

**Preliminary Program**

# 109th Audio Engineering Society Convention

exhibits  
special events  
workshops  
technical papers  
technical tours  
student program

September 22-25, 2000  
Los Angeles, California  
L.A. Convention Center

[www.aes.org](http://www.aes.org)

**AUDIO  
AES  
SURROUNDED BY SOUND**

## Message from the Co-Chairs

**W**e welcome you to the 109<sup>th</sup> Convention of the Audio Engineering Society, where we will indeed be "Surrounded By Sound" for four days in Los Angeles. The art of science in surround and multi-channel audio production are at the heart of this year's dynamic program, assembled through the efforts of a dedicated Convention Committee.

The 109<sup>th</sup> Convention has been developed with a commitment to educational training and tutorial presentations. Featured will be a wide array of technical papers, workshops, educational, special events and a full schedule of technical tours to several facilities located in the Los Angeles area, where we will have the opportunity to see the heart of the audio industry in action. This year's convention promises to include the most comprehensive professional audio exhibition to date.

The opening ceremonies, headlined by keynote speaker, Herbie Hancock, will offer the opportunity to recognize and salute the recipients of this year's AES Awards for outstanding contributions to the Society and the audio industry. The Airmen of Note, jazz ensemble of the United States Air Force, will also perform.

The traditional AES Convention Party will be held at the Autry Museum of Western Heritage, offering the opportunity to learn about and experience Hollywood's western heritage and the influence of the "cowboy western" film on the entertainment industry. Among the cultural and special events will be an organ concert by Graham Blyth, "An Afternoon With Sidney Harman" and a Platinum Artist/Producer Series. Additionally, meetings of the active committees of the AES will continue the heritage of leadership in research, applications and standards for the audio industry.

The modern and spacious Los Angeles Convention Center is a perfect venue for ease of access and professional presentation. Located in one of the major world centers of audio production for film, broadcast, manufacturing and communications, the city of Los Angeles will provide an exemplary backdrop for this convention of audio engineers.

It is our greatest wish that you will find the offerings of this international convention to be informative, challenging and entertaining. By joining your colleagues at the 109<sup>th</sup> Convention of the Audio Engineering Society, you are assured that you will meet and participate in a timely exchange with the leading professionals in this dynamic industry.

Sincerely,  
Roy Pritts and Ron Streicher,  
Convention Co-chairs

# 109th Audio Engineering Society Convention

## September 22-25, 2000

### Los Angeles Convention Center

**T**he 109<sup>th</sup> Audio Engineering Society Convention—with the largest exhibition of professional audio technology in the world—is taking place at the Los Angeles Convention Center. This preliminary program is designed to help you plan your trip to the 109<sup>th</sup> AES Convention, September 22-25, 2000.

### Advance Registration

Advance registration for the complete program and exhibits is highly recommended and offered at a reduced registration fee. To register in advance, please complete the enclosed form and fax or mail to the address indicated or register online at [www.aes.org](http://www.aes.org), where a secure server makes registration and payment by credit card easy. The latest news and updated schedules can also be found at the AES web site.

*Please note: The deadline for advance registration is September 15, 2000. In order for confirmation and badges to be sent to you in the mail, the deadline is September 1.*

### At the Convention

The on-site Registration Desk will be located in the South Lobby of the Los Angeles Convention Center. Registration hours are listed on the convention calendar enclosed in this program. Cash or credit cards (Amex/MasterCard/Visa) may be used for on-site registration.

### CONVENTION INFORMATION

#### Exhibit Hours

Friday, September 22	Noon – 6:00 pm
Saturday, September 23	10:00 am – 6:00 pm
Sunday, September 24	10:00 am – 6:00 pm
Monday, September 25	10:00 am – 4:00 pm

A list of participating exhibitors to date can be found on the back cover.

### Air Travel to Los Angeles and Hotel Accommodations

In cooperation with American Airlines, the AES has arranged exclusive Meeting Saver Fares to the 109<sup>th</sup> Convention. To take advantage of these special fares, call 1-800-433-1790 and ask for Star File# 4690UX.

A number of hotel rooms in Los Angeles have been reserved for convention attendees at special meeting rates. For more information on the locations available, see the separate form and enclosed map. Please use this housing form to book your hotel. It is highly recommended that this be done as early as possible.

A complimentary roundtrip shuttle bus service will be provided between most of the official AES 109<sup>th</sup> Convention hotels and Los Angeles Convention Center.

### Meetings Held in Conjunction with the 109<sup>th</sup> Convention

#### Annual AES Business Meeting:

Friday, September 22, at 8:30 am, open to all AES members in good standing.

#### Technical Committee Meetings:

Coordinated by the AES Technical Council, the technical committees track trends in audio in order to recommend to the Society special papers sessions, standards, projects, publications and awards in their fields. The TC meetings are open to all convention registrants and a meeting schedule will be available at [www.aes.org](http://www.aes.org) (Technical Council).

#### Standards Committee Meetings:

Audio Engineering Society Standards Committee meetings, subcommittee meetings and working groups are open to the public. The working group meetings begin two days before the opening of the Convention. A list of meetings appears in the July/August issue of the *Journal of the Audio Engineering Society*. The time and places of the meetings are updated regularly on the AESSC web page.

#### Historical Committee Meeting:

The AES Historical Committee meeting will take place on Sunday, September 24, at 1:00 pm, and is open to all attendees with badges.

A list of meetings appears in the 2000 July/August issue of the *Journal of the Audio Engineering Society*.

## SPECIAL EVENTS

**Friday,  
September 22,  
11:00 am**

### Opening Ceremonies and Awards Presentations

Each year the AES acknowledges the work of the

individuals whose outstanding contributions to the Society in the areas of research, scholarship and publication enhance our industry. The 109<sup>th</sup> Convention Opening Ceremonies will include the AES Awards Presentation, a keynote address by Grammy® winning modern music pioneer, Herbie Hancock and a performance of Glen Miller favorites by the Airmen of Note, the premier jazz ensemble of the United States Air Force. All attendees with badges are invited to attend this exciting event. Please join us in acknowledging the work of those whose dedication and tremendous efforts have significantly contributed to the advancement of the audio industry.

**Special Events** except the AES Party are free of charge and open to all registered attendees. A variety of events covering a broad range of interests are planned to encourage all attendees, from students to seasoned professionals, to participate.

**Keynote Address:** The 109<sup>th</sup> AES Convention welcomes legendary jazz musician and composer Herbie Hancock. The Grammy® and Oscar® award-winning jazz icon recorded his first solo album, *Takin' Off*, and Top 10 hit, "Watermelon Man" in 1963 for Blue Note Records. Over the next several years, he worked with a number of visionary artists including the legendary Miles Davis. His innovative 1973 *Headhunters* album pioneered a sound that would be coined 'fusion'—a melting pot of funk and rock with jazz—and marked the first time he recorded with a synthesizer. This platinum recording became the largest-selling jazz album in history. In 1983, Hancock released *Future Shock*, a pioneer electronic piece featuring the Grammy-winning single, "Rockit." Hancock accepted his seventh Grammy in 1998 for "Gershwin's World."

## Platinum Record Artists and Producers Series

This series features an exploration of the relationship between the artist and producer with panels including Dave Alvin and Al Schmitt, and American and British platinum producers who will discuss their various techniques and will share anecdotes on the making of some of their chart-topping hits.

**Friday, September 22, 12:30 pm**

### Beyond the Board: Mysteries of the Artist-Producer Relationship

**Moderator:** Robert L. Doerschuk, *Harmony Central*, Palo Alto, CA, USA

There is more to recording than gear or, even, talent. The final ingredient involves building trust and a creative rhythm between the artist and the producer. We'll explore this topic with Blasters co-founder, solo artist, and producer Dave Alvin, along with one of the many associates who have worked with him on landmark projects.

**Saturday, September 23, 12:30 pm**

### Platinum Producers Panel

**Moderator:** Paul Verna, *Independent Producer/Engineer and Pro Audio Journalist*, New York, NY, USA

**Panelists:** Al Schmitt (honoree), Ed Cherney, Tommy LiPuma, George Massenburg, Phil Ramone, Elliott Scheiner

Focusing on the career of Al Schmitt, renowned producer/engineer whose credits include music icons Duke Ellington, Ray Charles, Sam Cooke, Frank Sinatra and Steely Dan, this panel will discuss the technical and musical challenges of producing platinum projects. A special guest appearance by one of Mr. Schmitt's platinum artists will also be featured.

**Sunday, September 24, 12:30 pm**

### Behind the Glass: Platinum Producers

**Moderator:** Howard Massey, *EQ Magazine and Surround Professional Magazine*, Port Washington, NY, USA

**Panelists:** Jack Douglas, Geoff Emerick, Eddie Kramer, George Massenburg, Alan Parsons

How do you make a hit record? "Behind The Glass: Platinum Producers" will present an all-star cast of top American and British producers who will compare and contrast their working techniques and will provide real-world anecdotes about the chart-topping hits they crafted on both sides of the Atlantic.

**Friday, September 22, 2:30 pm**

### Mixing 5.1 Surround Live

**Chair:** Ron Streicher, *Pacific Audio-Visual Enterprises*, Monrovia, CA, USA

Multichannel and surround sound have been a part of the audio industry's vocabulary for several decades, primarily as accompaniment

to the visual entertainment media such as film and, more recently, video productions. This Special Event Workshop will focus on the production of live surround sound events. A panel of industry experts will discuss how they produce audio programming for live television, theater and concert events, where there is no chance to do a re-take.

