
**Cinematography — B-chain electro-
acoustic reponse of motion-picture
control rooms and indoor theatres —
Specifications and measurements**

*Réponse électro-acoustique de la chaîne B des salles de contrôle et
d'exploitation cinématographique — Spécifications et mesurages*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 2969:2015

<https://standards.iteh.ai/catalog/standards/sist/eca452ab-e9fd-433e-9a9f-39ad2e695871/iso-2969-2015>



Reference number
ISO 2969:2015(E)

© ISO 2015

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 2969:2015

<https://standards.iteh.ai/catalog/standards/sist/eca452ab-e9fd-433e-9a9f-39ad2e695871/iso-2969-2015>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Terms and definitions	1
3 Method of measurement	3
4 Characteristic amplitude responses with respect to frequency	5
Annex A (informative) Factors outside the scope of this International Standard	8
Bibliography	17

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 2969:2015

<https://standards.iteh.ai/catalog/standards/sist/eca452ab-e9fd-433e-9a9f-39ad2e695871/iso-2969-2015>

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#).

The committee responsible for this document is ISO/TC 36, *Cinematography*.

This third edition cancels and replaces the second edition (ISO 2969:1987), which has been technically revised.

<https://standards.iteh.ai/catalog/standards/sist/eca452ab-e9fd-433e-9a9f-39ad2e695871/iso-2969-2015>

Introduction

This International Standard is to be used in conjunction with the relevant standards which cover that part of the motion picture sound system from the transducer to the input terminals of the main fader.

In this International Standard, normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: “shall”, “should”, or “may”. Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any section explicitly labelled as “Informative” or individual paragraphs that start with “Note”.

The keywords “shall” and “shall not” indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, “should” and “should not” indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords “may” and “need not” indicate courses of action permissible within the limits of the document.

The keyword “reserved” indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword “forbidden” indicates “reserved” and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to this document is one that includes all mandatory provisions (“shall”) and, if implemented, all recommended provisions (“should”) as described. A conformant implementation need not implement optional provisions (“may”) and need not implement them as described.

Unless otherwise specified, the order of precedence of the types of normative information in this document are as follows: Normative prose is the authoritative definition; Tables are next; followed by formal languages; then figures; and then any other language forms.

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

ISO 2969:2015

<https://standards.iteh.ai/catalog/standards/sist/eca452ab-e9fd-433e-9a9f-39ad2e695871/iso-2969-2015>

Cinematography — B-chain electro-acoustic response of motion-picture control rooms and indoor theatres — Specifications and measurements

1 Scope

This International Standard specifies the measurement methods and characteristic electroacoustic frequency response of the B-chain of motion-picture dubbing theatres (mixing rooms), screening rooms, and indoor theatres whose room volume exceeds 125 m³ (4,414 ft³). It is intended to assist in standardization of monitoring and reproduction of motion-picture sound in such rooms. The goal is to have constant perceived loudness and frequency response from installation to installation, and from position-to-position within an installation. This International Standard does not cover that part of the motion-picture sound system extending from the transducer to the input source audio selector.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

complete sound reproduction system

system used in indoor theatres and screening rooms and in motion-picture sound post-production facilities such as dubbing theatres, mix rooms and ADR control rooms

Note 1 to entry: The complete system in an indoor theatre or review room is generally considered to consist of an A-chain and a B-chain.

Note 2 to entry: Represented diagrammatically in [Figures 1](#) and [2](#).

2.2

pre-emphasized audio track

audio record, either magnetic or photographic, containing high-frequency boost equalization, which is intended for playback over de-emphasized theatre playback systems

Note 1 to entry: Now very rarely used, but found on all films prior to the mid-1970s. Part of the playback de-emphasis was generated by use of Curve-N in previous versions of this standard (see [2.10](#) and [A.10](#)).

2.3

wide-range audio track

audio record, either magnetic, analogue photographic or digital, which is intended for playback over theatre playback systems aligned to this International Standard

Note 1 to entry: This characteristic was previously referred as Curve-X (see [2.9](#)). Such tracks are recorded without fixed pre- and de-emphasis. Analogue wide-range soundtracks invariably use noise reduction companding technology.

