



**An anthology
of articles on
Sound Reinforcement
from the pages of the
Journal of the
Audio Engineering
Society
Vol. 15–Vol. 44
(1967–1996)**

*Copyright © 1996 Audio
Engineering Society, Inc.
Library of Congress Catalog
Card No. 78-61478.
ISBN No. 0-937803-30-8.
Selections from Volumes 15 through 44,
1967–1996. First printing 1996 August
(all rights reserved). Except for brief
passages to be used in review
or as citation of authority,
no part of this book may be
reproduced without prior
permission from:
Audio Engineering Society, Inc.,
60 East 42nd Street, New York,
New York, 10165-2520, USA.
Telephone: 212 661 8528.
FAX: 212 682 0477.*

preface

Since the first *Sound Reinforcement* anthology of papers published in the *Journal of the Audio Engineering Society* was issued in 1978, advances in the state of the art in this technology have included: 1) improvements in the ability to control loudspeaker directional characteristics; 2) greater understanding of loudspeaker interaction and coverage effects for more than one loudspeaker in a cluster; 3) more accurate and easier prediction and evaluation of intelligibility; 4) greater application of digital processing and control; and 5) introduction and widespread application of computer sound system adjustment and control.

These advances are reflected in the papers chosen from the *Journal* for inclusion in this anthology.

John M. Eargle and Mark R. Gander made sufficient contribution to the selection process to be considered co-editors. I am sincerely grateful to them.

David Lloyd Klepper
White Plains, New York, USA
and
Jerusalem, Israel

1996 January

contents

A. ELECTRONICS AND ELECTRONICS-TRANSDUCER INTERACTION

Computer-Controlled Sound Systems. Bob Moses (Vol. 42, pp. 938-955 [1994 November])	10
Theory and Design of a Digital Audio Signal Processor for Home Use. David Griesinger (Vol. 37, pp. 40-50 [1989 January/February])	22
Multiple-Point Equalization in a Room Using Adaptive Digital Filters. S. J. Elliott and P. A. Nelson (Vol. 37, pp. 899-907 [1989 November])	33
Effects of Cable, Loudspeaker, and Amplifier Interactions. Fred E. Davis (Vol. 39, pp. 461-468 [1991 June])	42
Considerations in Grounding and Shielding Audio Devices. Stephen R. Macatee (Vol. 43, pp. 472-483 [1995 June])	50
Fundamentals of Grounding, Shielding, and Interconnection. Kenneth R. Fause (Vol. 43, pp. 498-516 [1995 June])	62

B. LOUDSPEAKER PERFORMANCE AND THE LOUDSPEAKER-ROOM INTERFACE

Acoustical Measurements by Time Delay Spectrometry. Richard C. Heyser (Vol. 15, pp. 370-382 [1967 October])	82
Determination of Loudspeaker Signal Arrival Times: Part 1. Richard C. Heyser (Vol. 19, pp. 734-743 [1971 October])	95
Determination of Loudspeaker Signal Arrival Times: Part 2. Richard C. Heyser (Vol. 19, pp. 829-834 [1971 November])	105
Determination of Loudspeaker Signal Arrival Times: Part 3. Richard C. Heyser (Vol. 19, pp. 902-905 [1971 December])	111
Editor's note. David Lloyd Klepper	115
Acoustical Impulse Response of Interior Spaces. Richard G. Cann and Richard H. Lyon (Vol. 27, pp. 960-964 [1979 December])	116
Comments. Don Davis (Vol. 28, p. 817 [1980 November])	120
Authors' Reply. Richard H. Lyon and Richard G. Cann (Vol. 28, p. 817 [1980 November])	120
Central Cluster Design Technique for Large Multipurpose Auditoria. E. T. Patronis, Jr. and Catharina Donders (Vol. 30, pp. 407-411 [1982 June])	121
Loudspeaker Coverage by Architectural Mapping. Ted Uzzle (Vol. 30, pp. 412-424 [1982 June])	126
Editor's note. David Lloyd Klepper	138
The Design of Distributed Sound Systems from Uniformity of Coverage and Other Sound-Field Considerations. Rex Sinclair (Vol. 30, pp. 871-881 [1982 December])	139
Corrections. (Vol. 31, p. 256 [1983 April])	149
An Accurate and Easily Implemented Method of Modeling Loudspeaker Array Coverage. John R. Prohs and David E. Harris (Vol. 32, pp. 204-217 [1984 April])	150