**Friday, September 22, 2:30 pm**

### AES31-3-1999 Digital Audio File Interchange Format

**Chair:** Mark Yonge, *Solid State Logic*, Begbroke, Oxford, UK

The ability to move digital audio projects easily and reliably from one computer system to another is crucial for the development of professional audio in all fields, but has previously been elusive. In December 1999, AES standard AES31-3-1999 was published to provide an open format for interchanging audio file and edit data, compatible with multiple computer platforms. At this special event, manufacturers will present AES31 interchange solutions and experts will be on hand to answer questions on its implementation.

**Friday, September 22, 7:30 pm**

### AES Wild West Party at Autry Museum of Western Heritage

Get ready to step back in time to a bygone era at the Autry Museum of Western Heritage, where we will enjoy an extraordinary reception of spectacular food and cocktails in a unique Western atmosphere that celebrates both the historical and mythical Old West. In a career that spanned 60 years of the entertainment industry, "America's Favorite Singing Cowboy," Gene Autry, was unsurpassed as an image-maker of the American West. Earning five stars on Hollywood's Walk of Fame for radio, records, film, television and live theatrical performance, Autry was part of a group of singing cowboys whose music shaped American entertainment and became a fundamental element of the American experience. Join us as we celebrate the Spirit of the West and take advantage of an exclusive viewing of the museum's galleries, included in the ticket price.

**Saturday, September 23, 3:00 pm**

### Successful Women in Audio Panel Discussion

**Chair:** Cosette Collier, *Middle Tennessee State University*, Murfreesboro, TN, USA

In recognition of the first Women in Audio session held 20 years ago at the AES 66<sup>th</sup> Convention in Los Angeles, and to celebrate the completion of Women in Audio: Project 2000, this panel will include some of today's top women in audio who will address the current issues that women in the industry face.

**Saturday, September 23, 3:00 pm**

### "An Afternoon with . . . Sidney Harman"

**Moderator:** George Peterson, *Mix Magazine*, Emeryville, CA, USA

Founder of Harman-Kardon, Inc. and a pioneer of the high-fidelity industry, Dr. Sidney Harman will participate in an interactive discussion with the audience, which will focus on his career as an innovator of audio products.

**Saturday, September 23, 6:30 pm**

### Multichannel Audio Over the Internet2: The McGill to USC Demonstration

**Chairs:** Chris Cain, *University of Southern California*, Los Angeles, CA, USA; Jeremy Cooperstock and Wieslaw Woszczyk, *McGill University*, Montreal, Canada; *USC School of Cinema/TV*

This demonstration presents the Internet transmission of multichannel music in high-resolution 24bit/96kHz PCM and MPEG AAC with video and spatialization control between McGill University in Montreal, Canada and the University of Southern California, Los Angeles. Discussion will focus on technical issues, challenges of latency, quality of service and a review of applications. Bus transportation to the nearby USC Campus and School of Cinema/Television will be provided.

**Saturday, September 23, 8:00 pm**

### Organ Concert featuring Graham Blyth

Continuing the tradition of presenting organ recitals during AES conventions since 1993, Graham Blyth, renowned organist and technical director of

Soundcraft, will perform a recital on the 98-rank Aeolian-Skinner organ at the Pasadena Presbyterian Church. During the recital, Ron Streicher will conduct a student workshop on live, on-location recording techniques.

**Sunday, September 24, 9:00 am**

### **SPARS Business Panel: The Care and Feeding of Your Most Important Valuable Resource—Your Employee**

**Moderator:** Michael Tarsia, *Sigma Sound*, Philadelphia, PA, USA

An elite panel of studio owners and managers will discuss salary basis for studio and audio/video facilities, how to cover non-compete clauses in contracts, incentives for employees who expend extra effort to make your business successful, what to look for when hiring employees and how to keep them, and if an employee leaves, how to prevent them from taking clients.

**Sunday, September 24, 3:00 pm**

### **Grammy® Recording SoundTable at AES**

The National Academy of Recording Arts and Sciences, Inc. is proud to present its 12th Annual Recording SoundTable at the AES Convention in Los Angeles. This year's event will feature the creative teams behind some of the year's most successful recordings including *Smooth* (Santana) and *The Return of the Saturn* (No Doubt). These teams will provide an in-depth look at the process and techniques involved in these recording projects. The Academy's presence at AES will also include a one-on-one conversation with Glyn Johns, the engineering and producing legend behind the seminal recordings of the Rolling Stones, the Who, the Eagles, Eric Clapton and Led Zeppelin.

Over the past decade, the Recording SoundTable has brought together panelists of the highest stature from Bruce Swedien to George Massenberg, Al Schmitt to Bob Clearmountain and Roger Nichols to Tom Lord-Alge. "This year's program will continue the high standard of professional excellence that this series has established," said Michael Greene, president/CEO of the Recording Academy. "We are proud to have been partners with AES since the inception of this series."

**Monday, September 25, 9:00 am**

### **Hearing Protection for Music Performance and Audio Production Professionals**

**Co-chairs:** Bob Schulein, *Etymotic Research*, Elk Grove Village, IL, USA and Ellen Kelly, *Center for Speech and Hearing Sciences, Inc.*, East Brunswick, NJ, USA

It's becoming a topic of ever-increasing concern: musicians and sound engineers are at risk of hearing loss due to their exposure to high levels of live and amplified music. Loss of hearing acuity can be detrimental to a career in music or audio production. However, several methods exist that can effectively protect hearing while still allowing the professional uncompromising performance.

The purpose of this Special Event Workshop is to assist music and audio production professionals in reducing sound exposure by using current technologies. The presentation will familiarize the participants with changes in the auditory system resulting from excessive levels as well as the effect that hearing loss has on the ability to monitor and play music. Specific emphasis will be placed on the use of various forms of hearing protection devices, the use of in-ear monitors and architectural modifications to the listening environment.

### **Continuous Throughout Convention "When Vinyl Ruled" Exhibit**

A special working exhibit will literally open a door into the early years of commercial stereo recording, organized by the AES Historical Committee. The pro audio scene of the early 1960s didn't have computers or DAWs, and its faders had to fly to keep pace with the agile digits of dedicated studio engineers. Vintage gear will feature a portable console designed by Universal Audio's Bill Putnam for the United/Western Studios, whose remote location recording staff worked under Wally Heider, as well as an Ampex 300 three-track reel-to-reel tape recorder, and Altec 604 speakers for in-your-face monitoring. Oodles of ancillary gear will complete a functioning control room environment that will excite nostalgia in some and wonder in all, at how things were in the days "When Vinyl Ruled."

## TECHNICAL COUNCIL

**Sunday, September 24, 6:00 pm**

### **Richard C. Heyser Memorial Lecture and Reception featuring Dr. Alan C. Kay**

The Richard C. Heyser Distinguished Lecturer for the 109<sup>th</sup> AES Convention is Dr. Alan C. Kay, Disney Fellow and vice president of research and development for the Walt Disney Company. Dr. Kay holds a doctorate with distinction for the development of the first graphical object-oriented personal computer, and has been elected a Fellow of the American Academy of Arts and Sciences, the National Academy of Engineering, the Royal Society of Arts and the Computer Museum History Center. Dr. Kay will discuss the computer revolution and the developments that promise to ensue with its onset.

The Heyser Series is an endowed lectureship featuring lectures by eminent individuals with outstanding reputations in audio engineering and its related fields. The series is featured twice annually, at both the United States and European Conventions. Established in May 1999, the Richard C. Heyser Memorial Lecture honors the memory of Richard Heyser, a former AES Governor and Silver Medal recipient. A scientist at the Jet Propulsion Laboratory, Mr. Heyser was awarded nine patents in audio and communication techniques and was widely known for his ability to clearly present new and complex technical ideas.

## STUDENT PROGRAMS

The AES convention provides student members around the world with an opportunity to meet and share experiences related to education in the field of audio.

Enhance your education and expand your networking opportunities as a 109<sup>th</sup> **Student Volunteer**. You'll work alongside audio professionals to assist the Convention Committee with event operations for the papers, workshops, technical tours, special events and education sessions.

Student volunteers will receive a 109<sup>th</sup> full program pass and an official 109<sup>th</sup> shirt! For more details and to participate, please visit AES Web site, [www.aes.org](http://www.aes.org) or contact us at [109th\\_studentvolunteers@aes.org](mailto:109th_studentvolunteers@aes.org)

**Friday, September 22, 1:30 pm**

### **Student Delegate Assembly 1**

**Chair:** Justin Davis, *University of Colorado-Denver Student Section*, Denver, CO, USA

**Vice Chair:** Marie Ebbing, *Ball State University Student Section*, Muncie, IN, USA

Students and educators are invited to participate in a discussion of opportunities in the audio field and issues of importance to audio education. This opening meeting of the Student Delegate Assembly will introduce the candidates for the coming year's election for

the North/South America Regions. Each AES regional vice president may present two candidates for the election to be held at the closing meeting of the SDA. Entries for the Recording Competitions and the Poster Session events will be collected at this meeting. One entry from each AES student section or audio program will be forwarded to the respective judging teams for selection of finalists in each category. For instructions and submission forms, see the 109<sup>th</sup> Website, Student Activities at [www.aes.org](http://www.aes.org).