2.4

A-chain (transducer system)

part of a motion-picture audio system extending as far as the input source selector, as shown in [Figures 1](#) and [2](#)

2.5

B-chain (final chain)

part of a motion-picture sound reproduction system, as shown in [Figures 1](#) and [2](#), commencing at the input source audio selector and terminating in the listening area

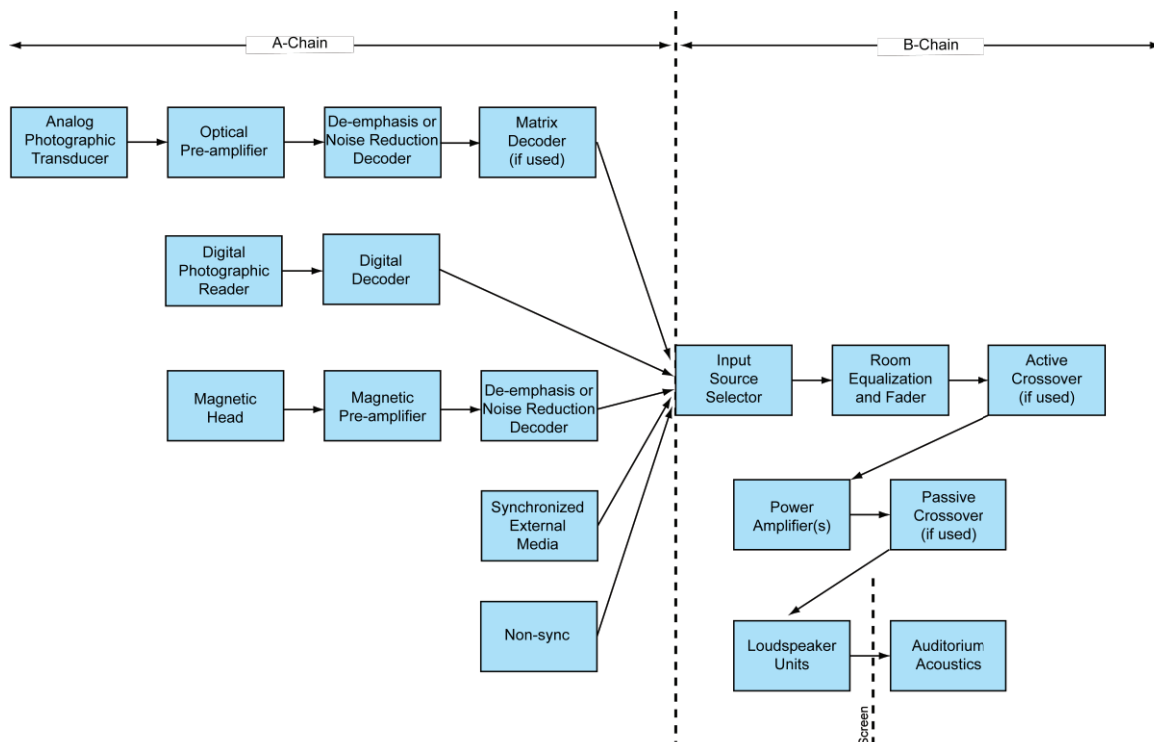


Figure 1 — Complete theatrical audio reproducing chain — Traditional Film Formats
(standards.itech.ai)