Computer Simulation of Loudspeaker Directivity. David G. Meyer (Vol. 32, pp. 294–315 [1984 May])	164
Digital Control of Loudspeaker Array Directivity. David G. Meyer (Vol. 32, pp. 747–754 [1984 October])	186
A Graphic Method for Choosing and Aiming Loudspeakers for Reinforcement. Peter W. Tappan (Vol. 34, pp. 269–277 [1986 April])	194
Comments. Peter W. Tappan (Vol. 34, p. 664 [1986 September])	203
Horn Layout Simplified. Bob Thurmond (Vol. 35, pp. 976–983 [1987 December])	204
Cluster Suitability Predictions Simplified. Bob Thurmond (Vol. 36, pp. 337–341 [1988 May])	212
Introduction to Special Issue on Loudspeaker Arrays. Neil A. Shaw (Vol. 38, p. 203 [1990 April])	217
Measurement and Estimation of Large Loudspeaker Array Performance. Mark R. Gander and John M. Eargle (Vol. 38, pp. 204–220 [1990 April])	218
Multiple-Beam, Electronically Steered Line-Source Arrays for Sound-Reinforcement Applications. David G. Meyer (Vol. 38, pp. 237–249 [1990 April])	235
Prediction of the Full-Space Directivity Characteristics of Loudspeaker Arrays. Kenneth D. Jacob and Thomas K. Birkle (Vol. 38, pp. 250–259 [1990 April])	248
An Array Filtering Implementation of a Constant-Beam-Width Acoustic Source. Jefferson A. Harrell and Elmer L. Hixson (Vol. 38, pp. 221–230 [1990 April])	258
Low-Frequency Sound Reproduction. Mark E. Engebretson (Vol. 32, pp. 340–346 [1984 May])	268
Near-Field and Far-Field Performance of Large Woofer Arrays. G. L. Augspurger (Vol. 38, pp. 231–236 [1990 April])	275
Large Arrays: Measured Free-Field Polar Patterns Compared to a Theoretical Model of a Curved Surface Source. John Meyer and Felicity Seidel (Vol. 38, pp. 260–270 [1990 April])	281
Comparative Performance of Three Types of Directional Devices Used as Concert-Sound Loudspeaker Array Elements. Paul F. Fidlin and David E. Carlson (Vol. 38, pp. 271–295 [1990 April])	292
Effective Performance of Bessel Arrays. D. (Don) B. Keele, Jr. (Vol. 38, pp. 723–748 [1990 October])	317
Microalignment of Drivers via Digital Technology. John A. Murray (Vol. 42, pp. 254–264 [1994 April])	343

C. RECONCILING SPEECH AND MUSIC

Sound Reinforcement Systems in Early Danish Churches. Dan Popescu (Vol. 28, pp. 713–717 [1980 October])	356
The Acoustical Design of a 4000-Seat Church. A. H. Marshall, C. W. Day, and L. J. Elliott (Vol. 35, pp. 897–906 [1987 November])	361
A Holographic Approach to Acoustic Control. A. J. Berkhout (Vol. 36, pp. 977–995 [1988 December])	371
Acoustical Negative Feedback for Gain Control. David Klepper (Vol. 39, pp. 64–65 [1991 January/February])	390
The Acoustics of St. Thomas Church, Fifth Avenue. David Lloyd Klepper (Vol. 43, pp. 599–601 [1995 July/August])	392

D. INTELLIGIBILITY EVALUATION

Acoustic Feedback—Its Influence on Speech Intelligibility. Sverre Stensby, Asbjørn Krokstad, and Svein Sørsdal (Vol. 27, pp. 887–890 [1979 November])	396
Those Early Late Arrivals! Mr. Haas, What Would You Do? Cecil Cable and R. Curtis Enerson (Vol. 28, pp. 40–45 [1980 January/February])	400
The Practical Application of Time-Delay Spectrometry in the Field. Cecil R. Cable and John K. Hilliard (Vol. 28, pp. 302–309 [1980 May])	406
Comments. F. J. Fahy (Vol. 29, p. 262 [1981 April])	414
Authors' Reply. C. R. Cable and J. K. Hilliard (Vol. 29, pp. 262–264 [1981 April])	414
The Modified Hopkins–Stryker Equation. Don Davis (Vol. 32, pp. 862–867 [1984 November])	417
Subjective and Predictive Measures of Speech Intelligibility— The Role of Loudspeaker Directivity. Kenneth D. Jacob (Vol. 33, pp. 950–955 [1985 December])	423
Comments. Farrel M. Becker (Vol. 34, pp. 560–561 [1986 July/August])	429
Additional comments. Don Davis (Vol. 34, pp. 561–562 [1986 July/August])	430
Author's reply. Kenneth D. Jacob (Vol. 34, pp. 562–563 [1986 July/August])	431
Measurement of %AL _{cons} . Carolyn P. Davis (Vol. 34, pp. 905–909 [1986 November])	433
Application of Speech Intelligibility to Sound Reinforcement. Don Davis and Carolyn Davis (Vol. 37, pp. 1002–1019 [1989 December])	438
Correlation of Speech Intelligibility Tests in Reverberant Rooms with Three Predictive Algorithms. Kenneth D. Jacob (Vol. 37, pp. 1020–1030 [1989 December])	456
Editor's note. David Lloyd Klepper	466
Speech Intelligibility in Some German Sports Stadiums. K. Rijk, F. Breuer, and V. M.A. Peutz (Vol. 39, pp. 39–46 [1991 January/February])	467
Correction. (Vol. 39, p. 266 [1991 April])	475
Use of the L. G. Marshall–Crown–Techron ELR Program for Adjusting Digital Units in Sound Reinforcement Systems. David Lloyd Klepper (Vol. 43, pp. 942–945 [1995 November])	476
An Analysis Procedure for Room Acoustics and Sound Amplification Systems Based on the Early-to-Late Sound Energy Ratio. L. Gerald Marshall (Vol 44, pp. 373–381 [1996 May])	480

E. SPECIAL SYSTEMS

Conference Systems Using Infrared-Light Techniques. H.-J. Griese (Vol. 27, pp. 503–506 [1979 June])	490
---	-----