**Friday, September 22, 3:30 pm**  
**Meet the Textbook Authors**

Don Puluse, *Berklee School of Music*, Boston, MA, USA

A panel of leading authors of the instructional materials that are shaping education in the audio industry will discuss present and future publications. Each author will address the issues in his specialized

area, publisher's expectations and future projects. The audience will be encouraged to participate in a dialogue on content and needs in books, articles and training aids available in our industry.

**Saturday, September 23, 9:30 am**  
**Student Recording Competition**

**Host:** Roy Pritts, *University of Colorado at Denver*, Denver, CO, USA  
 Finalists selected by an elite panel of judges will give brief descriptions and play recordings in the Classical and Jazz/Pop categories. One submission per student section or school is allowed. Meritorious awards will be presented at the closing Student Delegate Assembly meeting on Sunday.

**Saturday, September 23, 1:00 pm**  
**Education Fair**

Institutions offering studies in audio—from short courses to graduate degrees—will be represented in a “tabletop session.” Information on each school's respective programs will be made available through the display of literature and academic guidance sessions with representatives. There is no charge for schools to participate and admission is free and open to all convention attendees. To reserve a table and signage for your institution, please send an e-mail request to: [109theducationfair@aes.org](mailto:109theducationfair@aes.org)

**Saturday, September 23, Time TBD**  
**Organ Tutorial/Student Recording Session**

A special student tutorial on location recording will precede the Graham Blyth organ concert at the Pasadena Presbyterian Church. Ron Streicher of Pacific Audio-Visual Enterprises and 109<sup>th</sup> Convention Co-chair, will provide students with insight into the techniques of microphone placement, acoustics and recording within the church environment. Transportation will be provided. Information on this unique event will be available at the Student Delegate Assembly 1.

**Sunday, September 24, 9:00 am**  
**Educators' Forum**

**Hosts:** Roy Pritts, *University of Colorado at Denver*, Denver, CO, USA; and Don Puluse, *Berklee School of Music*, Boston, MA, USA  
 A meeting of the AES Education Committee, teachers, authors, students and members interested in the issues of primary and continuing education of the audio industry. This is an opportunity to discuss the programs of the Education Committee and to provide input for future projects of the Committee.

**Sunday, September 24, 10:30 am**  
**Student Delegate Assembly 2**

**Chair:** Justin Davis, *University of Colorado-Denver Student Section*, Denver, CO, USA  
**Vice Chair:** Marie Ebbing, *Ball State University Student Section*, Muncie, IN, USA

The closing meeting of the SDA will elect new officers. Votes will be cast by the designated representative from each recognized AES Student Section in the North/South America Regions. Judges' comments and awards will be presented for the Recording Competitions and Poster Session. Plans for future student activities at local, regional and international levels will be summarized.

**Sunday, September 24, 1:30 pm**  
**Jobs Forum**

**Host:** David Porter, *Music Annex*, San Francisco, CA, USA  
 An elite panel of representatives of the audio industry will address the issues of entry-level employment and expectations of employers. This panel of experts in the audio field will discuss the present state of the job market. Broad aspects of the audio industry will be represented and enthusiastic participation by attendees is anticipated.

**Monday, September 25, 2:00 pm**  
**Student Technical Tour**

A technical tour for students is anticipated. Details will be posted on the 109<sup>th</sup> Web site, Student Activities at [www.aes.org](http://www.aes.org).

**Continuous throughout Convention:**  
**Student Center**

The Student Center is an assembly area for the Student Delegate Assembly and students to meet as well as the designated area for many of the student events. A communications board will be available to post e-mail and Web site addresses from all participating student members and institutions.

**Poster Session**

The Student Center will serve as the display area for the showcase of Posters of the scholarly, research and creative works of student AES members. One submission per student section or school is permitted. To submit entries, please send an email to: [109theducationevents@aes.org](mailto:109theducationevents@aes.org)

## WORKSHOPS

**Friday, September 22, 2:00 pm**  
**W1: Small Room Acoustics (Tutorial)**

**Chair:** Jan Voetmann, *DELTA Acoustics and Vibration*, Lyngby, Denmark  
**Presenters:** Søren Bech; David Griesinger; David Moulton; Jiri Tichy; Bob Walker

This workshop opens with a tutorial in basic room acoustics followed by four presentations addressing important issues in small room acoustics. Recent approaches to solving acoustical problems will be shown. The fundamentals of acoustics will be explored and discussed by a group of internationally respected acousticians.

**Friday, September 22, 2:00 pm**  
**W2: Speech Intelligibility of Public Address/Audio Systems**

**Chair:** Peter Mapp, *Peter Mapp Associates*, Colchester, Essex, UK

This workshop focuses on the influence of loudspeaker design and application combined with acoustic characteristics on the perceived intelligibility of speech. Aspects such as loudspeaker directivity, frequency response and distortion will be discussed, together with the effects of signal-to-noise and direct-to-reflecting ratios. Methods of measurement and prediction will also be presented after an illustrated introductory talk presenting current knowledge. The discussion should be helpful to loudspeaker manufacturers, PA system operators, and sound reinforcement system designers.

**Saturday, September 23, 9:00 am**  
**W3: Audio Watermarking for Packaged and Network Media**

**Chair:** Tony Faulkner, *Green Room Productions*, London, UK  
**Panelists:** Karlheinz Brandenburg, M.O.J Hawksford, Paul Jessop, Bob Katz, George Massenburg and Al McPherson

This highly topical presentation on audio watermarking has important implications for future economic models of music distribution. Watermarking technologies must be simultaneously inaudible to the listener and traceable through various data compression schemes. Presenters will demonstrate examples of current approaches with practical applications. A lively discussion is anticipated.

**Individual Workshop Tickets:**

Attendees who are registered for exhibits can attend individual workshops by paying a \$35 fee at the Technical Tour desk.

**Saturday, September 23, 9:00 am**

**W4: Mastering for the Internet**

*Chair:* Dave Harris, *StarMedia Broadband*, San Francisco, CA, USA

*Panelists:* Bernard Grill; Rick Schwartz; David Wheeler

Webcasting, or the streaming of audio and video over the Internet, has emerged as a new industry with new opportunities for audio professionals. Just as audio is mastered for traditional delivery formats such as vinyl, cassette and CD, Internet delivery has its own set of issues. This workshop will cover different methods for optimizing audio for a range of streaming codecs. Panelists will represent major tool developers and audio professionals who work with streaming audio everyday.

**Saturday, September 23, 3:00 pm**

**W5: High Resolution Audio**

*Chair:* Malcolm Hawksford, *University of Essex, Colchester*, Essex, UK

*Panelists:* Kevin Halverson; Jim Johnston; Siegfried Linkwitz; Vicki Melchior; Mike Story; Bob Stuart; Takeo Yamamoto

This workshop addresses the key issues of high-resolution audio acquisition, storage and playback. Examples of high-resolution audio will be presented and panelists will discuss the impact of these technologies on working methods and final delivery. The workshop will also set the stage for small listening room demonstrations of high-resolution audio, which will be available throughout the convention.

**Saturday, September 23, 2:00 pm**

**W6: Digital Libraries, Preservation and Metadata**

*Chair:* Elizabeth Cohen, *Cohen Acoustical*, Los Angeles, CA, USA

*Panelists:* Richard Bradshaw; Peggy Bulger; Mike Christel; Werner Deutsch; Henry Gladney; Mickey Hart; Steve Lymam

Preserving, storing and retrieving audio are increasingly important parts of asset management. This workshop explores the artistic and technical challenges of storing and retrieving audio programs. Various solutions for digital audio library management will be shown. Topics include the future of optical and magneto-optical media, media longevity, data migration, development of digital libraries and data management. Workshop participants will discuss the magnitude of the digitization challenge, data migration policies, the implementation of digital libraries, and how we find an audio object that we are interested in without massive games of bit tag.

**Sunday, September 24, 9:00 am**

**W7: Microphones—How They Work and How to Put Them to Work for You (Tutorial)**

*Chair:* Ron Streicher, *Pacific Audio-Video Enterprises*, Monrovia, CA, USA

*Panelists:* Wes Dooley; John Eargle; Juergen Wahl

The focus of this tutorial workshop will be a comprehensive review of the broad range of factors that determine how microphones work. Emphasis will also be given to practical methods for applying these complex tools to your recording or sound reinforcement project. Among the topics for discussion are the basic operating principles of microphones as transducers, how to make best use of polar patterns, the physical characteristics and limitations of microphones, powering systems, and other related pragmatic issues including microphone mounting hardware, cables, windscreens, etc. The workshop will include numerous practical examples and demonstrations.

**Sunday, September 24, 9:00 am**

**W8: System Problem Solving with Alternative Transducers**

*Chair:* John Stewart, *Harman Motive, Inc.*, Martinsville, IN, USA

*Panelists:* Thomas Danley; Neil Harris; Klaus Heinz; Tony Hooley; Roger Sanders; Bruce Thigpen

The form factor and performance characteristics of common direct

radiator transducer designs do not always meet the needs of every application. This workshop will present alternative approaches to putting air in motion and show how these approaches can be applied to problematic system issues. What options are available to the system designer? An eclectic collection of manufacturers and experimenters will demonstrate transducers that reproduce sound without axial pistonic motion. A listening experience along with a brief tutorial explaining each technology and its advantages will be provided. This workshop offers a unique opportunity to see and hear these transducers first hand.