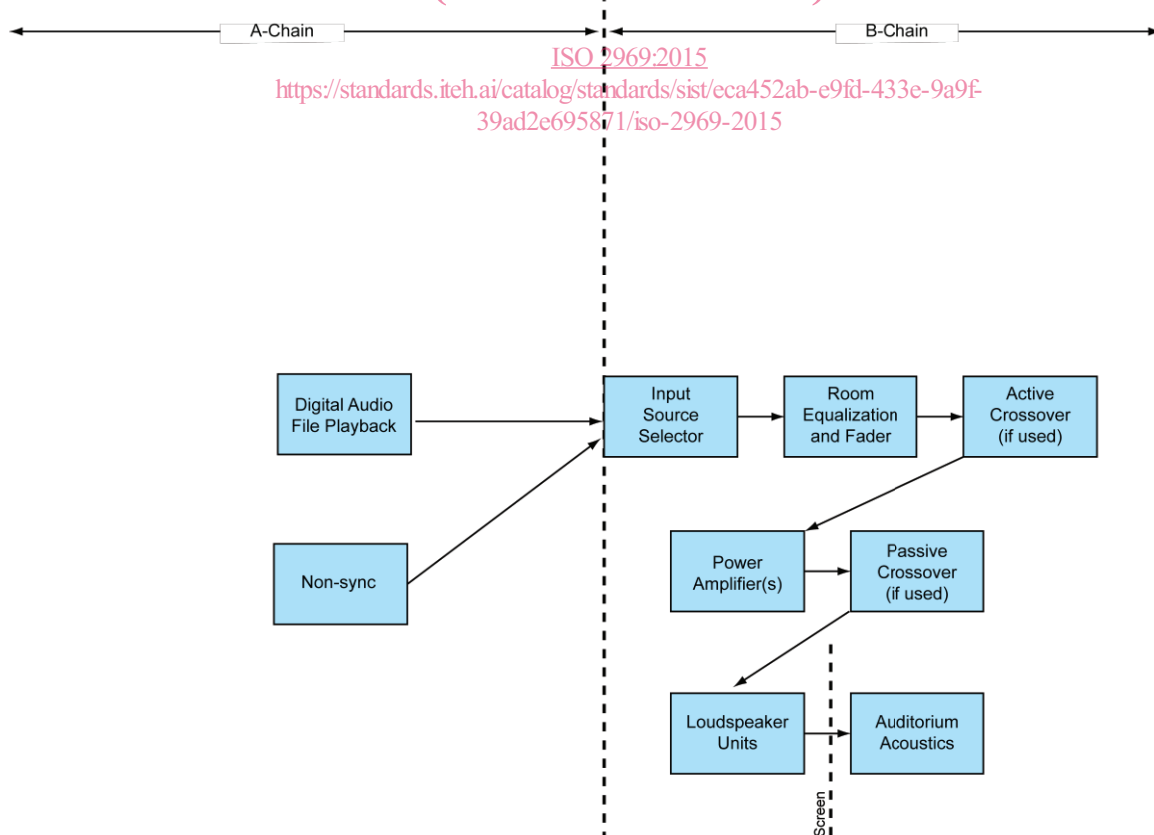


Figure 2 — Complete theatrical audio reproducing chain — Digital Cinema

2.6

pink noise

stochastic signal having a continuous spectrum with equal energy per equal logarithmic interval of frequency, and with a Gaussian probability distribution of instantaneous amplitude (see 3.4)

2.7

wide-band pink noise

pink noise having a bandwidth exceeding the normal acoustic frequency range

Note 1 to entry: A suitable test signal should have a frequency response flat to within $\pm 0,5$ dB when measured in 1/3-octave bands with centre frequencies from 25 Hz to 20 kHz with an integrating averaging technique.

2.8

electroacoustic response

<B-chain> spatially and temporally averaged sound pressure level measured in 1/3-octave bands expressed in decibels with respect to reference level (see A.9) when wide-band pink noise is applied to the input source selector (see Figures 1 and 2)

Note 1 to entry: The electroacoustic response is computed as a spatial and temporal average over the listening area using one of the methods given in A.4.

2.9

Curve-X

X-Curve

B-chain characteristic referred to as Curve-X for wide-range sound tracks, also known as X-Curve

Note 1 to entry: This characteristic typically required some high-frequency equalization boost when older loudspeakers were in use, but is now easily achievable with contemporary loudspeakers. All contemporary practice is targeted to the X-Curve.

2.10

Curve-N

B-chain characteristic referred to as Curve-N for use with loudspeakers with much poorer high-frequency response than those typically now in use (see A.10)

3 Method of measurement

3.1 The electroacoustic response shall be measured with the equipment arranged in accordance with Figures 3 and 4 (see Annex A).

