

SOUND COMMUNICATIONS

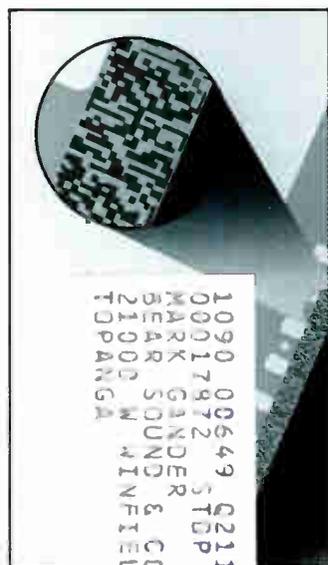
Volume 36 Number 11

November 23, 1990

SPECIAL ENVIRONMENTS

From elevators to museums to factory visitors centers, system designers are living up to the challenge. **25**

DIGITAL AUDIO IN MOVIES



Kodak and Optical Radiation stunned the industry last year with their CDS system for theatrical films. Is this system the end of the story? Decidedly not. New formats are on the boards from companies such as Dolby — and even from Kodak itself. **38**

SIGNAL PROCESSING

Signal processing goes digital — or does it? Signal processing units. Stand-alone, Modular, or all in one? Digital or Analog? PC-controlled? What do we have to look forward to? What not? **17**



IN THIS ISSUE

THE AES CONVENTION

- **A Personal View**
In the heady climes of an AES convention, how does the sound contractor fare? **50**

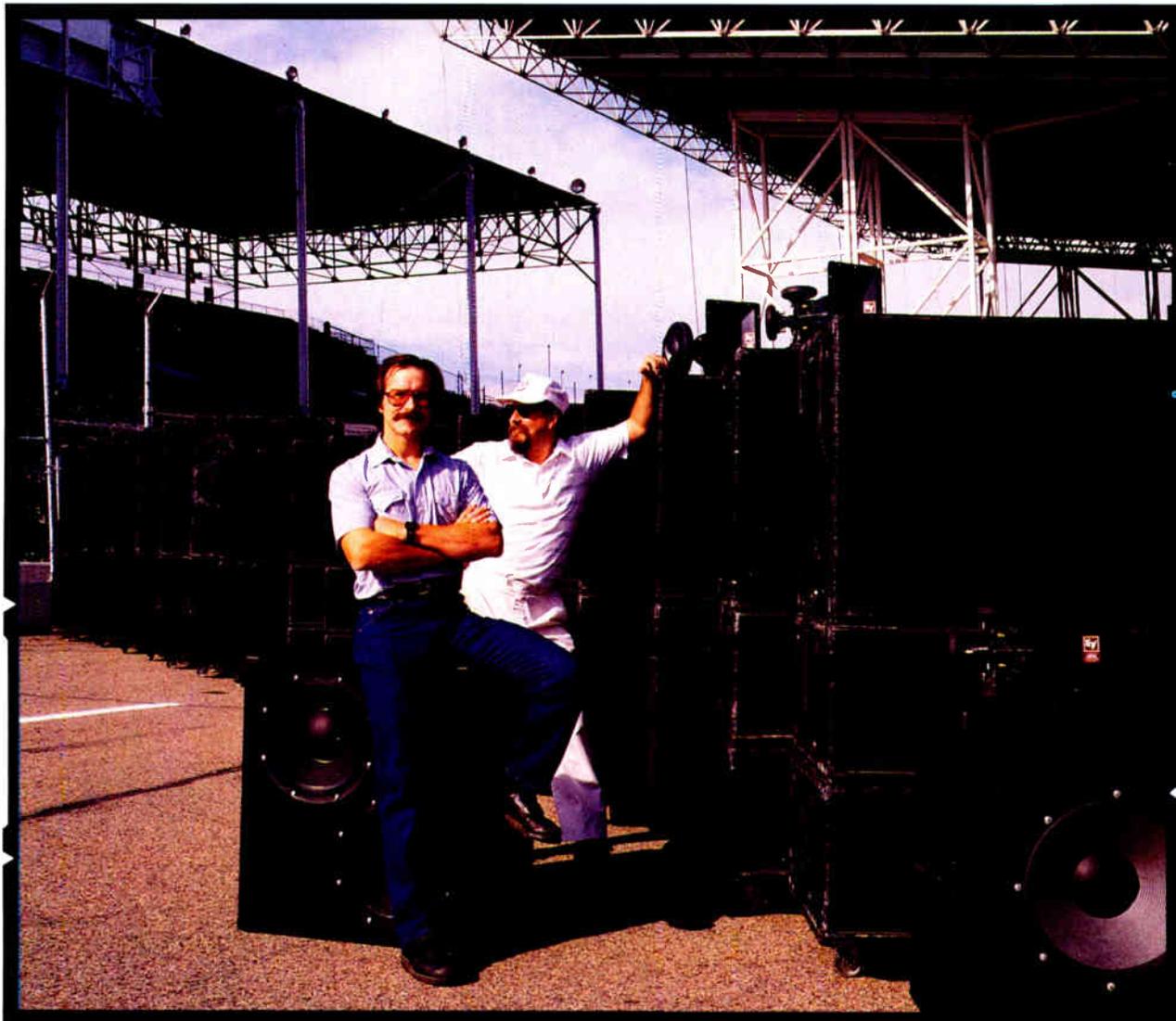
- **On the Exhibit Floor**
The exhibit floor in L.A. had more audio products for video, more digital audio workstation, and more. **54**