**Sunday, September 24, 2:00 pm**

**W9: Perceptual Audio Coders—What to Listen For**

*Chair:* Markus Erne, *Swiss Federal Institute of Technology*, Zurich, Switzerland

Low bit-rate audio coding has become a widely used technology during recent years. Due to the use of sophisticated signal processing techniques exploiting psychoacoustic phenomena, non-transparent coding results in artifacts that sound very different from traditional distortions and are frequently not obvious at all to the untrained listener. The workshop will present the work of the AES Technical Committee on Coding of Audio Signals, which aims at explaining different types of coding artifacts and making a collection of such sound material available to the public. Attendees should leave with a better understanding of how to identify and evaluate these artifacts.

**Sunday, September 24, 3:00 pm**

**W10: Everything You Ever Wanted to Hear About Loudspeakers (Tutorial)**

*Chair:* Justin Baird, *Meyer Sound Laboratories*, Berkeley, CA, USA

*Invited Panelists:* Durand Begault; Wolfgang Klippel; Bob McCarthy; David McGrath; David Wessel

The loudspeaker has always played a special role in the ever-changing audio industry. For the majority of sound reinforcement applications, loudspeaker systems continue to be the final filter in the audio path.

All of the improvements in the quality of audio processing are for naught if the reproduction of the signal is not accurate. How do we insure that the loudspeaker faithfully provides the desired end result? This is the subject of our discussion. We will survey the current technological trends in loudspeaker processing and design, and find out how these tools help to provide a subjectively transparent reproduction of the desired sound field. We will also discuss practical methods for subjective loudspeaker testing.

**Monday, September 25, 9:00 am**

**W11: Mastering and Authoring for High Resolution Audio**

*Chair:* Garry Margolis, *Consultant*, Los Angeles, CA, USA

DVD-Audio and Super Audio CD, the new high-resolution consumer audio formats, have introduced new challenges for the preparation of content for commercial release. Mastering and authoring for these new formats will be explored by a panel of engineers who are involved in the creation of the discs.

**Monday, September 25, 9:00 am**

**W12: How Many Loudspeaker Channels are Enough?**

*Chair:* Chris Cain, *University of Southern California*, Los Angeles, CA, USA

*Panelists:* David Griesinger, Tomlinson Holman

The increasing data rates and capabilities of delivery systems enable the audio designer more options when it comes to how the audio budget is distributed. There are differing opinions on the necessity and feasibility of the number of channels and relative positions of loudspeakers which are required to accurately reproduce a naturally occurring soundfield. This workshop will bring together the leaders in the field of soundfield reproduction to

explore and demonstrate the possibilities. This is an open forum for comments on the future of sound reproduction.

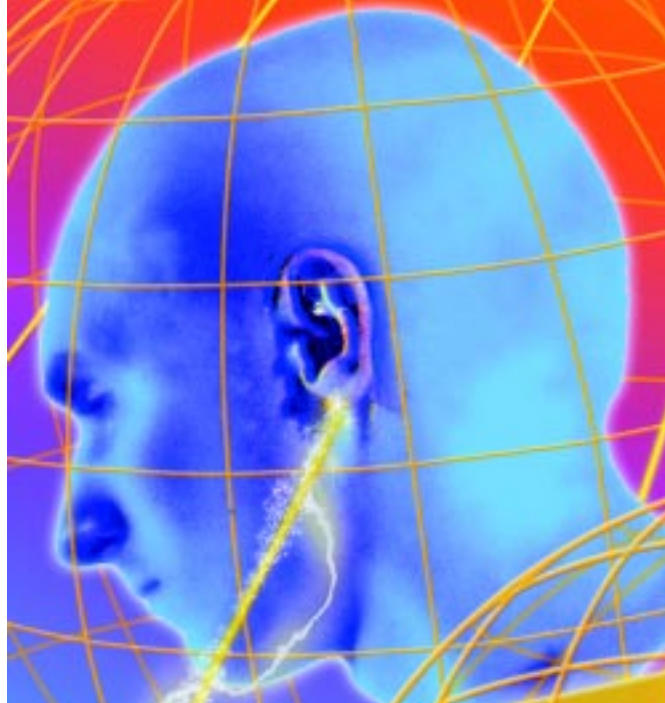
**Monday, September 25, 2:00 pm**

### **W13: Auditory-Visual Interaction**

**Co-chairs:** Durand Begault, *NASA Ames Research Center*, Moffett Field, CA, USA; Armin Kohlrausch, *Philips Research Laboratories*, Eindhoven, The Netherlands

**Panelists:** Myra van Esch-Bussemakers, Armin Kohlrausch, Dominique Massaro, Russell Storms, Elizabeth Wenzel

An understanding of image, sound and movement perception is vital for the successful design and application of audio/visual systems. Examples include multimedia entertainment, gaming, soundscape analysis, teleconferencing, virtual reality and user-system interaction. This workshop brings together professionals from the research and professional application communities who will define relevant areas and methodologies and discuss the significant issues of audio/visual interaction. The emphasis will be on differences and commonalities arising between questions of different application contexts. The audience will be encouraged to interact with the panel in a question and answer session.



## **TECHNICAL PAPERS**

**Friday, September 22—9:00 am**

### **SESSION A: DIGITAL SIGNAL PROCESSING, PART 1**

**Chair:** John Strawn, *S Systems Inc.*, Larkspur, CA, USA

**Object-Based Sound Source Modeling for Musical Signals**—Tero Tolonen, *Helsinki University of Technology*, Espoo, Finland

**Block Floating-Point FIR Filters Using a Fixed-Point Multiplier**—Duane K. Wise, *Consultant*, Boulder, CO, USA

**Advanced Watermarking and Its Applications**—Christian Neubauer and Jürgen Herre, *Fraunhofer Institute for Integrated Circuits*, Erlangen, Germany

**Speeding Up HILN—MPEG-4 Parametric Audio Encoding with Reduced Complexity**—Heiko Purnhagen, Nikolaus Meine, and Bernd Edler, *University of Hannover*, Hannover, Germany

**Energy Compaction Property of the MDCT in Comparison with Other Transforms**—Ye Wang and Miikka Vilermo, *Nokia Research Center*, Tampere, Finland; and Leonid Yaroslavsky, *Tel Aviv University*, Ramat Aviv, Israel

**Friday, September 22—9:30 am**

### **SESSION B: MICROPHONES**

**Chair:** David Josephson, *Josephson Engineering*, San Jose, CA, USA

**Add-On Microflown for a High-End Pressure-Gradient Microphone**—H.-E. de Bree, *University of Twente*, Enschede, The Netherlands

**The Influence of Viscothermal Effects on Calibration Measurements in a Tube**—J. W. van Honschoten, H.-E. de Bree, F. J. M. van Eerden, and G. J. M. Krijnen, *MESA Research Institute*, *University of Twente*, Enschede, The Netherlands

**Unique Directional Properties of Dual-Diaphragm Microphones**—Guy Torio and Jeff Segota, *Shure Incorporated*, Evanston, IL, USA

**A Display Technique for Evaluating the Disturbance of Microphone Response Patterns**—Chris Woolf and Oliver Prudden, *Rycote Microphone Windshields Ltd.*, Stroud, Gloucestershire, UK (Invited)

**Friday, September 22—2:00 pm**

### **SESSION C: DIGITAL SIGNAL PROCESSING, PART 2**

**Chair:** John Strawn, *S-Systems*, Larkspur, CA, USA

**Virtual Loudspeaker Rendering for Multiple Listeners**—Jong-Soong Lim and Chris Kyriakakis, *University of Southern California*, Los Angeles, CA, USA

**A Method for Orthogonal Amplitude and Delay Processing of Subjective Listening Test Material**—Aki Mäkivirta, *Genelec OY*,

Iisalmi, Finland; and Jan Abildgaard Pedersen, *Bang & Olufsen a/s*, Struer, Denmark

**Analysis and Simulation of Analogue Dynamic Compressors and Limiters in the Digital Domain**—Michael J.

Kemp, *Sintefex Audio Lda.*, S. Marcos da Serra, Portugal

**Towards the Automatic Generation of Sound Synthesis Techniques: Preparatory Steps**—Ricardo A. Garcia, *Massachusetts Institute of Technology*, Cambridge, MA, USA

**The Modeling and Synthesis of Musical Signals with PRISM**—Mark Phillips, Jeff Barish, and Rob Maher, *3Com Corporation/U.S. Robotics Corporation*, Boulder, CO, USA

**Why Professional 1-Bit Sigma-Delta Conversion is a Bad Idea**—Stanley P. Lipshitz and John Vanderkooy, *University of Waterloo*, Waterloo, Ontario, Canada

**Stereo Acoustic Echo Cancellation for Sound Spatialisation Using Pair-Wise Loudspeakers with Cross-Talk Cancellation**—Godwin L. Bainbridge, Malcolm O. J. Hawksford, and Peter J. Hughes, *University of Essex*, Colchester, Essex, UK (Poster)

**A 117-dB D-Range Current-Mode Multi-Bit Audio DAC for PCM and DSD Audio Playback**—Shige Nakao, Hitoshi Terasawa, Fumitaka Aoyagi, Norio Terada, and Toshi Hamasaki, *Burr-Brown Japan Ltd.*, Kanagawa, Japan (Poster)

**An Asynchronous Sample-Rate Converter with 120-dB THD+N Supporting Sample Rates up to 192 kHz**—Kevin James McLaughlin and Robert Adams, *Analog Devices*, Wilmington, MA, USA (Poster)

**Friday, September 22—2:00 pm**

### **D: ANALOG SIGNAL PROCESSING**

**Chair:** John Vanderkooy, *University of Waterloo*, Waterloo, Ontario, Canada

**Current-Steering Transimpedance Amplifiers for High-Resolution Digital-to-Analogue Converters**—Malcolm O. J. Hawksford, *University of Essex*, Colchester, Essex, UK

**Integral Noise Shaping for Quantization of Pulse-Width Modulation**—Pallab Midya and Matt Miller, *Motorola Labs*, Schaumburg, IL, USA; and Mark Sandler, *King's College London*, Strand, London, UK

**Prediction Correction Algorithm for Natural Pulse-Width Modulation**—Pallab Midya, Bill Roeckner, Pat Rakers, and Poojan Wagh, *Motorola Labs*, Schaumburg, IL, USA

**A Hybridized, High Performance, Compact PWM Amplifier for Audio**—Mark Takita, *Nikon Research Corporation of America*, Belmont, CA, USA

#### **Please note:**

The final presentation order of papers may vary slightly from the preliminary schedule.

