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T H E B A S I C S O F

 AUDIO

AND  VISUAL

SYSTEMS

 DESIGN

Revised Edition

infoComm

INTERNATIONAL COMMUNICATIONS
INDUSTRIES ASSOCIATION, INC.®

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The Basics of Audio and Visual Systems Design: Revised Edition

Published by the International Communications Industries Association, Inc. (ICIA)[®]
11242 Waples Mill Road, Fairfax, VA 22030, www.infocomm.org

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First printing 2003

Second printing 2005

Printed in the United States of America

Library of Congress Control Number 2003105705

ISBN 0-939718-19-7

Letter from ICIA Executive Director

In the last 20 years audiovisual professionals may not have known they were being selected for advancement in their company when their supervisor told them, "Here, read this book." Many of them today, however, credit *The Basics of Audio and Visual Systems Design* as their first and most important introduction to being an AV professional. It is for that reason that the International Communications Industries Association, Inc.® (ICIA) has undertaken the task of producing a second edition that will replace the tattered copies on the industry's bookshelves and introduce a whole new generation to the field.

Prior to 1983, when this work was first published by the National Audio-Visual Association, Inc. (NAVA), renamed the ICIA that same year, no one book contained the diverse set of physics, electronics, ergonomics and design that makes up the audiovisual industry. Ray Wadsworth, by collecting all of these topics in one place, provided the audiovisual industry its own, unique identity for the first time. He, along with other pioneering writers, began to codify the knowledge of practitioners and in so doing made it possible for the next generation to build on their knowledge. Today, as ICIA presents this book to the industry, it owes much to Ray Wadsworth's foresight in capturing the elements that make up an industry that is both technical and creative.

Through the years, *The Basics of Audio and Visual Systems Design* has served as a primary resource for ICIA's Design School. The first Design classroom courses were delivered in 1997. They have evolved into today's robust combination of online courses, multiple-day classroom sessions, seminars and workshops at InfoComm exhibitions around the world, as well as certification opportunities. The curriculum committee that developed these courses, and the outstanding facilitation provided by Steve Thorburn, PE, CTS-D, CTS-I, and John Campanella, CTS-D, through the years, have set the industry standard in education of the audiovisual design community. Steve, John and the editors and writers of this book have expanded it beyond the basics of the 1983 edition and educated an ever-expanding group of design professionals that long will long serve our industry, our members, and our customers.

The second edition was undertaken by The Professional Education and Training Committee (PETC) of ICIA and spearheaded in its initial phases by Fred Dixon, CTS, of Dixon Media Systems and Design and Kim Milliken of Da-Lite Screen Company. Mike Weems, CTS, MCP, of InFocus Corporation, built upon their work and brought the project to completion. We owe all three and their companies a debt of gratitude.

Although the science and technology that are the foundation of the audiovisual industry haven't changed, today's applications provide a power to ideas never dreamed of in 1983. It is ICIA's privilege to provide this work to a new generation of audiovisual professionals, with gratitude to those who came before.

Randal A. Lemke, Ph.D.
Executive Director
International Communications
Industries Association, Inc.

*ICIA owes much to
Ray Wadsworth's
foresight in
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up an industry that
is both technical
and creative.*

Preface

The original and new material is a treasure trove of knowledge about our industry.

In 1983 Raymond Wadsworth, PE, wrote the first edition of this book. It was a monumental task to assemble in one place the many elements that audiovisual systems design at that time comprised. His work was widely heralded, and the book became the “AV bible” that many in the audiovisual industry refer to even today.

But audiovisual systems have advanced considerably since 1983, so in January of 2001 Kim Milliken, with Da-Lite Screens, took up the task of editing a revised and updated version of the book. At a meeting that month during ICIA’s Institute for Professional Development in San Antonio, Texas, Kim enlisted a group of individuals to assist him in the task of revision and, in some cases, writing entire new chapters. Work began.

The initial goal of Kim and all of the section editors/writers was to update the book while remaining as faithful to the original as possible.

