0323	max
J = K		ref		ref
R	0.15	max	0.0059	max

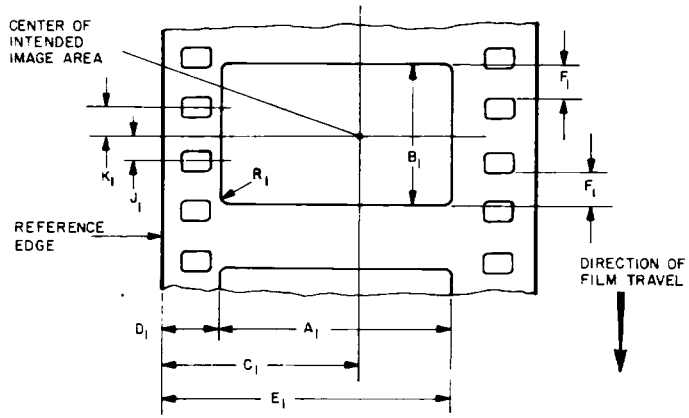

Fig. 2
Image Area on 35-mm Internegative or Duplicate Negative

Film as Seen from inside Camera Looking toward Camera Lens; Emulsion Away from Observer

Dimensions	Millimeters		Inches	
A_1	21.95	ref	0.8642	ref
B_1	13.13	min	0.5169	min
	13.55	max	0.5335	max
C_1	18.75	ref	0.7382	ref
D_1	7.80	max	0.3071	max
E_1	29.75	min	1.1713	min
F_1	3.10	min	0.1220	min
$J_1 = K_1$		ref		ref
R_1	0.25	max	0.0098	max

Appendix

(The Appendix is not a part of this American National Standard, but is included for information purposes only.)

A1. If the aperture plate is not in the plane of the emulsion, the physical dimensions of the aperture in the camera will be slightly different from the dimensions given in the figures. The exact amount of this difference will depend upon the *f* value and focal length of the camera lenses used and upon the distance between the emulsion and the physical aperture. This separation should be no greater than is necessary to prevent scratching of the film.

A2. It is the intent of this standard to provide a camera image such that the exposed area will always be larger than the area of the printer aperture.

A3. The centerline of the image area is given for convenience in interpreting the standard, facilitating such applications as the optical design of equipment and assisting in the understanding of suitable mechanical embodiments related to the camera aperture image area. Note that the centerline of the image area is displaced from the centerline of the film by 1.12 mm (0.0441 in).

Draft American National Standard

Measurement and Characteristics of Electro-Acoustic Response of Motion-Picture Control Rooms and Indoor Theaters

PH22.202

1. Scope

This standard specifies the measurement and characteristics of the electro-acoustic response of motion-picture control rooms and indoor theaters whose volume exceeds 250 m^3 (8829 ft^3). It is intended to assist in standardization of reproduction of motion-picture sound in control rooms and indoor theaters. It does not apply where the recorded sound is intended for reproduction under domestic listening conditions, i.e., radio broadcasting, television broadcasting, tape, or disc. This standard does not cover that part of the motion-picture sound system from the transducer to the input terminals of the main fader.

2. Definitions

2.1 Complete Sound Reproduction System: Represented diagrammatically in Fig. 1 and used in studio dubbing theaters, laboratory review rooms, and indoor theaters, generally considered to consist of an A Chain and a B Chain.

2.2 A Chain (Transducer System): That part of a motion-picture sound system, as shown in Fig. 1, extending from the transducer to the input terminals of the main fader.

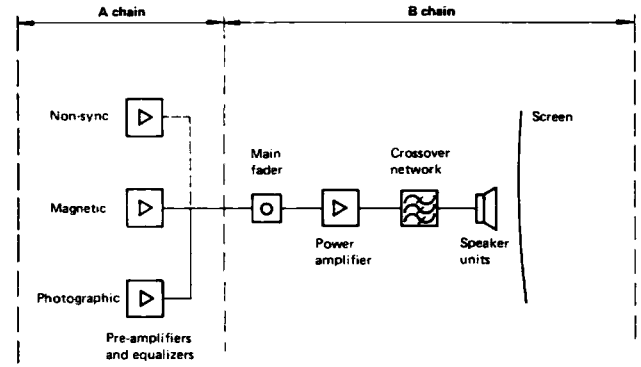

Fig. 1
Complete Theatrical Sound Reproducing System

2.3 B Chain (Final Chain): That part of a motion-picture sound reproduction system, as shown in Fig. 1, commencing at the input terminals of the main fader and terminating at any position in the listening area of the room or auditorium at which sound pressure measurements are taken.

2.4 Electro-Acoustic Response: The electro-acoustic response of the final chain is the sound pressure level expressed in decibels with respect to an arbitrary reference pressure (see Sec. 4) over a given frequency range measured at a given position in the listening area when pink noise of constant electromotive force (emf) is applied to the input terminals of the main fader, preceding the power amplifier. (See Fig. 1.) For a given area, this response is determined by averaging the rms sound pressures for each frequency band at all measuring positions in the auditorium. (If the variations among the sound pressure levels at the different measuring positions are small, not exceeding 4 dB, the arithmetic mean of these individual sound pressure levels in decibels can be used.)