- **CHURCH SOUND Transformation**
On Friday it's a gym: on Sundays it's a church. **46**

- **Modular**
This Atlanta church sound system was designed and installed by Georgia Sound. **30**

MODELER UPDATE

Bose Modeler release 3.1 began shipping last summer. Mike Klasco begins his in-depth review of the new software, following up on his reviews of previous versions. Release 3.1 is a hit. **66**



“No speaker comes close to delivering the performance and reliability of the EVX.”

Art Welter, owner of Southern Thunder Sound Company located in Minneapolis, Minnesota, speaks from experience, “We’ve made it a point to evaluate every high-performance speaker available, but we always come back to Electro-Voice.” Southern Thunder, a regional concert sound company, provides sound reinforcement for events ranging from state fairs to rock concerts to church rallies, and almost everything in between. Major clients include comedian Bill Cosby and jazz violinist Jean Luc Ponte.

The company uses EVX woofers in their proprietary L-4 and subwoofer cabinets, designed and manufactured by Welter Systems. “We’re really happy with the development of the EVX speaker. They clearly outdistance the competition and provide much better reliability than any other speaker on the market.”

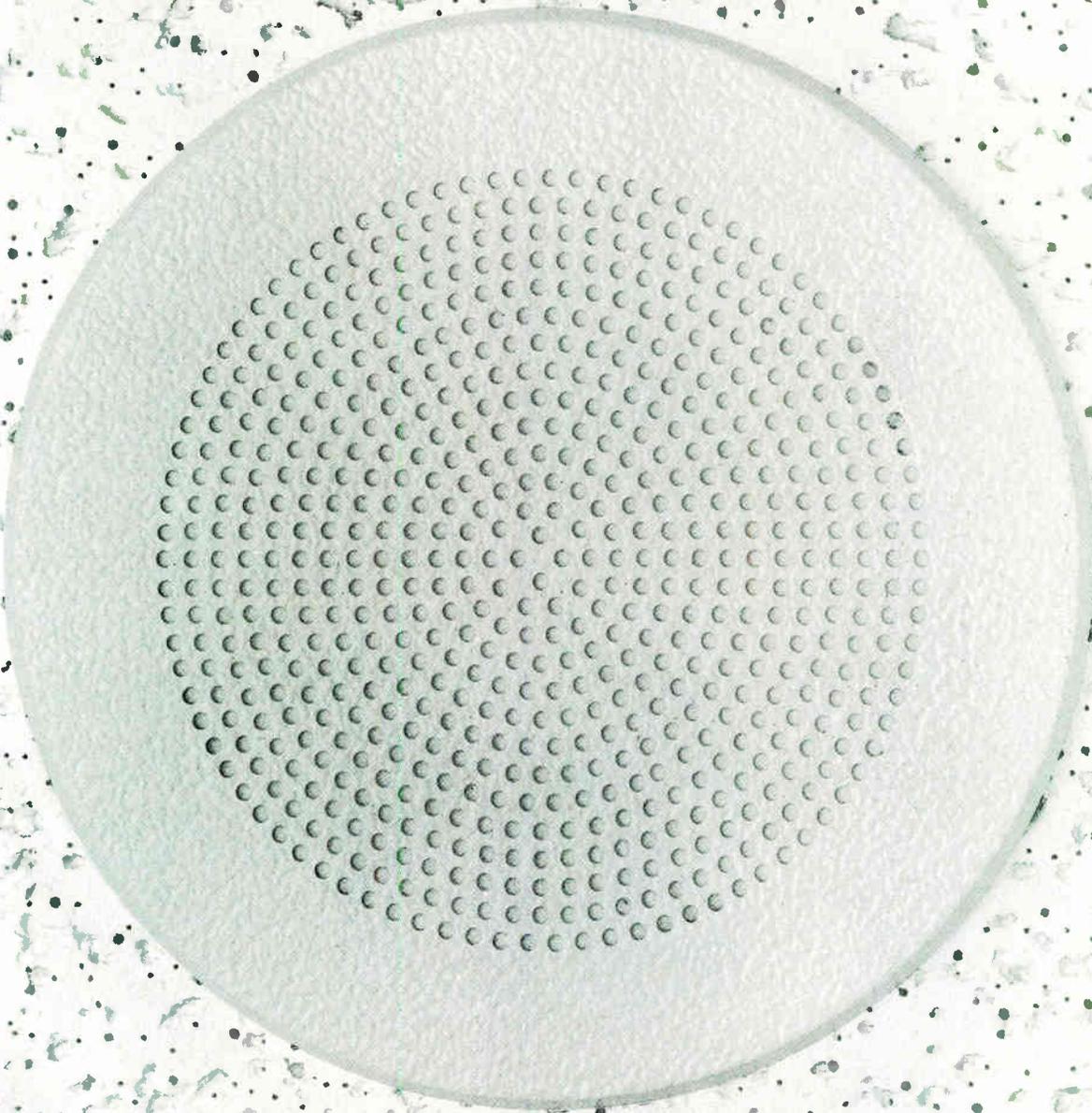
When it comes to power handling and efficiency, EVX’s have no competition. Electro-Voice’s exclusive HeatWick™ design efficiently dissipates heat, providing power handling capability of up to 1000 watts while delivering extremely high output and low distortion.

