January 1978 *Journal* Wanted

Vol. 87, No. 1, January 1978. Due to disruption of usual publication procedure, the inventory of this issue is nearly depleted. A number of copies will be welcomed for Society purchase at $4.00 each. Please send any available copies.

Att: The Editor
SMPTE
862 Scarsdale Ave.
Scarsdale, NY 10583

Standards & Recommended Practices

Approved SMPTE Recommended Practices

The Board of Governors approved two SMPTE Recommended Practices on 8 July 1977: RP 79-1977, Specifications for Flutter Test Film for 35-mm Four-Track Release Print Sound Reproducers, Magnetic Type, and RP 80-1977, Specifications for Azimuth Test Film for 35-mm Four-Track Release Print Sound Reproducers, Magnetic Type.

Proposed SMPTE Recommended Practices

Two Proposed SMPTE Recommended Practices are published here for a trial period and public review: RP 36, Positioning the Headwheel and Adjacent Tape Guides for 2-in Quadruplex Video Magnetic Tape Recorders (revision of RP 36-1971), and RP 89, Dual-Program Audio for 2-in Quadruplex Video Magnetic Tape Recording at 15 and 7.5 in/s.

Comments on the practices should be addressed to Alex E. Alden, Manager of Engineering Services, at Society Headquarters prior to 1 August 1978. If no adverse criticism is received, the proposals will be submitted to the Society's Board of Governors for approval.

Reaffirmed SMPTE Recommended Practices

The Executive Committee for Standards Approval, acting on behalf of the Board of Governors, approved the reaffirmation of two SMPTE Recommended Practices on 28 March 1978: RP 25-1968, Sound and Picture Synchronization on Motion-Picture Film Relative to the Universal Leader for Magnetic and Photographic Tracks, and RP 47-1972, Electronic Method of Dropout Detection and Counting.

SMPTE Recommended Practices are available from Society Headquarters for $1.50 each.

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 2969-1977, Cinematography — Electro-Acoustic Response of Motion-Picture Control Rooms and Indoor Theatres — Specifications and Measurements, does not have a comparable American National Standard as yet but is in accord with engineering practices.

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.

The International Standard published here was developed by Technical Committee 36 on Cinematography. The work of this committee is administered by the Engineering Department of the Society which functions as the secretariat in ANSI's name. A report of the last meeting of the committee was published in the June 1976 *SMPTE Journal*. — Alex E. Alden, *Manager of Engineering Services*.

SMPTE RECOMMENDED PRACTICE — RP 79–1977

Specifications for Flutter Test Film for 35-mm Four-Track Release Print Sound Reproducers, Magnetic Type

1. *Scope*

This practice specifies a test film for determining the presence of flutter in 35-mm motion-picture magnetic sound reproducers operating at 90 ft (27.4 m) per minute designed for four-track magnetic sound release prints.

2. *Test Film Signal*

2.1 Frequency. The sound record on each of the four tracks shall be an original recording which will reproduce at a frequency of 3150 ± 25 Hz when the linear speed of the film is 96 perforations per second or approximately 90 ft per minute (18 in or 45.7 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 records shall be in accordance with American National Standard Position, Dimensions and Reproducing Speed of Four Magnetic Sound Records on 35-mm Motion-Picture Release Prints, PH22.137-1974. The sound record may also be recorded so that it extends from one edge of the film to the other.

2.4 Recorded Level. The recorded signals shall have a recorded level of 6.0 ± 1.5 dB below the reference level of a frequency of 1000 Hz having an rms shortcircuit flux per unit track width of 200 nanowebers per meter (0 dB). The signal level shall not fluctuate more than ± 0.5 dB within the test film length.

2.5 Flutter. The weighted peak flutter of the sound record shall not exceed ± 0.04 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 Phase. The recorded signal in each of the four records shall be in an in-phase relationship to the other three. A recording made as described in the Appendix is considered to be in phase.

3. *Film Stock*

3.1 The film stock shall be splice-free and of the low-shrinkage, safety type in compliance with American National Standard Specifications for Motion-Picture Safety Film, PH22.31-1967 (R1973) and cut and perforated in accordance with American National Standard Dimensions for 35-mm Motion-Picture Film, CS-1870, PH22.102-1974.

3.2 The magnetic recording stripes shall be in accordance with American National Standard Dimensions of Magnetic Striping of 35-mm Motion-Picture Film for Four-Track Magnetic Sound Release Prints, PH22.177-1970 (R1976).

