

CEA Bulletin

Home Theater Video Design

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(Formulated under the cognizance of the CEA's **R10 Residential Systems Committee**.)

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The following members of the CEA/CEDIA R10 WG3 Home Theater Video Working Group contributed to the development of this document:

Rich Annibaldi, Pioneer
Brad Bergoie, Cinema Design Group
Andres C. Colpa, Home Box Office
Michael Connors, Invision Home Systems
Dennis Erskine, Erskine Group, LLC
Derek Flickinger, Interactive Homes, Inc
Joshua Kairoff, Display Engineering, Inc
Mario Leone, Electronic Solutions Co
Travis Misterek, Best Buy Co, Inc
Jon Richardson, Echostar
Aaron Rigg, Avicall Australia
Joaquin Rivera, Stewart Filmscreen Corp
Rob Sabin, Electronics Design Group
Joel Silver, Imaging Sciences Foundation
Mark Stockfisch, Quantum Data, Inc
Tameez Sunderji, Rovi Corporation
Carlinea Williams, Herma Technologies
Walt Zerbe, Russound

Foreword

This bulletin was created by CEA/CEDIA R10 Residential Systems Committee.

This guide provides a standardized approach to theater installation and performance objectives outlines with recommendations for the design of high performance home theaters that meet or exceed the commercial experience. To meet those objectives, this document describes:

- Optimized Room layout and environment/system design
- Image performance objectives/specifications
- Recommended practices for image evaluation and calibration

CEDIA and its certified Electronic Systems Contractors (ESCs) follow these practices, where applicable, to deliver high value to dedicated home theater environments, helping ensure full performance potential for the equipment and the room.

A cinematic experience is at its simplest definition an experience causing participants to feel as if they were watching a 35mm analog film motion picture in a commercial movie theater.

Commercial movie theaters are designed as an environment that supports, without distraction, creative storytelling using motion cinema as its medium. Anything that introduces or creates visual distractions is likely to erode the feeling of being in a cinema. Unlike projection screens used in meeting rooms, schools or sports bars, home cinema screens should display a projected image without themselves becoming a noticeable part of the viewing environment.

It should be noted that there is a significant difference between a dedicated theater and a multi-purpose media room. By definition, a dedicated theater is designed for only one purpose: watching movies and television. In contrast, a multi-purpose media room is designed not only for watching movies and television but also as a space used for entertainment.

Although a properly completed home theater provides the best quality video experience, many principles within this document are relevant to all levels of video. Thus, whether completing the ultimate home cinema or a setting up a simple flat panel on a wall, utilizing these principles can enhance the viewer's experience.

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1. Introduction

Home theater rooms are gathering spaces with one main purpose: watching movies. These rooms can also have other uses like listening to and performing music, entertaining, gaming, or simply lounging. *Home Theater Video Design* provides the parameters for the proper design of a home theater that meets relevant industry guidelines. Additionally, these practices ensure that a home theater supports other multi-media uses such as music, gaming, photo viewing, web browsing, and broadcast TV.

Whether used as a dedicated space or a multi-purpose space, a properly executed home theater should be able to faithfully reproduce the picture and sound content. That's because the film's director and the entire crew working alongside the director carefully craft the content to create an emotionally engaging story that can transport the audience to far away lands in far away times. Therefore, it is important that the professionals who deliver the home theater experience be aware of the precise set of video and audio standards by which film content is created. The best way to ensure that an ESC's projects are successful and that customers are satisfied is simply adhering to movie technical production standards.

When designing a home theater, many factors come into play. Several are interdependent and interactive, and the design process will invariably be iterative. Every step will need to be revisited and altered, continuing around the circle of decision points multiple times until the work is finished. Strive for the ideal, but some compromises – in the name of space, layout, safety, aesthetics, and results of customer interviews – are inevitable. For example, the picture screen and front speakers will compete for space since they need to be in the same location. Of the several ways to deal with that issue, some yield better overall results than others. Ultimately, the best sounding and best looking home theater experience is the one with the most intelligent set of compromises!

2. References

2.1 Informative Reference List

NOTE: The following references contain provisions that, through referenced in this text, constitute informative provisions of this bulletin. At the time of publication, the edition indicated was valid. All standards and bulletins are subject to revision, and parties to agreements based on this standard or bulletin are encouraged to investigate the possibility of applying the most recent edition of the standard or bulletin indicated below.

- CEA/CEDIA-CEB22 *Home Theater Recommended Practice: Audio Design*
- CIE 1931 XYZ Color Space, International Commission on Illumination (CIE)
- Digital Cinema Initiative digital cinema systems specification version 1.1
- ITU-R Recommendation BT 601-6, "Studio Encoding Parameters of Digital Television for Standard 4:3 and Wide Screen 16:9 Aspect Ratios"
- ITU-R Recommendation BT.709, "Parameter values for the HDTV standards for production and international programme exchange"
- "A Case for Redundant Array of Inexpensive Disks (RAID)," David A Patterson, Garth Gibson, and Randy H Katz University of California, Berkley Department of Electrical Engineering & Computer Sciences, 1988
- CEDIA Electronic Systems Technical Reference Manual, First Edition (2008)