A short time later, Kim was diagnosed with what proved to be a terminal illness. He set the book project aside, and later was forced to give it up entirely. Finally, in the summer of 2002, I realized that if the book were going to get published, it would have to be without Kim as the editor. Kim had served as my Vice Chair of the Professional Education and Training Committee (PETC) until that time. After finding no one else to volunteer, I assumed the role of editor.

A few of the original section contributors had completed their tasks; other sections had not even been begun. In a reorganization and expansion of Ray’s book, Kim had outlined 13 sections. Of these, Kim had tackled seven himself, covering projection screens, optics and light. Later it was decided to combine some of Kim’s material, resulting in a total of 12 sections.

The original and new material is a treasure trove of knowledge about our industry. However, I immediately found that editing what amounts to a technical reference book is challenging indeed. I found that the most difficult task in editing a “basics” book is deciding what to put in and what to leave out. I hope that what we have compiled will satisfy your needs. The staff at ICIA, all of the contributors and I welcome your comments and suggestions. In fact, we hope that the task of revising this book will be an ongoing one, with more editions to come as the industry advances. Each section of this book has been reviewed numerous times. But as you use this work, you might happen upon some mistake that we missed. If you do, please drop ICIA a line.

My other task was to update the look of the book. The layout has changed from two columns to one, new fonts have been adopted, all drawings, tables, figures and charts are new or "refreshed," and more open space has been provided for notes. Even the cover retains elements from the old, while projecting a more modern image.

Many individuals contributed to this book; they are listed on the acknowledgments page. Since ICIA is a member organization, the members who assisted with the editing and writing of this book did so as volunteers, without compensation. The countless hours, thoughts and ideas they contributed have been invaluable, and we thank them.

What Ray and Kim wrought (with a little tinkering by us mortals) has finally made it back onto the shelves again. I hope they are pleased.

Mike Weems, CTS, MCP

Chair, Professional Education and Training Committee
International Communications
Industries Association, Inc.

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This book is dedicated to
two of the true legends of our industry.

Raymond H. Wadsworth, PE

At InfoComm 2001:
ICIA President
Spencer Bullins, CTS,
presents Ray Wadsworth,
original author of
*The Basics of Audio and
Visual Systems Design*,
proposed cover of
revised book.



The late Raymond H. Wadsworth, PE, was Senior Vice-president for Hubert Wilke, Inc., communications facilities consultants. For nine years, prior to joining the Wilke organization in 1965, he was Director of Engineering and Product Development for TelePrompter Corporation and TelePro Industries. During that time he supervised design and engineering for more than 100 audiovisual system installations, including the Air Force Command Post, Joint Chiefs of Staff in the Pentagon, National Aeronautics and Space Administration, White Sands Missile Range, Johnson & Johnson, Consolidated Edison, Phillips Petroleum Company, Princeton University, the University of Illinois, and Orange Coast College.

He received his mechanical engineering degree from Duke University and his professional engineer's license from the University of the State of New York. He was co-author of an architectural textbook and wrote extensively for such magazines as *Machine Design*, *Architectural Record*, *American School and University* and *Video Systems*.

He was the sole author of the first edition of this book in 1983.

M . K . M i l l i k e n

Kim Milliken was one of the founders of Optixx Screen Systems (OSS), the first U.S. company to design and manufacture large size Fresnel/Lenticular screens. In 1991, OSS was acquired by Da-Lite Screen Company, and Kim became Director of Display Technology.



While at Da-Lite, he authored "Angles of View," a monthly series of technical papers on the various aspects of visual displays. He also advanced professional development in the audiovisual industry through teaching ICIA Design School Onsite and through the Attributes of Visual Display workshops at ICIA's annual trade show, InfoComm. Through his many years of service in leadership positions, as a member of the ICIA Board of Governors and of the Steering Committee for the Professional Education and Training Committee (PETC), Kim made an invaluable contribution to the profession and to ICIA.

In 2002, the ICIA Board of Governors honored Kim with the ICIA Distinguished Achievement Award. In 2003, the ICIA Professional Education and Training Committee (PETC) honored Kim posthumously with the Fred Dixon Service in Education Award.