2.5 Pink Noise: A continuous spectrum noise having constant energy per constant percentage bandwidth and Gaussian probability distribution of instantaneous values.

3. Method of Measurement

3.1 The electro-acoustic response shall be measured with the equipment and instruments arranged in accordance with Figs. 2, 3, and 4. (See Appendix.)

3.2 Sound pressure level measurements (see Appendix) shall be made as follows:

(a) In dubbing theaters, at each of the principal listening areas

(b) In review rooms and review theaters, at a sufficient number of positions to cover the listening area

(c) In indoor theaters, at Position X as shown in Fig. 3 and Position R as shown in Fig. 4 and at other representative positions within the shaded area

3.3 It is recommended that measurements be made at a height between 1 and 1.5 m (3.3 and 4.9 ft), and not closer than

(a) 1.5 m (4.9 ft) to any wall

(b) 5 m (16.4 ft) to the loudspeakers

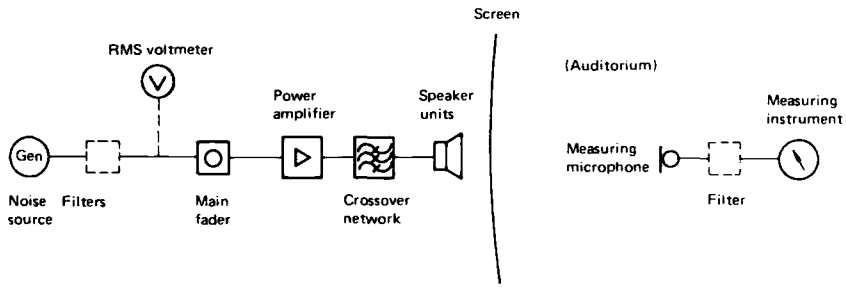

Fig. 2
Method of Measurement of B Chain
(See Appendix A3)

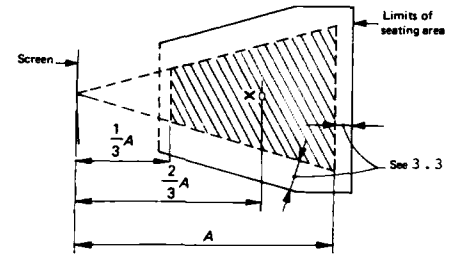

Fig. 3
Theater Auditorium

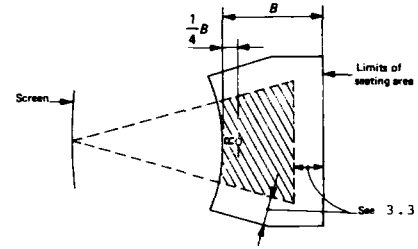

Fig. 4
Theater Balcony

B Chain Characteristics			
Central Frequencies of One-Third Octave Bands Hz	Characteristics dB	Tolerances + dB	—
50	—6	6	6
63	—3	5	5
80	—1	4	4
100	0	3	3
125	0	3	3
160	0	3	3
200	0	3	3
250	0	3	3
315	0	3	3
400	0	3	3
500	0	3	3
630	0	3	3
800	0	3	3
1000	0	3	3
1250	0	3	3
1600	0	3	3
2000	0	3	3
2500	—1	3	3
3150	—2	3	3
4000	—3	3	3
	Characteristics X[1]	Tolerances X[1]	
5000	— 5 —4	±3	±3
6300	— 8 —5	±3	±3
8000	—11 —6	±3	±3
10 000	—14 —7	±3	±3

[1]See Sec. 4.

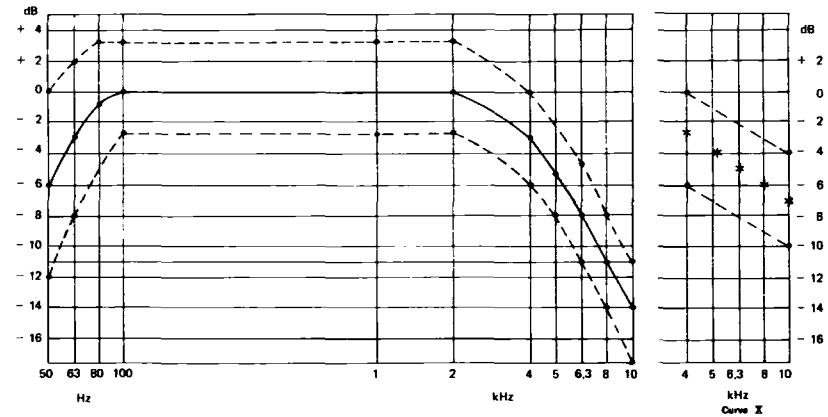

Fig. 5
Curve of B Chain Characteristic

NOTE: Tolerances are based upon 1/3-octave measurements. If 1/1-octave measurements are used, reduce tolerance by 1 dB.