3.3 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.

4. *Identification*

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

5. *Calibration*

5.1 Flux. The shortcircuit 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.

5.2 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).

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

Appendix

(The Appendix is not a part of this SMPTE Recommended Practice, but is included for information purposes only.)

In-phase relationship of the sound records, as printed by a multiple-head recorder, can be assured if the individual coils of the recording head are similar and are assembled in the same manner.

The relationship is accomplished by connecting the winding in series so that the end of each coil is connected to the beginning of the next coil maintaining a consistent direction of winding.

The relationship is also accomplished in a parallel-type connection if the corresponding beginning leads are connected together and the corresponding ending leads are connected together and the direction of winding of each coil is kept consistent with other coils.

Approved 8 July 1977

SMPTE RECOMMENDED PRACTICE — RP 80–1977

Specifications for Azimuth Test Film for 35-mm Four-Track Release Print Sound Reproducers, Magnetic Type

1. *Scope*

This practice specifies a test film for use in aligning the azimuth of magnetic head gaps in 35-mm motion-picture magnetic sound reproducers operating at 90 ft (27.4 m) per minute designed for four-track magnetic sound release prints.

2. *Test Film Signal*

2.1 Frequency. The sound record on each of the four tracks shall be an original recording which will reproduce at a frequency of 8000 ± 100 Hz when the linear speed of the film is 96 perforations per second or approximately 90 ft per minute (18 in or 45.7 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 records shall be in accordance with American National Standard Position, Dimensions and Reproducing Speed of Four Magnetic Sound Records on 35-mm Motion-Picture Release Prints, PH22.137-1974. The sound record may also be recorded so that it extends from one edge of the film to the other.

2.4 Recorded Level. The recorded signals shall have a recorded level of 6.0 ± 1.5 dB below the reference level of a frequency of 1000 Hz having an rms shortcircuit flux per unit track width of 200 nanowebers per meter (0 dB). The signal level shall not fluctuate more than ± 0.5 dB within the test film length.

2.5 Flutter. The weighted peak flutter of the sound record shall not exceed ± 0.04 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 Phase. The recorded signal in each of the four records shall be in an in-phase relationship to the other three. A recording made as described in the Appendix is considered to be in phase.

3. *Film Stock*

3.1 The film stock shall be splice-free and of the low-shrinkage, safety type in compliance with American National Standard Specifications for Motion-Picture Safety Film, PH22.31-1967 (R1973) and cut and perforated in accordance with American National Standard Dimensions for 35-mm Motion-Picture Film, CS-1870, PH22.102-1974.

3.2 The magnetic recording stripes shall be in accordance with American National Standard Dimensions of Magnetic Striping of 35-mm Motion-Picture Film for Four-Track Magnetic Sound Release Prints, PH22.177-1970 (R1976).

3.3 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.

4. *Identification*

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

5. *Calibration*

5.1 Flux. The shortcircuit 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.

5.2 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).

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

Appendix

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In-phase relationship of the sound records, as printed by a multiple-head recorder, can be assured if the individual coils of the recording head are similar and are assembled in the same manner.

The relationship is accomplished by connecting the winding in series so that the end of each coil is connected to the beginning of the next coil maintaining a consistent direction of winding.

The relationship is also accomplished in a parallel-type connection if the corresponding beginning leads are connected together and the corresponding ending leads are connected together and the direction of winding of each coil is kept consistent with other coils.

Approved 8 July 1977

PROPOSED

SMPTE RECOMMENDED PRACTICE

RP 36

Revision of RP 36-1971

Positioning the Headwheel and Adjacent Tape Guides for 2-in Quadruplex Video Magnetic Tape Recorders

1. *Scope*

This practice establishes the relative locations of critical elements in the path of the tape between the input and output guides for 2-in (51-mm) quadruplex video magnetic tape recorders operating at 15 and 7.5 in/s (381 and 190.5 mm/s).

2. *Definitions*

2.1 Tape Input Guide. The last guiding element encountered by the tape as it approaches the vacuum guide.

2.2 Tape Output Guide. The first guiding element encountered by the tape after it leaves the vacuum guide.

2.3 Reference Line. A line which is tangent to both the input guide and the output guide and is perpendicular to both.

2.4 Tape Neutral Plane. A plane which is defined to be tangent to the input guide and output guide and also contains the reference line.

2.5 Reference Plane. A plane which passes through the reference line and is perpendicular to the tape neutral plane.

2.6 Pole Tip Plane. The plane of rotation of the pole tip which records vertical sync. This plane is perpendicular to the tape neutral plane and the reference plane.