Acknowledgments

*Many people
contributed to
making this
book possible.
Please thank
them for their
efforts on our
behalf.*

We are grateful to the following individuals who were responsible for either editing a section, writing a new section or doing a combination of both. Except as noted, sections were originally written by Raymond H. Wadsworth, PE.

SECTION 1 was edited by Kim Milliken, with new material contributed by George Mihalakis, CEO, Gain Micro-Optics.

SECTION 2 was edited by Kim Milliken.

SECTION 3 was edited by Kim Milliken, with new material contributed by George Mihalakis, CEO, Gain Micro-Optics.

SECTION 4 was edited by Kim Milliken.

SECTION 5 was edited by Kim Milliken.

SECTION 6 was edited by Kim Milliken.

SECTION 7 was written by Jody Thomas, CTS, CEO, Kayye Consulting, Inc.

SECTION 8 was edited by Steve Thorburn, PE, CTS-D, CTS-I, co-founder, Thorburn Associates, Inc.

SECTION 9 was partially written by Ray H. Wadsworth, PE, and contains new material written and edited by Mike Weems, CTS, MCP, Senior Technical Trainer, InFocus Corporation.

SECTION 10 was written by Phillip Giddings, PE, founder of Engineering Harmonics, Inc.

SECTION 11 was written by L. William Nattress, III, Senior Associate, Shen Milsom and Wilke, Inc.

SECTION 12 was jointly written by Scott Sharer, CTS, Communication Design Group, and Jim Smith, CVE, AV Integration Support Engineer, Polycom.

Thanks go to the following peer reviewers who made corrections and/or additions to the various sections.

SECTION 1 was reviewed and edited by George Mihalakis, CEO, Gain Micro-Optics, and Judith D. Loughran, CTS, Senior Vice President, Da-Lite Screen Company.

SECTION 2 was reviewed by George Mihalakis, CEO, Gain Micro-Optics, and reviewed and edited by Judith D. Loughran, CTS, Senior Vice President, Da-Lite Screen Company.

SECTION 3 was reviewed and edited by George Mihalakis, CEO, Gain Micro-Optics, and Judith D. Loughran, CTS, Senior Vice President, Da-Lite Screen Company. (At George's suggestion, the original Sections 3 and 4 were merged.)

SECTION 4 was reviewed and edited by Judith D. Loughran, CTS, Senior Vice President, Da-Lite Screen Company.

SECTION 5 was reviewed and edited by Judith D. Loughran, CTS, Senior Vice President, Da-Lite Screen Company.

SECTION 6 was reviewed and edited by Judith D. Loughran, CTS, Senior Vice President, Da-Lite Screen Company.

SECTION 7 was reviewed by Steve Barlow, Product Marketing Manager–CDS, Philips Business Solutions, and Gary Kayye, CTS, Chief Visionary, Kayye Consulting.

SECTION 8 was reviewed by Raymond H. Wadsworth, PE.

SECTION 9 was reviewed by Christopher J. Soltesz, Broadcast Television Engineer, Sony Electronics, Inc.

SECTION 11 was reviewed by Billy Duncan, Technical Trainer, AMX Corp., and Dave Silberstein, CTS, Training Manager, Crestron Electronics, Inc.

SECTION 12 was jointly reviewed by the two section authors.

Additional Review

Additional gratitude is extended to Scott Walker, CTS-D, Principal, Waveguide Consulting, Inc., and Mark Valenti, President, The Sextant Group, for looking over the final product.

Members of the ICIA staff also contributed to this effort:

Randal A. Lemke, Ph.D., Executive Director

Terry Friesenborg, CTS, Senior Vice President of Education

Taly Walsh, Senior Vice President of Marketing and Membership

Melissa Taggart, Vice President of Education and Workforce Development

Catherine Zipf, Director of Marketing

Hector Rodriguez, CTS, Technical Support Manager

Finally, ICIA joins Mike Weems, CTS, MCP, Senior Technical Trainer, InFocus Corporation, in thanking InFocus for its generosity in giving him the time and materials to accomplish this task.