**Optimized Modulation Scheme Eliminates Output Filter**—Michael Score and Donald Dapkus, *Texas Instruments*, Dallas, TX, USA

**A Novel Audio Power Amplifier Topology with High Efficiency and State-of-the-Art Performance**—Thomas Frederiksen, Henrik Bengtsson, and Karsten Nielsen, *Bang & Olufsen PowerHouse a/s*, Struer, Denmark (Poster)

**Computationally Efficient Conversion from Pulse-Code Modulation to Naturally Sampled Pulse-Width Modulation**—César Pascual, *University of Illinois*, Urbana-Champaign, IL, USA; and Bill Roeckner, *Motorola Labs*, Schaumburg, IL, USA (Poster)

Saturday, September 23—9:00 am

### E: LOUSPEAKERS, PART 1

**Co-chairs:** Steven Hutt and John Stewart, *Harman-Motive Inc.*, Martinsville, IN, USA

**Quantification of Subwoofer Requirements, Part II: The Influence of Lower System Cut-Off Frequency and Slope and Pass-Band Amplitude and Group Delay Ripple**—Søren Bech, *Bang & Olufsen a/s*, Struer, Denmark

**Design of High-Quality Studio Loudspeakers Using Digital Correction Techniques**—Ulrich Horbach, *Studer Professional Audio AG*, Regensdorf, Switzerland

**The Acoustics and Psychoacoustics of Loudspeakers and Rooms—The Stereo Past and the Multichannel Future**—Floyd E. Toole, *Harman International Industries, Inc.*, Northridge, CA, USA (Invited Tutorial)

Saturday, September 23—9:00 am

### F: PERCEPTION AND PSYCHOACOUSTICS, PART 1

**Chair:** Louis Fielder, *Dolby Laboratories, Inc.*, San Francisco, CA, USA

**Perceptual Study of Decay Parameters in Plucked String Synthesis**—Tero Tolonen and Hanna Järveläinen, *Helsinki University of Technology*, Espoo, Finland

**Elevated Speakers Image Correction Using 3-D Audio Processing**—See-Ee Tan, Yang Jun, Yew-Hin Liew, and Woon-Seng Gan, *Nanyang Technological University*, Singapore, Singapore

**Power Improvement in Crosstalk Cancellation Using Psychoacoustic Frequency Masking**—Yew-Hin Liew, Jun Yang, See-Ee Tan, and Woon-Seng Gan, *Nanyang Technological University*, Singapore, Singapore

**Perceptual Soundfield Reconstruction**—James D. Johnston, *AT&T Labs - Research*, Florham Park, NJ, USA; and Yin Hay (Vicky) Lam, *University of Strathclyde*, Glasgow, UK

**A Speech-Based Auditory Distance Display**—Douglas S. Brungart, *Air Force Research Laboratory, Human Effectiveness Directorate*, WPAFB, OH, USA

**Magnitude Estimation of Sound Source Speed**—Mark A. Ericson, *Air Force Research Laboratory*, Wright-Patterson AFB, WPAFB, OH, USA

**Spatial Acoustic Mode Shapes of the Human Pinna**—Yuvi Kahana and Philip A. Nelson, *University of Southampton*, Highfield, Southampton, UK

**Robustness of Acoustic Crosstalk Cancellation as a Function of Frequency and Loudspeaker Separation**—Felipe Orduña, *Universidad Nacional Autónoma de México*, Mexico, D.F., Mexico; and José Javier López and Alberto González, *Universidad Politécnica de Valencia*, Grao Gandia, Valencia, Spain

Saturday, September 23—2:00 pm

### G: LOUSPEAKERS, PART 2

**Co-chairs:** Steven Hutt and John Stewart, *Harman-Motive*, Martinsville, IN, USA

**Loudspeaker Acoustical Field Calculations with Application to Directional Response Measurement**—David W. Gunness and Ryan J. Mihelich, *Eastern Acoustic Works, Inc.*, Whitinsville, MA, USA

**Improved Loudspeaker Array Modeling—Part 2**—David W. Gunness and William R. Hoy, *Eastern Acoustic Works, Inc.*, Whitinsville, MA, USA

**Optimization of Bandpass and Transmission-Line Loudspeakers**—Juha Backman, *Nokia Mobile Phones*, Nokia Group, Finland

**Vibration Behaviour of Single-Suspension Electrodynamic Loudspeakers**—Andrew Bright, *Nokia Research Center*, Helsinki, Finland; and Technical University of Denmark, Lyngby, Denmark

**Horn's Directivity Related to the Pressure Distribution at Their Mouth**—Mario Di Cola and Davide Doldi, *Politecnico di Milano*, Milan, Italy

**Measurement and Simulation Results Comparing the Acoustics of Various Direct Radiators in the Presence of a Dominant Specular Reflection**—Neil Harris, *University of Essex*, and *New Transducers Ltd.*; Vladimir Gontcharov, *New Transducers Ltd.*, Hungtingdon, Cambridgeshire, UK; and Malcolm O. J. Hawksford, *University of Essex*, Colchester, Essex, UK

**The Application of Broadband Constant Beamwidth Transducer (CBT) Theory to Loudspeaker Arrays**—D. B. (Don) Keele, Jr., *DBK Associates*, Niles, MI, USA

**Distributed Mode Loudspeaker Resonance Structures**—James A. S. Angus, *University of York*, York, North Yorkshire, UK (Poster)

**High-Accuracy Wide-Bandwidth Automated Loudspeaker Modeling Using Finite-Element Analysis**—Carlos I. Beltran and Jesse H. Spence, *Advanced Acoustics Transducers*, Haverhill, MA, USA; and *Boston Acoustics*, Peabody, MA, USA (Poster)

**A New Approach to Speaker/Room Equalization**—Kuang-tao Chiao, Neil Harris, and Chris Kyriakakis, *University of Southern California*, Los Angeles, CA, USA (Poster)

**Non-Axisymmetric Elliptical Acoustic Waveguides with Very Different  $H^\circ \times V^\circ$  Coverage**—Mario Di Cola, *Politecnico di Milano*, Milan, Italy (Poster)

**Development of a Piezo-Electric Super Tweeter Suitable for DVD-Audio**—Mitsukazu Kuze and Kazue Satoh, *Matsushita Electric Industrial Co., Ltd.*, Kadoma-City, Osaka, Japan (Poster)

**Differential-Algebraic Equations Governing Nonlinear Transducer Networks**—Daniel M. Warren, *Knowles Electronics, LLC*, Itasca, IL, USA (Poster)

**Acoustic Intermodulation Distortion in Loudspeakers**—John Vanderkooy and Stanley P. Lipshitz, *University of Waterloo*, Waterloo, Ontario, Canada (Poster)

Saturday, September 23—2:00 pm

### H: PERCEPTION AND PSYCHOACOUSTICS, PART 2

**Chair:** Louis Fielder, *Dolby Laboratories, Inc.*, San Francisco, CA, USA

**Multidimensional Perceptual Unfolding of Spatially Processed Speech I: Deriving Stimulus Space Using INDSCAL**—William L. Martens, *University of Aizu*, Aizuwakamatsu-shi, Japan; and Nick Zacharov, *University of Aizu*, and *Nokia Research Center*, Tampere, Finland

**Verbal and Non-Verbal Elicitation Techniques in the Subjective Assessment of Spatial Sound Reproduction**—Russell Mason, Natanya Ford, Francis Rumsey, and Bart de Bruyn, *University of Surrey*, Guildford, Surrey, UK

**Correlation between Emotive, Descriptive and Naturalness Attributes in Subjective Data Relating to Spatial Sound Reproduction**—Jan Berg, *Lulea University of Technology*, Pitea, Sweden; and Francis Rumsey, *University of Surrey*, Guildford, Surrey, UK

**Aural Exciter and Loudness Maximizer: What's Psychoacoustic about "Psychoacoustic Processors?"**—Josef Chalupper, *Technical University of Munich*, Munich, Germany

**The Influence of Loudspeaker Type on Timbre Perception**—Sheila Flanagan and Brian C. J. Moore, *University of Cambridge*, Cambridge, Cambridgeshire, UK

**Immersive Sound Rendering Using Laser-Based Tracking**—Panayiotis G. Georgiou, Athanasios Mouchtaris, Stergios I. Roumeliotis, and Chris Kyriakakis, *University of Southern California*, Los Angeles, CA, USA