3. *Dimensions*

3.1 Primary References. The tape neutral plane, the reference plane, and the pole tip plane shall be the primary references for positioning the elements described in this practice (see Fig. 1).

3.2 Position of Tape Output Guide. The tape output guide shall be at a distance of 7.50 ± 0.25 in (190.5 ± 6.4 mm) from the pole tip plane (see Dimension B in Fig. 2). The guide may be on either side of the neutral plane.

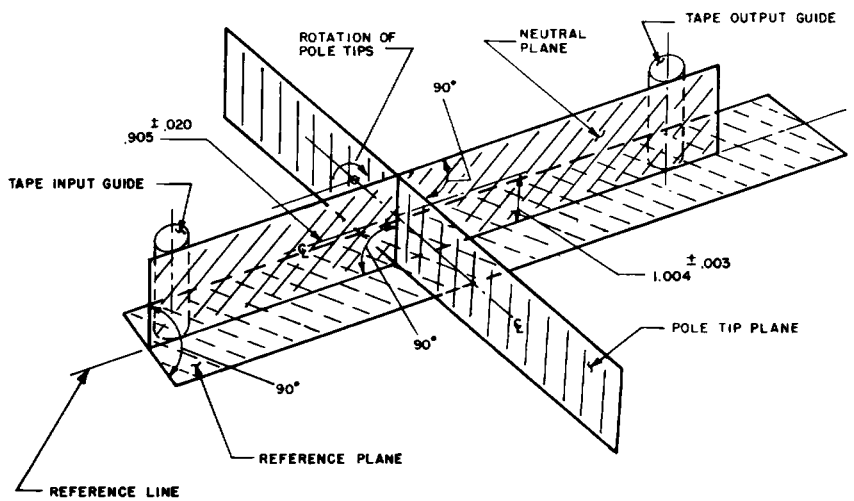


Fig. 1
Relationship Among Tape Neutral Plane, Reference Plane, and Pole Tip Plane

3.3 Position of Tape Input Guide. The tape input guide shall be at a distance of 7.50 ± 0.35 in (190.5 ± 8.9 mm) from the pole tip plane and shall be located symmetrically with respect to the pole tip plane and tape output guide with a tolerance of 0.3 in (8 mm) (see Dimension A in Fig. 2). The guide may be on either side of the neutral plane.

3.4 Position of Tape. When undeflected by the vacuum guide, the tape shall lie in the tape neutral plane with its reference edge coincident with the reference line, and the magnetic surface facing the axis of rotation of the pole tips.

3.5 Position of Axis of Rotation of Pole Tips. The axis of rotation of the pole tips shall be parallel to the tape neutral plane and 0.905 ± 0.020 in (22.99 ± 0.51 mm) from it (see Dimension C in Fig. 2). It shall also be parallel to the reference plane and 1.004 ± 0.003 in (25.50 ± 0.08 mm) from it.

3.6 Position of Vacuum Guide. The vacuum guide shall be positioned so that the centerline of the tape when deflected by the vacuum guide is parallel to the reference plane and 1.004 ± 0.003 in (25.50 ± 0.08 mm) from it.

3.7 Relationship Among Pole Tip Plane, Axis of Rotation and Vacuum Guide. The relationship shall be as specified in SMPTE Recommended Practices on Tape Vacuum Guide Radius and Position for 2-in Quadruplex Video Magnetic Tape Recording, RP 11-1968, and Specifications of Tracking Control Record for 2-in Quadruplex Video Magnetic Tape Recordings, RP 16-1977.

3.8 Tape Deformation by Control Track Head. Deformation of the tape by a control track head shall be limited to 0.020 in (0.51 mm) maximum, in a direction radial from the axis of rotation of the pole tips, at a location between the pole tip plane and the tape output guide, and at a distance 0.700 ± 0.100 in (17.78 ± 2.54 mm) from the pole tip plane and no more than 0.060 in (1.52 mm) from the reference edge of the tape.