Contents

Section

- 1** The Projected Image Format
 - 2** Screen Size versus Ceiling Height
 - 3** Projection Screens
 - 4** Projection Optics
 - 5** Mirrors in Projection Systems
 - 6** Measuring Light
 - 7** Projection Technologies
 - 8** The Audio in Audiovisual
 - 9** The Video in Audiovisual
 - 10** Technical Power and Ground Systems
 - 11** Remote Control Systems
 - 12** Videoconferencing
- Index

Figures, tables and charts

Section 1

- Figure 1-1 16:9 aspect ratio
- Table 1-1 Film and slide formats

Section 2

- Figure 2-1 Inadequate ceiling height
- Figure 2-2 Bottom of image should be at least 4'0" above floor to prevent excessive head interference
- Figure 2-3 Image the size of that used horizontally in Figure 2-2 cannot be used vertically without excessive head interference
- Figure 2-4 Concept of x-height
- Figure 2-5 Minimum height (alpha) should subtend not less than 10 arc minutes
- Table 2-1 Symbol size vs. viewing angle
- Figure 2-6 General equations for subtended angle
- Figure 2-7 Calculation for proximity to screen

Section 3

- Figure 3-1 Front screen works by reflection
- Figure 3-2 Rear screen works by transmission
- Figure 3-3 Front screen seating area
- Figure 3-4 Rear screen seating area
- Figure 3-5 Dual images reduce viewing area in front projection system
- Figure 3-6 Dual images reduce viewing area even more in rear screen systems
- Figure 3-7 Mini-screens behavior with respect to projected light rays
- Figure 3-8 Angular geometry
- Figure 3-9 Diffusion at different angles of incidence
- Figure 3-10 Curved screen directs more light to audience area than flat screen of same material
- Figure 3-11 Brightness measurements on the Y and X axis
- Figure 3-12 Projected light rays striking the single glass bead
- Figure 3-13 Reflection off the back surface of a glass bead
- Figure 3-14 The Fresnel lens on an optical rear projection screen

Section 4

- Figure 4-1 Five ways that a lens can produce an image of an object
- Figure 4-2 Thin lens geometry
- Figure 4-3 Method of ray tracing when rays fall outside of lens
- Figure 4-4 Compound lens geometry
- Figure 4-5 Measuring the optical center of a compound lens from the front vertex
- Figure 4-6 Example 1 of screen distance
- Figure 4-7 Example 2 of screen distance

Figures, tables and charts (*con't*)

Figure 4-8 Lens focal length is the same, whether rays from a distant object enter the rear or front elements of the lens

Figure 4-9 Nodal plans and ray paths for a simple object and image

Section 5

Figure 5-1 Calculating the angle of the mirror in rear projection

Figure 5-2 How to avoid secondary reflection

Section 6

Figure 6-1 Graphic representation of basic light measuring terms

Figure 6-2 Inverse square law

Figure 6-3 Lambert's cosine law

Figure 6-4 Cosine⁴ law

Section 7

Figure 7-1 Film projector

Figure 7-2 Harvard Graphics software allowed screen shots for electronically produced slide show presentations

Figure 7-3 Front projection screen

Figure 7-4 Scanning image creation

Figure 7-5 Effects of a line doubler on a scanned image

Figure 7-6 Example of a matrix image creation system

Figure 7-7 Transmissive illumination system

Figure 7-8 Reflective illumination system

Figure 7-9 Internally converged color system

Figure 7-10 Externally converged color system

Figure 7-11 Pre-converged color system (multi-layer)

Table 7-1 Technology implementation summary

Figure 7-12 Advent videobeam

Figure 7-13 Cathode ray operation

Figure 7-14 Shadow mask operation

Figure 7-15 Streaking

Figure 7-16 ANSI and peak

Figure 7-17 Setup pattern

Figure 7-18 Digital projector remote

Figure 7-19 Scheimpflug adjustment

Figure 7-20 Effect of burn-in

Figure 7-21 Self-contained LCD projector

Figure 7-22 Kodak datashow LCD panel

Figure 7-23 Light passing through a panel

Figure 7-24 Passive matrix addressing

Figure 7-25 Active matrix addressing

Figures, tables and charts (con't)