**Psychoacoustic Models and Non-Linear Human Hearing**—David J. M. Robinson and Malcolm O. J. Hawksford, *University of Essex*, Colchester, Essex, UK

**Perception-Based Room Rendering for Auditory Scenes**—Renato S. Pellegrini, *Ruhr-Universität Bochum*, Bochum, Germany



Sunday, September 24—9:00 am

## I: ROOM ACOUSTICS

**Chair:** David Schwind, *Charles M. Salter & Associates*, San Francisco, CA, USA

**Synthesis of Room Impulse Response Based on the Discrete Wavelet Transform**—Henryk Lopacz and Piotr Kleczkowski, *Technical University of Mining and Metallurgy AGH*, Cracow, Poland

**Compound of Objective and Subjective Investigation Aimed at Acoustical Amelioration of a Playhouse**—Hrvoje Domitrovic and Sinisa Fajt, *University of Zagreb*, Zagreb, Croatia; and Ivan Stamac, *Stims doo*, Zagreb, Croatia

**The Effect of Room Acoustics on Subwoofer Performance and Level Setting**—Eric Benjamin and Benjamin Gannon, *Dolby Laboratories, Inc.*, San Francisco, CA, USA

**Predictability of a Room Impulse Response**—Zihou Meng, Kimihiro Sakagami, and Masayuki Morimoto, *Kobe University*, Kobe, Hyogo, Japan; and Guoan Bi, *Nanyang Technological University*, Singapore, Singapore

**Measures to Avoid the Transmissions of Structure-Borne Sound: Sound Sources Next to Studios**—Wolfgang Teuber and Ernst-Joachim Voelker, *IAB Institut für Akustik und Bauphysik*, Oberursel, Germany

**Double Wall and Double Floor Constructions for Obtaining the Permitted Noise Levels in Studios**—Tom Langlotz and Ernst-Joachim Voelker, *IAB Institut für Akustik und Bauphysik*, Oberursel, Germany

**Noise Levels of Microphones for High-Quality Recordings—Are Our Studios Good Enough?**—Ernst-Joachim Voelker and Wolfgang Teuber, *IAB Institut für Akustik und Bauphysik*, Oberursel, Germany

**Architectural Acoustic Design of a Sound Effect Studio for Multi-Channel Recording**—Masamichi Otani, Toshio Wakatsuki, Mikihiro Okamoto, Mitsuo Kubo, and Masaki Sawaguchi, *NHK (Japan Broadcast- ing Corporation)*, Shibuya-ku, Tokyo, Japan

Sunday, September 24—9:00 am

## J: MULTICHANNEL SOUND

**Chair:** Tom Holman, *TMH Corporation*, Los Angeles, CA, USA

**An Inter-Channel Redundancy Removal Approach for High-Quality Multichannel Audio Compression**—Dai Yang, Hongmei Ai, Chris Kyriakakis, and C.-C. Jay Kuo, *University of Southern California*, Los Angeles, CA, USA

**Conversion of Two-Channel Stereo for Presentation by Three Frontal Loudspeakers**—Jerry Bauck, *Cooper Bauck Corporation*, Tempe, AZ, USA

**Equalization for Central Phantom Images and Dependence on Loudspeaker Spacing: Reformatting from Three Loudspeakers to Two Loudspeakers**—Jerry Bauck, *Cooper Bauck Corporation*, Tempe, AZ, USA (Poster)

**Multichannel Level Alignment, Part IV: The Correlation between Physical Measures and Subjective Level Calibration**—Nick Zacharov, *Nokia Research Center*, Tampere, Finland; and Søren Bech, *Bang & Olufsen a/s*, Struer, Denmark

**Surround Sound Mixing Using Rotation, Stereo Width, and Distance Pan Pots**—Itai M. Neoran, *ks WAVES Ltd.*, Tel-Aviv, Israel

**Enhanced Localization in 5.1 Production**—Thomas Lund, *TC Electronic A/S*, Risskov, Denmark

**Investigating the Potential of Omnidirectional Mic Arrays in the Reproduction of Surround Sound**—Charlie Fox, *University of Regina*, Regina, Saskatchewan, Canada

**Interactive Multichannel Sound Reproduction Linked with VRML Graphics**—Setsu Komiyama, Hiroyuki Okubo, Kazuho Ono, and Koichiro Hiyama, *NHK Science and Technical Research Laboratories*, Setagaya, Tokyo, Japan; and Hiroshi Asayama, *Timeware Corporation*, Shinagawa, Tokyo, Japan

Sunday, September 24—2:00 pm

## K: NETWORKING AND PC AUDIO

**Chair:** Richard Foss, *Rhodes University*, Grahamstown, South Africa

**A 1394-Based Architecture for Professional Audio Production**—Rob Laubscher and Bob Moses, *Digital Harmony Technologies, Inc.*, Seattle,

WA, USA; and Richard Foss, *Rhodes University*, Grahamstown, South Africa

**Controlling Audio Systems with ActiveX Controls over CobraNet and Other Ethernet-Based Networks**—Stephen R. Macatee and Devin Cook, *Rane Corporation*, Mukilteo, WA, USA

**Transporting Audio Signals on Category 5 UTP**—Stephen H. Lampen, *Belden Electronics Division*, San Francisco, CA, USA

**A PC-Based Graphic User Interface and Control Engine for an Audio Processing System**—Brent Karley and Teddy Chen, *Motorola*, Austin, TX, USA; and Jayant Datta, *Motorola*, Fairport, NY, USA

**Transport of Context-Based Information in Digital Audio Data**—Natalie Packham and Frank Kurth, *University of Bonn*, Bonn, Germany

Sunday, September 24—2:00 pm

## L: RECORDING AND REPRODUCTION

**Chair:** Bob Moses, *Digital Harmony Technologies, Inc.*, Seattle, WA, USA

**0 dB FS + Levels in Digital Mastering**—Søren H. Nielsen and Thomas Lund, *TC Electronic A/S*, Risskov, Denmark

**A Novel Noise Suppression Algorithm Using a Very Small Microphone Array**—Marc Ihle, *Siemens AG*, Ulm, Germany; and Kristian Kroschel and Rainer Riedlinger, *Universität Karlsruhe*, Karlsruhe, Germany

**The Design of VALDEMAR—An Artificial Head for Binaural Recording Purposes**—Flemming C. Christensen, Clemen Boje Jensen, and Henrik Møller, *Aalborg University*, Aalborg, Denmark

**Prediction-Based Audio Watermark Detection Algorithm**—Jong-Won Seok and Jin-Woo Hong, *Electronics and Telecommunications Research Institute*, Taejeon, Korea

**On-the-Fly Multi-Track Mixing**—Francois Pachet and Olivier Delerue, *Sony Computer Science Laboratory*, Paris, France

Monday, September 25—9:00 am

## M: LOW BIT-RATE CODING, PART 1

**Chair:** Jayant Datta, *Motorola*, North Syracuse, NY, USA

**Analysis of Decompressed Audio—The “Inverse Decoder”**—Jürgen Herre and Michael Schug, *Fraunhofer Institute for Integrated Circuits*, Erlangen, Germany

**A Dynamic Embedding Codec for Multiple Generations Compression**—Frank Kurth and Viktor Hassenrik, *University of Bonn*, Bonn, Germany

**Cyclostationarity-Based Audio Watermarking with Private and Public Hidden Data**—Leandro de C. T. Gomes, Mamadou Mboup, and Madeleine Bonnet, *Université René Descartes (Paris V)*, Paris, France; and Nicolas Moreau, *ENST/TSI*, Paris, France

**Backward Compatible Enhancement of DTS Multi-Channel Audio Coding That Delivers 96-kHz/24-Bit Audio Quality**—Zoran Fejzo, Stephen Smyth, Keith McDowell, Yu-Li You, and Paul Smith, *Digital Theater Systems, Inc.*, Agoura Hills, CA, USA

**PESQ—The New ITU Standard for End-to-End Speech Quality Assessment**—Antony W. Rix and Michael P. Hollier, *BT Advanced Communications Research*, Ipswich, UK; and John G. Beerends and Andries P. Hekstra, *Royal PTT Nederland NV*, Leidschendam, The Netherlands

**Evaluating the Perceived Audio Quality (PEAQ) of Internet Audio Codecs**—Michael Keyhl, *OPTICOM GmbH*, Erlangen, Germany

Monday, September 25—9:00 am

## N: INSTRUMENTATION AND MEASUREMENT

**Chair:** Thomas Kite, *Audio Precision, Inc.*, Beaverton, OR, USA

**Diagnosis and Remedy of Nonlinearities in Electrodynamical Transducers**—Wolfgang Klippel, *Klippel GmbH*, Dresden, Germany

**Coherence-Based, Wide-Band, Signal-to-Distortion Ratio versus Total Harmonic Distortion of Slightly Non-Linear Audio Systems**—D. Preis and R. Gregg, *Tufts University*, Medford, MA, USA

**The Accuracy of Loudspeaker Array Sound Field Predictions Using Low-Resolution 1/3-Octave, 5° Polar Data**—Henrik Staffeldt, *Technical University of Denmark*, Lyngby, Denmark

**Measuring the Head-Related Transfer Functions of an Artificial Head with a High-Directional Resolution**—Bjarke P. Bovbjerg, Flemming Christensen, Pauli Minnaar, and Xiaoping Chen, *Aalborg University*, Aalborg, Denmark