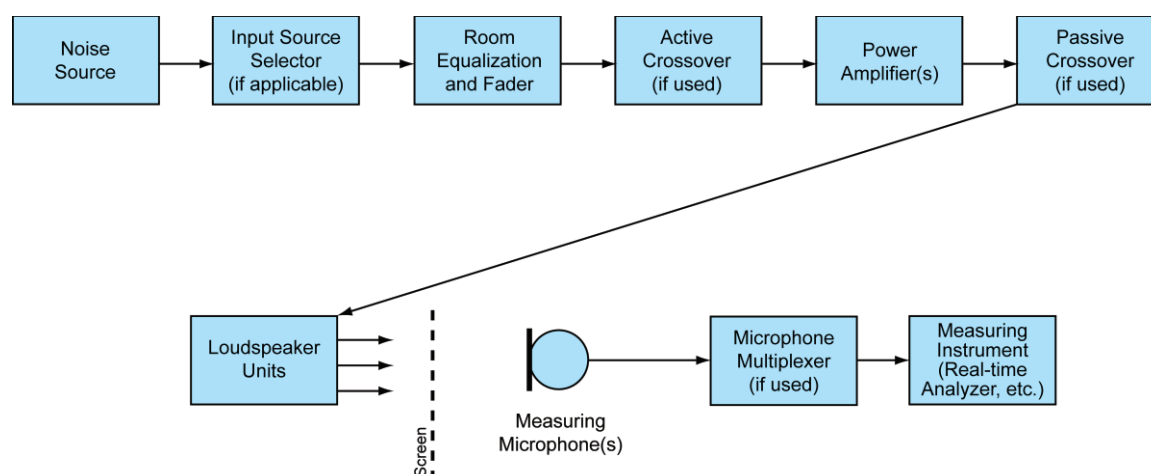


Figure 3 — Method of measurement of B-chain

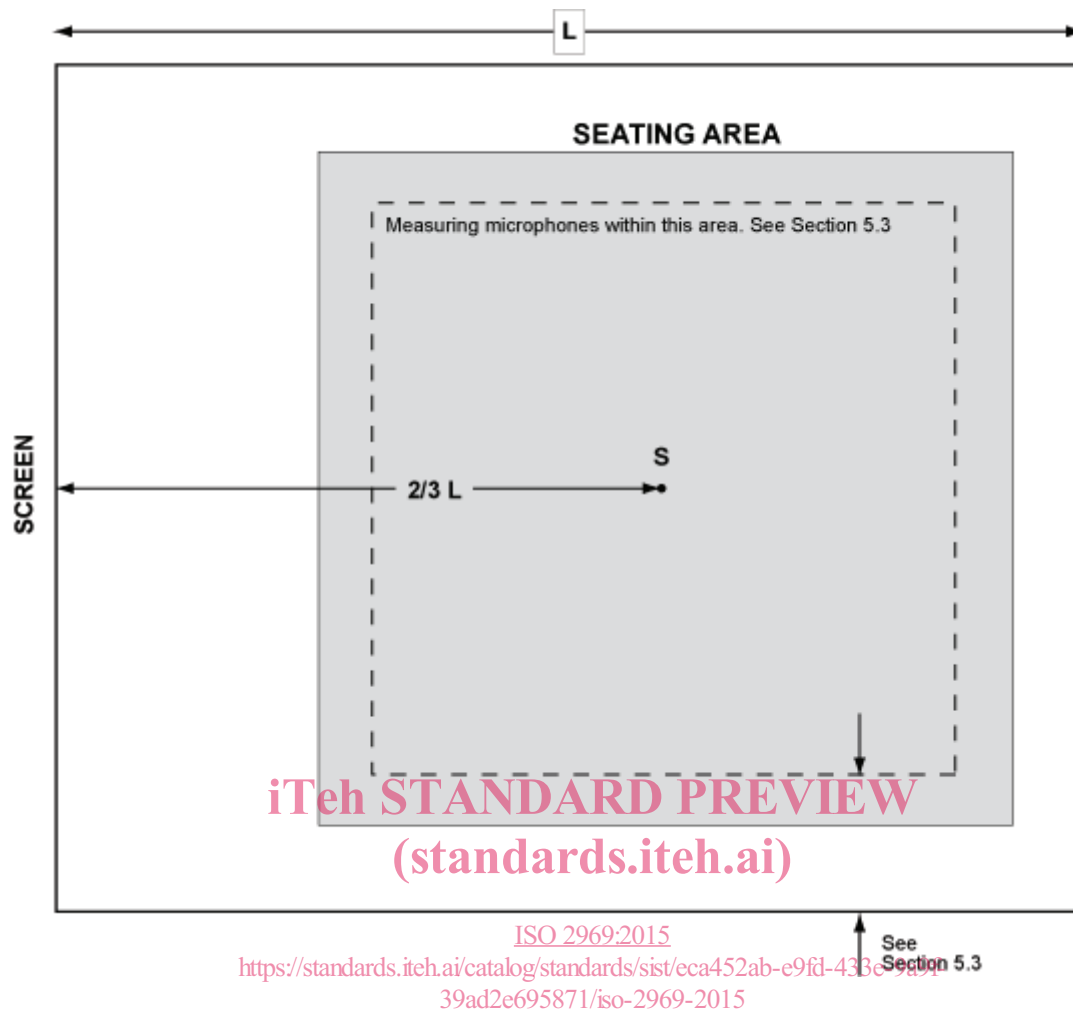


Figure 4 — Range of microphone placements

3.2 Sound pressure level (SPL) vs. Frequency measurements (see [Annex A](#)) shall be made as follows:

- On dubbing stages (in mixing rooms), at each of the principal listening positions, such as at the position of each of the mixing personnel, and at the producer's location. In rooms with a single primary listening position, care should be taken that this is not an aberrant location;
- In screening rooms, at a sufficient number of positions to cover the listening area and to reduce the standard deviation of measured position-to-position response to less than 3 dB. This will typically be achieved with four positions;
- In indoor theatres, at a minimum with the position S as shown in [Figure 4](#), and normally at a sufficient number of additional other positions to reduce the standard deviation of measured position-to-position response to less than 3 dB. This will typically be achieved with four positions (see [A.3.5](#)). An extra series of measurement positions will have to be added if the theatre has a balcony.

3.3 Measurements shall be made at a normal seated ear height between 1,0 m and 1,2 m (3.3 ft and 4.0 ft), but not closer than 150 mm (6 in) from the top of a seat, and not closer than 1,5 m (4.9 ft) to any wall and not closer than 5,0 m (16.4 ft) from the screen loudspeaker(s).

3.4 A suitable single loudspeaker auditorium sound pressure level with wide-band pink noise is 85 dB SPL C-weighted and slow reading (see [A.9](#)).

3.5 The measured level in any 1/3-octave band can be used directly if it exceeds the background noise in the band by at least 10 dB. If the background noise is between 4 dB and 10 dB below the test signal, the measurement may be corrected using the techniques described in ANSI/ASA S1.13 (see Table 4).