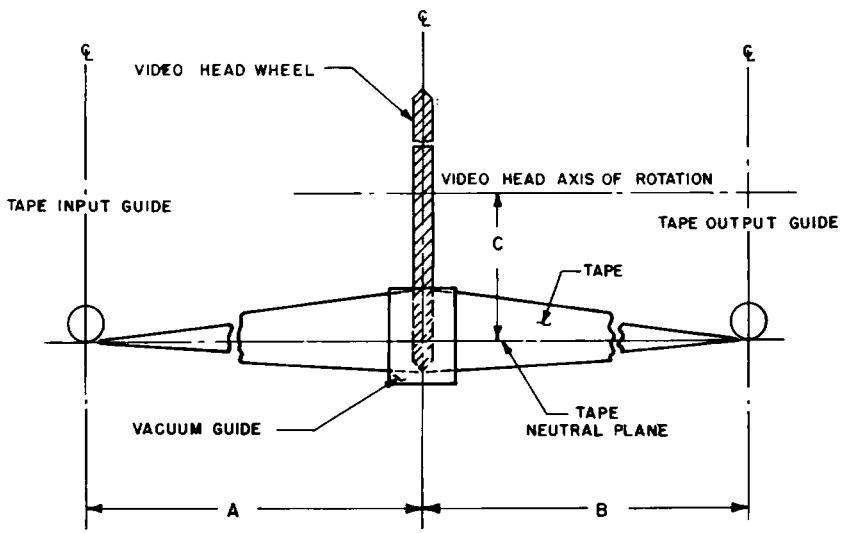


Fig. 2
Position of Tape Guides and Headwheel Assembly

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 89

Dual-Program Audio for 2-in Quadruplex Video Magnetic Tape Recording at 15 and 7.5 in/s

1. *Scope*

This recommended practice specifies the location, frequency response, operating level, and mechanical separation of the simultaneously-recorded information of the video and audio records, as recorded on 2-in quadruplex video magnetic tape operating at 15 and 7.5 in/s (see Note).

2. *Location of Program Audio Tracks*

The dimensions defining the transverse location of the dual-program audio tracks shall be as specified in the figure and table. The dual audio tracks are an alternative to the audio 1 (program audio) track defined in American National Standard Dimensions of Video, Audio and Tracking Control Records on 2-in Video Magnetic Tape Quadruplex Recorded at 15 and 7.5 in/s, C98.6-1973. All other track dimensions and the mechanical separation of the simultaneously-recorded information of the video and audio records are unchanged from the dimensions specified in ANSI C98.6-1973.

3. *Frequency Response and Operating Level*

The frequency response and operating level shall be as specified in American National Standard Frequency Response and Operating Level of Recorders and Reproducers for Audio Record One for 2-in Quadruplex Video Magnetic Tape Operating at 15 and 7.5 in/s, C98.3-1973.

4. *Use of Tracks for Stereo*

If the two tracks are used for stereo recording, the left channel shall be recorded on the track farthest from the reference edge of the tape.

5. *Program Audio Head Position*

In addition to the required dimensions for the mechanical separation of the simultaneously-recorded information of the video and audio records, the record/reproduce gaps of the two program audio heads shall lie on a common straight line.

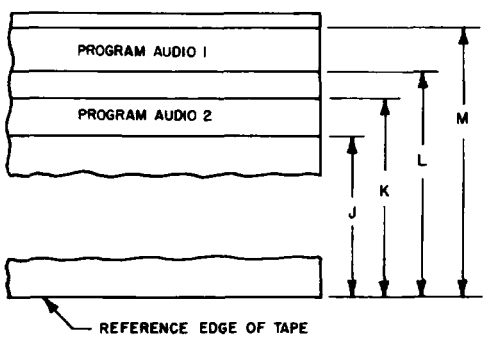
6. *Program Audio Head Phasing*

When the same signal is recorded on the two tracks, the two recorded tracks shall be so phased that when the two tracks are reproduced with a full-track head they will be additive.

7. *Monaural Recording*

If there is to be only one program recorded, both program tracks shall be utilized.

NOTE: Current technology restricts this practice to applications such as stereo where cross-talk is not a limitation.



Dimensions	Inches Min	Inches Max	Millimeters Min	Millimeters Max
J	1.920	1.928	48.77	48.97
K	1.945	1.951	49.40	49.56
L	1.965	1.971	49.91	50.06
M	1.988	1.996	50.50	50.70

Cinematography — Electro-acoustic response of motion-picture control rooms and indoor theatres — Specifications and measurements

1 SCOPE AND FIELD OF APPLICATION

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

2 REFERENCES

ISO 140, *Acoustics — Measurement of sound insulation in buildings and of building elements.*[1]

ISO 266, *Acoustics — Preferred frequencies for measurements.*

ISO 1189, *Cinematography — Recorded characteristic for magnetic sound records on* 35 mm *motion-picture film — Specifications.*

IEC Publication 179, *Precision sound level meters.*

3 DEFINITIONS

3.1 complete sound reproduction system : Represented diagrammatically in figure 1 and used in studio dubbing theatres, laboratory review rooms and indoor theatres, by convention consists of an A chain and a B chain.