4. Characteristics

The electro-acoustic response of the B chain shall be within the tolerance of the curve given in the table and Fig. 5. This response represents current practice. Curve X and its tolerance, shown as asterisks in Fig. 5, within 4 to 10 kHz, represents a characteristic for future standardization. (To assist in achieving compliance, the arbitrary reference pressure may be chosen to bring as many frequencies as possible within tolerance, i.e., any arbitrary constant may be subtracted from the set of band sound pressure levels measured as specified in Sec. 3.)

Appendix

(The Appendix is not a part of this American National Standard, but is included for information purposes only.)

A1. This standard refers to the B Chain (final chain) which includes the reproduction equipment as shown in Fig. 1 and the listening area or auditorium.

It should be emphasized that, in practice, the satisfactory reproduction of sound in a listening room or auditorium is also dependent upon the alignment and performance of the A Chain (see Fig. 1) of the installation. It is, therefore, essential that the A Chain be correctly aligned within the tolerances of existing or proposed standards by the use of the appropriate photographic or magnetic test film and, in the case of the photographic film, that relevant de-emphasis be applied.

A2. If a theater wishes to change to Characteristic X, it may be necessary to make suitable adjustments to the A Chain in order to reproduce conventionally recorded sound records.

A3. At least five methods of measurement are recognized as providing appropriate data for the evaluation of the electro-acoustic response of the B Chain. The methods depend upon the generation of pink noise from 31.5 Hz to 10 kHz or beyond, and are as follows:

(a) Generate pink noise in 1/3-octave bandwidths within preferred central frequencies conforming to American National Standard Preferred Frequencies and Band Numbers for Acoustical Measurements, S1.6-1967 (R1976). Measure the signal input and the sound level meter output with an rms voltmeter and sound level meter complying with American National Standard Volume Measurements of Electrical Speech and Program Waves, ANSI/IEEE 152-1953 (R1976).

(b) Generate pink noise in full bandwidth. Measure the acoustic output with an rms voltmeter and sound level meter complying with ANSI/IEEE 152-1953 (R1976), reading acoustic output through a series of 1/3-octave bandpass filters.

(c) Generate pink noise in full bandwidth. Measure the acoustic output with a calibrated microphone intended for use in the diffuse field and an audio-frequency spectrum analyzer, covering the spectrum in 1/3-octave bands.

(d) Generate pink noise by one of the methods described above and, with a calibrated microphone intended for use in the diffuse field and a precision tape recorder, record the microphone output level as a function of both frequency sweep and position analysis in the theater. Reproduce and analyze the results by one of the methods described above at a subsequent time in an appropriate laboratory.

(e) Generate pink noise in octave bands, the center frequencies of which shall be altered in either 1/1 or 1/3-octave steps. Measure the acoustic output with a sound level meter as described in (a). This procedure, using full-octave bands, requires that tolerances on the B Chain electro-acoustic response curve be reduced as noted in Fig. 5.

To obtain a valid representation of the acoustic response throughout the listening area, it is suggested that at least five positions be averaged when employing whole-octave bands, and at least nine positions when employing 1/3-octave bands.

A4. It is recommended that not only should the overall response fall within the tolerances specified in Sec. 4, but that each individual response also fall within those tolerances.

Provided that the final chain meets the tolerances specified, the electro-acoustic frequency response for sound reproduction should be satisfactory for both photographic and magnetic recordings.

Care should be taken that deviations from the required curve, although within the tolerance area, do not cause a tonal imbalance. For example, a situation where bass responses are all positive and treble responses negative, or vice versa, should be avoided.

When there is a departure from the electro-acoustic response of the listening room or auditorium specified in the table, it is necessary to determine the reason. The departure may be caused by one or more of the following faults:

(a) incorrect frequency response of the amplifier
(b) unsatisfactory loudspeaker performance
(c) incorrect location, orientation, and directivity of the loudspeakers
(d) acoustic defects of the room
(e) incorrect adjustment of the crossover network

Suitable corrective action must first be taken in relation to such faults.

If the electro-acoustic response remains unacceptable, suitable corrections should be made to the B part of the installation.

Because the measurements deal only with the steady-state properties of the auditorium, acoustical defects such as backstage overhang, harmful echoes, etc., do not show up. Attempts to use measurement results as a basis for major equipment redesign in a theater found defective have to be preceded by ascertaining that no grave acoustical faults are present. Methods for finding or eliminating such faults are not covered in this standard.

As the sound pressure level of band-limited random noise in rooms fluctuates strongly with time, it is recommended that measurements be time-averaged over a period of not less than 60 s for the lowest frequency band and not less than 5 s in the highest frequency band; for intermediate bands, averaging times may be approximately interpolated between these extremes.