3.6 A system for playing contemporary stereo films will generally employ a minimum of four wide-range channels: screen left, centre, and right loudspeaker systems, and a surround channel loudspeaker system employing a number of individual loudspeakers spaced around the left wall, rear wall and right wall of the room in such a way as to achieve uniform coverage. Most rooms where digital soundtracks are played have the surround channel separated into two or three separate channels, left rear and right rear, or left rear, centre rear and right rear. Such systems are frequently built up out of left wall, left rear, right rear and right wall banks of speakers. Most of these rooms also have a dedicated low-frequency channel using one or more sub-woofers. Some rooms may be equipped with two intermediate screen channels, one between left and centre, and one between centre and right. Regardless of the number of channels, each channel or bank shall be measured separately in turn and the equalization adjusted if necessary.

4 Characteristic amplitude responses with respect to frequency

4.1 The electroacoustic response of the B-chain for screen and surround channels shall be listed in Table 1 and shown in Figure 5 within the tolerances given. Note that this characteristic is for a medium-sized theatre (with between, say 200 and 500 seats) with average reverberation behaviour. See A.5 for a discussion of modifications required to this characteristic for larger and smaller spaces and for surround loudspeaker arrays.

4.2 It is recognized that there are a few older sound systems still in use in theatres which cannot meet the centreline of the standard over the fully extended frequency range. The response standard has been updated over the years to account for the changes in technology which permit a wider frequency range, but note the precaution on excessive equalization of older systems in A.6.

<https://standards.iteh.ai/catalog/standards/sist/eca452ab-e9fd-433e-9a9f-39ad2e695871/iso-2969-2015>