3.2 A chain (transducer system) : The A part of a motion-picture sound system as shown in figure 1, extending from the transducer to the input terminals of the main fader.

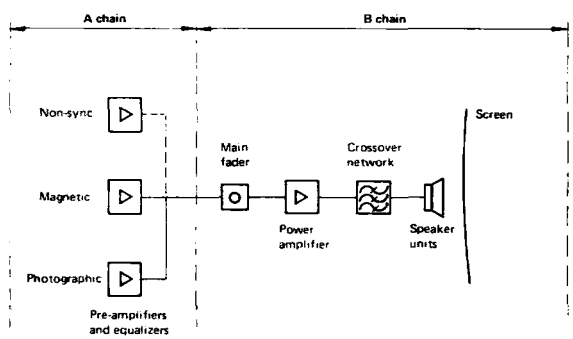


FIGURE 1 – **Complete theatrical sound reproducing system**

1) At present at the stage of draft. (Revision of ISO/R 140-1960.)

3.3 B chain (final chain) : That part of a motion-picture sound reproduction system as shown in figure 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.

3.4 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 clause 5), 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 figure 1).

For a given area, this response is arrived at by averaging, for each frequency band, the rms sound pressures[1] at all measuring positions in the auditorium.

3.5 pink noise : A continuous spectrum noise having constant energy per constant percentage bandwith, and Gaussian probability distribution of instantaneous values.

4 METHOD OF MEASUREMENT

4.1 The electro-acoustic response shall be measured with the equipment and instruments arranged in accordance with figures 2, 3 and 4 (see annex).

4.2 Sound pressure level measurements shall be taken as follows (see annex) :

a) in dubbing theatres, at each of the principal listening areas;

b) in review rooms and review theatres, at a sufficient number of positions to cover the listening area;

c) in indoor theatres, at position X as shown in figure 3, and R as shown in figure 4, and other representative positions within the shaded area.

4.3 It is recommended that measurements be made at a height of between 1 m (3.3 ft) and 1,5 m (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.

5 CHARACTERISTICS

The electro-acoustic response of the B chain shall be within the tolerance of the curve given in the table and figure 5. This response represents current practice. The curve x and its tolerance, shown with stars in figure 5, within 4 to 10 kHz represents the characteristic for future development.

NOTE – 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 in clause 4.

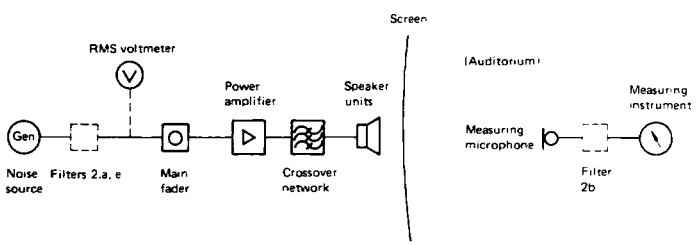


FIGURE 2 – **Method of measurement of B chain**

(See clause A.3 of the annex)

1) 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. If the variations exceed 4 dB, the procedures for averaging described in ISO 140 must be followed.

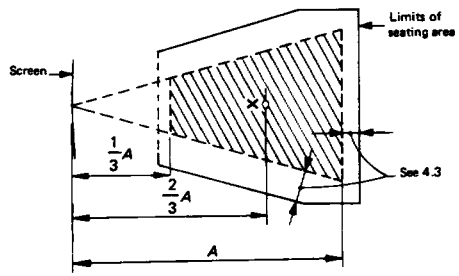


FIGURE 3 – **Theatre auditorium**

NOTE – See annex for measurement procedures

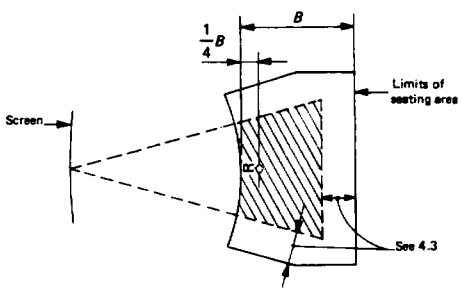


FIGURE 4 – **Theatre balcony**

NOTE – See annex for measurement procedures.