**Multitone Testing of Sound Systems' Components—Some Results and Conclusions**—Gene Czerwinski, Alexander Voishvillo, Sergei Alexandrov, and Alexander Terekhov, *Cerwin Vega, Inc.*, Simi Valley, CA, USA

**Testing Loudspeakers with Wavelets**—Marshall Buck, *Psychotechnology, Inc.*, Los Angeles, CA, USA; and *Audio Precision, Inc.*, Beaverton, OR, USA

**The Development of a Car Sound-Field Measurement System Using Compact PC**—Kazue Satoh, *Matsushita Electric Industrial Co., Ltd.*, Kadoma-City, Osaka, Japan; and Toshikazu Chiba, *Matsushita Communication Industrial Co., Ltd.*, Tsuzuki-ku, Yokohama, Japan (Poster)

**Modeling and Measurement of Cross-Talk Cancellation Zones for Small Displacements of the Listener in Transaural Sound Reproduction with Different Loudspeaker Arrangements**—José Javier López and Alberto González, *Universidad Politécnica de Valencia*, Grao Gandia, Valencia, Spain; and Felipe Orduña, *Universidad Nacional Autónoma de Mexico*, Mexico, D.F., Mexico (Poster)

**Measuring Acoustic Noise Emitted by Power Transformers**—Menno van der Veen, *Consultant*, Zwolle, The Netherlands; and Francisco de Leon, Brian Gladstone, and Valeriu Tatu, *Plitron Manufacturing Inc.*, Toronto, Ontario, Canada (Poster)

**Windnoise Measurement Using Real Wind**—Chris Woolf and Oliver Prudden, *Rycote Microphone Windshields Ltd.*, Stroud, Gloucestershire, UK (Poster)

Monday, September 25—2:00 pm

**O: LOW BIT-RATE CODING, PART 2**

*Chair:* Jayant Datta, *Motorola*, North Syracuse, NY, USA

**Implementation of MPEG-4 Audio Components on Various Platforms**—Bernhard Grill, Stefan Geyersberger, Johannes Hilpert, and Bodo Teichmann, *Fraunhofer Institute for Integrated Circuits*, Erlangen, Germany

**Error Resilient Source Coding with Variable Length Codes and Its Application to MPEG Advanced Audio Coding**—Ralph Sperschneider, *Fraunhofer Institute for Integrated Circuits*, Erlangen, Germany

**Dynamic Allocation of Bits Based on Perceptual Entropy in Perceptual Audio Coding Systems**—Kelvin H. C. Eng and Say Wei Foo, *National University of Singapore*, Singapore, Singapore; and Dong-Yan Huang, *Institute of Microelectronics*, Singapore, Singapore

**Optimal Prediction in Scalable Coding of Stereophonic Audio**—Ashish Aggarwal, Shankar L. Regunathan, and Kenneth Rose, *University of California*, Santa Barbara, CA, USA

**Perceptual Audio Coding Using a Time-Varying Linear Pre- and Post-Filter**—Bernd Edler, Christof Faller, and Gerald Schuller, *Bell Labs, Lucent Technologies*, Murray Hill, NJ, USA

**Analyzing the Performance of Lossless Coding Techniques Used in Audio Coders**—Matthew A. Watson and Michael Truman, *Dolby Laboratories, Inc.*, San Francisco, CA, USA

Monday, September 25—2:00 pm

**P: AUTOMOTIVE AUDIO**

*Chair:* Richard Stroud, *Delphi Delco Electronics*, Kokomo, IN, USA

**Automotive Audio Design (A Tutorial)**—Roger Shively, *Harman-Motive, Inc.*, Martinsville, IN, USA (Tutorial)

**APLODSP, Design of Customizable Audio Processors for Loudspeaker System Compensation by DSP**—Alberto Bellini, Angelo Farina, and Carlo Morandi, *University of Parma*, Parma, Italy; and Emanuele Ugolotti, Gianfranco Cibelli, and Gino Gobbi, *ASK Industries S.p.A.*, Reggio Emilia, Italy

**Experimental Validation of Equalizing Filters for Car Cockpits Designed with Warping Techniques**—Alberto Bellini and Angelo Farina, *University of Parma*, Parma, Italy; and Gianfranco Cibelli, Emanuele Ugolotti, and Filippo Bruschi, *ASK Industries S.p.A.*, Reggio Emilia, Italy

**Design of Acoustic Lever Loudspeaker Systems, Part One**—Alan S. Phillips, *Visteon Automotive Systems*, Allen Park, MI, USA

## TECHNICAL TOURS

**Technical Tours** provide an opportunity for convention attendees to visit some of the resources and facilities in the Los Angeles area.

Registration for these tours is at the Convention only and priority is given to full program participants. Check with the Tour Desk in the registration area. Space is limited and fills quickly. There is a nominal charge for Technical Tours.

the ear canal through the inner ear to the brain. Three brief presentations on the regeneration of sensory hair cells, the perception of sound and the impact of background noise on speech intelligibility and amplification will also be included.

Friday, September 22, 2:00 pm  
**T3: NBC Tonight Show Studio**

We are all aware of the promise that high definition television (HDTV) and surround sound hold for the future of audio. We are especially pleased to bring you this special tour guided by the engineers who are using the latest in HDTV and surround sound technologies for the production of the NBC "Tonight Show."

Friday, September 22, 10:00 am  
**T1: Harman International**

On this tour of the Harman International facility, we will gain insight into the pioneering design and manufacture of Harman loudspeakers and how they are evaluated.

Friday, September 22, 1:00 pm  
**T2: House Ear Institute**

This special tour will offer a behind-the-scenes look at the Institute's laboratories and an overview of the scientific exploration of the auditory system from

Saturday, September 23, 9:00 am  
**T4: The Village**

This tour will feature a visit to The Village, a legendary, state-of-the-art recording and scoring facility in West Los Angeles. An integral part of the record, film and television scene for more than 30 years, the facility is a four-room complex housed within a 30,000 sq. ft., 1920's era Masonic Temple and features a wide variety of vintage and modern gear.

Saturday, September 23, 4:00 pm  
**T5: Staples Center**

Welcome to the newest arena in Los Angeles. Opened in the fall of 1999, the Staples Center is home to many of the area's spectacular live events, including the upcoming Democratic National Convention. The arena features a specially designed \$1.5-million facility sound system and 675 separate speakers outside of the seating area.

Sunday, September 24, 9:00 am  
**T6: The Village**

For those of you who couldn't make the first trip to The Village, a second tour has been scheduled. Please refer to the above description of this tour for details.

Monday, September 25, 10:00 am  
**T7: Whitmor Wirenetics**

Located in nearby Valencia, Whitmor Wirenetics is a manufacturer and a distributor of custom and off-the-shelf wire products. This tour is designed to provide insight into how wire and cable are manufactured and to present the various types of cables and their uses.