Figure 7-26	Epson ELP-3000 LCD projector
Figure 7-27	Light polarizer
Figure 7-28	Dichroic mirrors system
Figure 7-29	Combining prism
Figure 7-30	Micro-lens array
Figure 7-31	DLP™ uses a reflective image generation device, a DMD™
Figure 7-32	Cutaway of DMD™ chip showing all operating components
Figure 7-33	Light reflection process of three-mirror array
Figure 7-34	Color wheel assembly
Figure 7-35	SCR color wheel assembly
Figure 7-36	Comparison of different resolution DMD™ chips
Figure 7-37	Comparison of DLP™ and LCD images
Figure 7-38	Polarizing beam splitter
Figure 7-39	Three-chip DLP™ projector
Figure 7-40	Christie digital cinema projector
Figure 7-41	Hughes-JVC 300 series ILA projector
Figure 7-42	ILA layer breakdown
Figure 7-43	Breakdown of light path with single CRT and ILA
Figure 7-44	Breakdown of light paths with three CRTs and ILAs
Figure 7-45	Hughes-JVC 200 series ILA projector
Figure 7-46	D-ILA device
Figure 7-47	SLM GLV imaging device
Figure 7-48	SLM GLC imaging process

Section 8

Figure 8-1	Sound waves striking human ear
Figure 8-2	Inner ear auditory mechanism
Figure 8-3	Calculation of 1 horsepower
Figure 8-4	Sound pressure is greater nearer the source
Table 8-1	Typical sound pressures and their decibel levels relative to the threshold of sound
Table 8-2	Typical sound power outputs and their decibel levels relative to the threshold of sound
Figure 8-5	Example 3: Sound pressure level
Figure 8-6	Example 4: Horn installation outdoors
Table 8-3	Common sound pressure levels of the human voice
Table 8-4	Typical values of directivity factor Q
Table 8-5	Condensed list of sound absorption coefficients
Figure 8-7	Reverberation time based on room volume
Figure 8-8	Example 5: Acoustical calculations, lecture hall
Figure 8-9	Critical distance calculations
Figure 8-10	Typical problem A
Figure 8-11	Typical problem B
Figure 8-12	Ceiling loudspeaker placement
Table 8-6	Distance between ceiling loudspeakers 50 percent overlap at plane of ear

Figures, tables and charts (*con't*)

Table 8-7	Distance between ceiling loudspeakers 30 percent overlap at plane of ear
Table 8-8	Distance between ceiling loudspeakers 0 percent overlap edge to edge
Figure 8-13	Typical problem C

Section 9

Figure 9-1	Rf distribution system
Figure 9-2	Comprehensive system schematic
Figure 9-3	Partial test chart
Figure 9-4	Resolution capability of the normal eye
Figure 9-5	Calculating object size
Figure 9-6	Three ways that video can flow from a camera into a switcher
Table 9-1	Video formats for analog signals
Table 9-2	Digital video formats and their uses
Table 9-3	The flavors of DTV

Section 10

Figure 10-1	Typical comprehensive technical power and isolated ground method
Table 10-1	Some power codes and regulations
Figure 10-2	Essential elements of technical equipment and system grounding
Figure 10-3	Equipment grounding
Figure 10-4	Basic isolated ground wiring method
Chart 10-1	The isolated star ground levels (suggested)
Figure 10-5	Typical distribution panelboard wiring methods
Figure 10-6	Typical duplex outlet wiring methods
Figure 10-7	Typical rack wiring methods
Figure 10-8	Fixed equipment rack and tray installation detail

Section 11

Figure 11-1	An interlocked circuit
Figure 11-2	A Binary Coded Decimal (BCD) circuit
Figure 11-3	Cable voltage loss equation
Figure 11-4	The DTE to DCE wiring scheme
Figure 11-5	The DCE to DCE wiring scheme
Figure 11-6	The centralized processing topology
Figure 11-7	The client/server topology
Figure 11-8	The distributed processing topology