TABLE – Characteristics of the B chain

Central frequencies of one-third octave bands	Characteristics	Tolerances
Hz	dB	+ 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
1 000	0	3 3
1 250	0	3 3
1 600	0	3 3
2 000	0	3 3
2 500	−1	3 3
3 150	−2	3 3
4 000	−3	3 3
	Characteristics	Tolerances
		x[1]		x[1]
5 000	−5	−4	±3	±3
6 300	−8	−5	±3	±3
8 000	−11	−6	±3	±3
10 000	−14	−7	±3	±3

1) See clause 5.

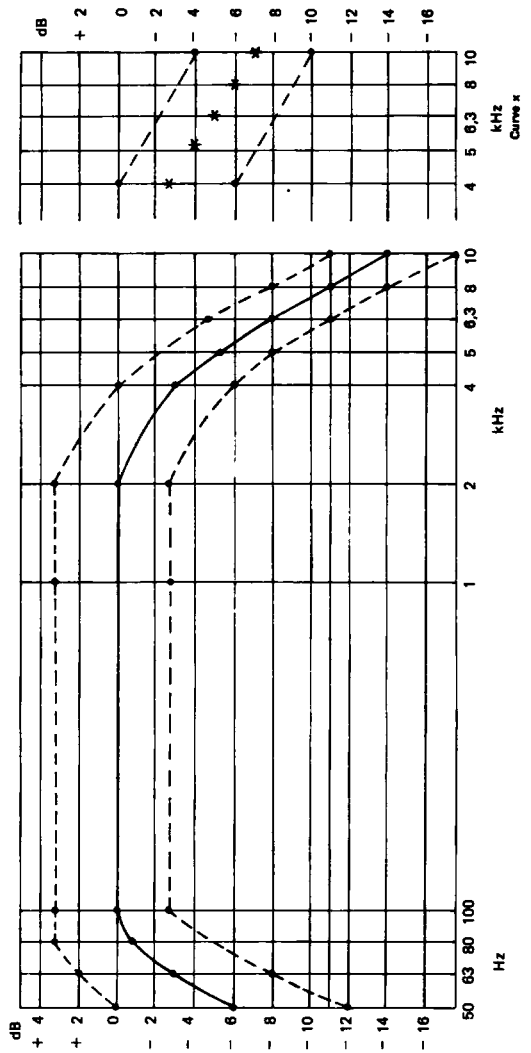


FIGURE 5 – Curve of B chain characteristic

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

ANNEX

GUIDE TO THE PRACTICAL APPLICATION OF THIS INTERNATIONAL STANDARD

A.1 This International Standard refers to the B chain (final chain) which embraces the reproduction equipment as shown in figure 1 and the listening area or auditorium.

It must 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 figure 1) of the installation. It is therefore essential that the A chain is correctly aligned within the tolerances of existing or proposed standards by the use of the appropriate optical or magnetic test film, and, in the case of the optical part, the relevant de-emphasis is applied.

A.2 If a theatre wishes to change to characteristic x, it may be necessary to make suitable adjustments to the A chain in order to play conventional product.

A.3 Method of measurement

A.3.1 At least five methods of measurement are recognized as providing appropriate data for the evaluation of the electro-acoustic response of the B chain. These 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 ISO 266. Measure the signal input and the sound level meter output with an rms voltmeter and sound level meter complying with IEC Publication 179.

b) Generate pink noise in full bandwidth. Measure the acoustic output with an rms voltmeter and sound level meter complying with IEC Publication 179, 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 analyser, covering the spectrum in 1/3 octave bands.

d) Generate pink noise in one of the methods described in a), b) or c), 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 theatre. Reproduce and analyse the results by one of the methods described in a), b) or c) at a subsequent time in an appropriate laboratory.

e) Generate pink noise in octave bands, the centre 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 figure 5.

A.3.2 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.

A.4 It is recommended that not only should the response averaged over all measurement positions fall within tolerances specified in clause 5, but also that the response at each of the individual measurement positions should fall within these tolerances.

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

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

Where in any situation it is found that there is a departure in the electro-acoustic response of the listening room or auditorium specified in the table, it will be necessary to determine the reason. This 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, then suitable active or passive 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 and so on, do not show up. Attempts to use measurement results as a basis for major equipment redesign in a theatre 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 International Standard.

As the sound pressure level of band-limited random noise in rooms fluctuates strongly with time, it is recommended that measurements should 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.