# EXHIBITORS

- A.D.A.M. Audio GmbH  
A & G Solvzioni Digitali  
Aardvark  
ACO Pacific, Inc.  
Acoustic Sciences Corporation  
Acoustic Systems  
Acoustical Solutions, Inc.  
Acoustics First Corporation  
ADC  
ADK Microphones  
Akai Musical Instrument Corporation  
AKG  
AKM Semiconductor, Inc.  
Alcorn McBride, Inc.  
Alesis Corp.  
Allen & Heath  
AlterMedia  
Amek - A Division of  
Harman International Industries  
Ametron - American Elect. Supply, Inc.  
AMS Neve PLC  
Analog Devices, Inc.  
AnTares Systems  
Aphex Systems  
API Audio Products, Inc.  
Apogee Electronics, Inc.  
Apogee Sound, Inc.  
Applied Microphone Technology  
ART-Applied Research & Technology  
ASC, Advanced Sonic Concept  
ATC Loudspeaker Technology  
ATI - Audio Technologies, Inc.  
ATR Service Co.  
Audient  
Audio Accessories, Inc.  
Audio Composite Engineering, Inc.  
Audio Developments  
Audio Engineering Associates  
Audio Independence Ltd.  
Audio Intervisual Design / DTD  
AM Publishing Ltd. / Audio Media  
Audio Precision  
Audio Resources Ltd.  
Audio-Technica U.S., Inc.  
ATI (Audio Toys Inc.)  
Audio2000's (H & F Technologies, Inc.)  
AudioControl Industrial  
Audiomatica SRL  
Audiomation  
Auidix Corporation  
Auralux Acoustics  
Avalon Design, Inc.  
AXI / Audio Exchange International  
B & C Speakers  
Bag End Loudspeakers  
Baltic Latvian Universal Electronics "B.L.U.E."  
BASF/EMTEC Pro Media  
BE Radio Magazine  
Behringer Spezielle Studiotechnik GmbH
- Belden Wire & Cable Company  
Benchmark Media Systems, Inc.  
Berklee College of Music  
Beyerdynamic  
BGW Systems, Inc.  
BitHeadz, Inc.  
Brainstorm Electronics, Inc.  
Brauner USA  
Bryston Ltd.  
BSS  
Burr-Brown Corporation  
Cable Factory  
CAD Professional Microphones  
Cadac Electronics Ltd.  
Cakewalk  
Calrec Audio Ltd.  
CAP Audio Professional Corp.  
Carver Professional div. of Phoenix Gold  
CASES by MASCO  
CB Electronics / AEA  
Cedar Audio Limited  
Cestelion / Group One Ltd.  
Cerin-Vega  
Chevin Research  
Cirrus Logic / Crystal Brand  
Clear-Com Intercom Systems  
Cliff Electronic Components, Inc.  
CLM Dynamics  
Coffey Sound  
Coles  
Coles / AEA  
CommScope, Inc.  
Community Professional Loudspeakers  
Cooper Sound Systems  
Countryman Associates, Inc.  
Crane Song Ltd.  
Crest Audio, Inc.  
Crown International  
Cycling '74  
D.A.S. Audio of America, Inc.  
D Sound America  
D.W. Fearn  
DACS Ltd  
Dan Dugan Sound Design  
Data Conversion Systems (des) Ltd.  
DB Technologies  
dbx Pro  
Demeter Tube Amplification  
Denon Electronics  
Design FX Audio  
Digibid Incorporated  
Digidesign  
Digidesign Development Partners  
Digigram  
Digital Music Technologies  
DigiTech  
Disc Makers  
DK Audio  
Doc's Proplugs, Inc.  
Dolby Laboratories, Inc.  
Doremi Labs, Inc.
- Dorough Electronics  
DPA Microphones / TGI North America Inc.  
Drawer (USA) / Transamerica Audio Group, Inc.  
DSP Media  
Digital Theater Systems, Inc.  
Dynaudio Acoustics / Munro Associates  
E-mu Systems / Ensoniq  
Earth Works  
Eastern Acoustic Works, Inc.  
EDnet, Inc.  
EGO Systems, Inc.  
Electric  
Electronic Musician  
EMAGIC  
Emkay Innovative Products  
Empirical Labs, Inc.  
EQ  
Equi=Tech Corporation  
ETA Systems  
Euphonix, Inc.  
Event Electronics  
Eventide, Inc.  
Expression Center for New Media  
Fairlight USA  
Ferrotech Corporation  
Film & Video Magazine  
Focal Press  
Fostex Corp. of America  
Fraunhofer Institute Integrated Circuits (ITS)  
Frontier Design Group  
Fuji Photo Film USA, Inc.  
Furman Sound  
G PRIME Limited  
Gefen Systems  
GenelecOY  
Gentner Communications Corp.  
Geoffrey Daking & Co., Inc.  
Gepco International, Inc.  
Glyph Technologies  
GML  
Gold Line  
Government Video  
Grace Design  
Great River Electronics Inc.  
Group One Ltd  
H.E.A.R. - Hearing Education & Awareness for Rockers  
Hafler Professional  
Harrison by GLW, Inc.  
HHB Communications USA LLC  
Hosa Technology, Inc.  
House Ear Research Institute  
Independent Audio  
Industrial Acoustics Co.  
Innova-son  
Innovative Electronic Designs, Inc.  
Intertec Publishing  
IZ Technology Corp.  
Jan-Al Cases  
JBL Professional  
Joemeek  
The John Hardy Company  
Josephson Engineering  
JRF Magnetic Sciences  
Junger Audio Studioteknik GmbH
- Kind of Loud Technologies  
Klippel GmbH  
Klotz Digital America, Inc.  
KRK Systems, Inc.  
KS Audio  
Kurzweil Music Systems  
Cox Audio Engineering / L-Acoustics  
Lake DSP Pty Ltd.  
Lake Shore Cryotronics, Inc.  
Lawson, Inc.  
Lectrosonics, Inc.  
Leitch, Inc.  
Leonhard Research A/S  
Level Control Systems  
Lexicon, Inc.  
Lighthouse Digital Systems, Inc. / Lightwave Systems, Inc.  
Liquid Audio  
Listen, Inc.  
Little Labs  
Live Sound! Magazine  
Location Sound Corporation  
Logitek Electronic Systems, Inc.  
M.Klemme Technology, Corp.  
Mackie Designs  
MAGMA  
Magtrax  
Manley Laboratories, Inc.  
Marquette Audio Labs  
Marshall Electronics, Inc.  
Martech  
Martin Audio  
Martinsound, Inc.  
MBHO - Haun Microphones US  
McCauley Sound, Inc.  
Medea Corporation  
Mediaform  
Medialine  
Mercury Recording Equipment  
Merging Technologies  
Metric Halo Laboratories  
Meyer Sound Laboratories, Inc.  
Microboards Technology, Inc.  
Microtech Systems  
Millennia Media, Inc.  
Miller Freeman PSN, Inc.  
Miller & Kreisel Sound Corporation  
Mind print  
Mitsui Advanced Media  
Mix  
Momentum Data Systems, Inc.  
Monster Cable Products, Inc.  
Motorola, Inc.  
mSoft Inc.  
M.A.D. Labs  
Music Connection Magazine  
Music Maker Publications  
Musiconsult  
Mutronics  
Mytek Digital  
Nagra USA, Inc.  
National Academy of Recording Arts and Science  
Native Instruments  
Nemal Electronics Intl., Inc.  
Network Music, LLC  
Neumann  
Neutrik USA, Inc.  
Neutrik Instrumentation, Inc.  
NewWave Technologies  
Nexo USA  
NHT Pro / Vergence Technology
- Noren Products, Inc.  
Norris-Whitney Communications  
NXT New Transducers Ltd.  
Opticom  
Oram Pro Audio  
Otari Corporation  
Pacific Radio Electronics  
Panasonic Broadcast & Television Systems  
Pearl Lab  
Peavey Electronics Corp.  
Pendulum Audio, Inc.  
Penny and Giles Control Inc.  
Pilchner Schoustal Inc.  
Pioneer / TAD - Technical Audio Devices  
Plitron Manufacturing, Inc.  
PMC Monitors  
PMI Audio Group  
Post Magazine (AdvanStar Info. Tech. Group)  
Powerphysics  
Precision Laboratories  
PreSonus Audio Electronics  
Prime LED  
Prism Media Products, Inc.  
Pro Audio Review / Radio World  
Purple Audio, Inc.  
Q. USA, Inc. (Quested Monitoring Systems)  
QSC Audio Products, Inc.  
Radial Engineering (A Division of CableTek)  
RADIANT Audio Engineering, Inc.  
Radikal Technologies  
RDL Radio Design Labs  
Ramtech Industries, Inc.  
Rane Corporation  
Rapco Pro USA  
RCS Enterprises  
Recording Magazine  
Renkus-Heinz, Inc.  
Residential Systems  
Rohde & Schwarz GmbH & Co. KG  
Roland Corporation  
Rolls Corporation  
Rorke Data, Inc.  
Royer Labs  
RPG Diffusor Systems, Inc.  
Sabine, Inc.  
Sabra-som  
SADIE, Inc.  
Sanken  
Scarab Technology  
Schedu ALL Software  
Schoeps / Posthorn Recordings  
SeaSound  
SEK'D America  
Selenium Loudspeakers  
Sellmark Electronics  
Sennheiser Electronics Corp.  
Serafine, Inc. (The Serafine Collection)  
Shep Associates Ltd.  
Shure Incorporated  
SLS Loudspeakers  
Solid State Logic  
Sonic Foundry, Inc.  
Sonic Solutions  
Sonifex Limited  
Sonorus, Inc.  
Sony Electronics, Inc.  
Sony/Philips Super Audio CD  
Sound Devices, LLC  
Sound Ideas  
Sound on Sound Magazine  
Sound & Video Contractor Magazine  
Soundcraft  
Soundelux Microphones
- Soundfield Research / Transamerica Audio Group  
Soundman  
Sounds Logical  
Soundscape Digital Technology Ltd.  
Soundtracs USA, Inc.  
SPARS  
SPL Electronics  
Stage Accompany USA  
Stage Tec GmbH  
Steinberg N. America  
STUDER  
Studio Projects  
Studio Technologies, Inc.  
Summit Audio, Inc.  
Surround Professional  
Swissonic America  
Switchcraft, Inc.  
Symbolic Sound Corporation  
Symatrix, Inc.  
Syst Labs  
Systems Contractor News  
Tannoy / TGI North America, Inc.  
TASCAM  
Taytrix, Inc.  
TC Electronic Inc.  
TC Works  
Teca Spa  
Television Broadcast  
Telex Communications, Inc.  
TerraSonde  
Testa Communications  
Texas Instruments  
THAT Corporation  
Thinkware  
Third Wave Media  
360 Systems  
THX Division, Lucasfilm Ltd  
TOA Electronics, Inc.  
Toroid Corporation of Maryland  
Transamerica Audio Group  
Tri Tech Audio Ltd  
Trident Audio Developments Ltd.  
Truth Audio Inc.  
Tube Tech  
Turbosound  
Ucik, Inc. (dba SEK'D America)  
United Business Media  
Universal Audio  
Uptown Automation Systems  
UR SRL  
US Air Force Band  
Technical Support  
Vega  
Videohelper, Inc.  
Videography  
Vintage Studio Rentals  
Virtual Mixing Co. / Calif. Recording Institute  
Ward-Beck Systems Ltd.  
Wave Distribution  
Wave Arts, Inc.  
Wave Digital Systems  
WaveFrame  
Waves, Inc.  
Webber Tapes LTD  
West Penn Wire / CDT  
Westlake Audio  
Whirlwind  
Wireworks Corporation  
Wohler Technologies, Inc.  
World Link Digital  
XTA Electronics / Group One Ltd.  
Yale Electronics  
Yamaha Corporation of America  
Z - Systems, Inc.  
Zack Electronics  
Zaxcom Audio



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