Join the ever increasing list of EVX converts and find out what Art Welter already knows. “Nothing comes close to an EVX.”

For additional information, literature or technical assistance, please contact Ivan Schwartz, Electro-Voice concert sound marketing manager at 616-695-6831.



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Committees and Shows

First off, I want to congratulate Mike Klasco — and the industry at large — for the formation during the AES convention of the Acoustics and Electroacoustics Standards committee with Mike as its chairman, and David Klepper as vice chairman. I think this a historic move.

SOUND & COMMUNICATIONS facilitated a meeting during AES of software developers and other interested parties to follow up on the first productive meeting during NSCA.

Out of that meeting came the establishment of the overall committee with working Subcommittees on Speaker Measurements, Materials Measurements and Architectural Acoustics CAD transfer. The participants in that early morning group headed by Mike deserve congratulations, as does the AES, for the incisive bringing together of all interested parties to impact upon the future of the audio business. You can read Mike's column on the subject in CAD Topics in this issue.

The AES Convention

A propos of the AES, the 89th convention in Los Angeles was by most accounts a success. Ron Streicher's handling of the convention was respected, and the mood was upbeat.

AES-TV News was on the air with a new show each day of the convention. This television news program is, as most of you know, produced by Testa Communications and written by the staff of SOUND & COMMUNICATIONS magazine. AES-TV News was able to bring AES attendees the news first — in their hotel rooms — of such stories as Siemens acquiring AMS, AKG acquiring Quested Monitors, and Otari acquiring King Instrument; in addition to product news such as the advent of new DAT machines — by JVC, Otari, along with products first seen at NAB from Sony and Panasonic. Technical seminars on these news programs included one on Architectural Acoustics (excerpted in this issue); one on Digital Workstations; and one on computerized room design pro-

grams. Copies of AES-TV News are available from the office of the publisher of SOUND & COMMUNICATIONS.

CEDIA

Speaking of conventions, a new one has come into our lives. CEDIA, the Custom Electronics and Design Installers Association, held its first Management Seminar in Amelia Island in mid October, and over 300 custom installers of residential media equipment attended. Among the more glamorous demonstrations were a full demo of the Technics THX system, the Sony Digital Transfer System, and the new Soundstream system, all of which we have



AES-TV News' Emmy-Award-winning director Judy Matthews and videographer Ben DeLuca shoot Steve Krampf of Waveframe.

written about in these pages. On the floor of the show were new products by Harman Video, Memorex (yes, Memorex) and Middle Atlantic (cosmetically snazzy racks for residential systems) and many other companies. We will be following up in these pages in future issues on the concerns of those who attended, those who exhibited, and those who wanted to attend but didn't.

Judith Morrison
Editor in Chief

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Sound & Communications • DJ Times • Post
Sound & Communications Blue Book
The Music & Sound Retailer • The Retailer Red Book
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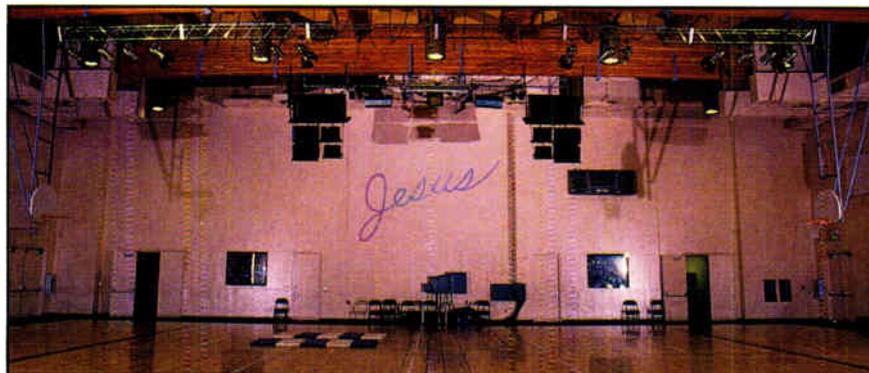
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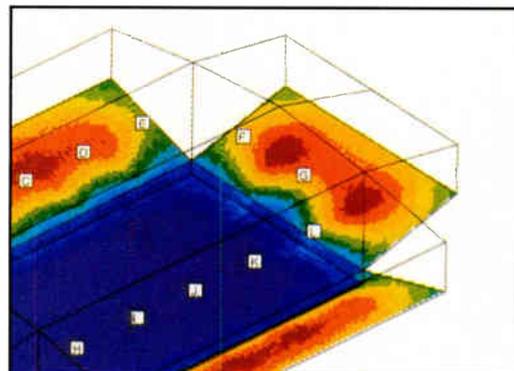
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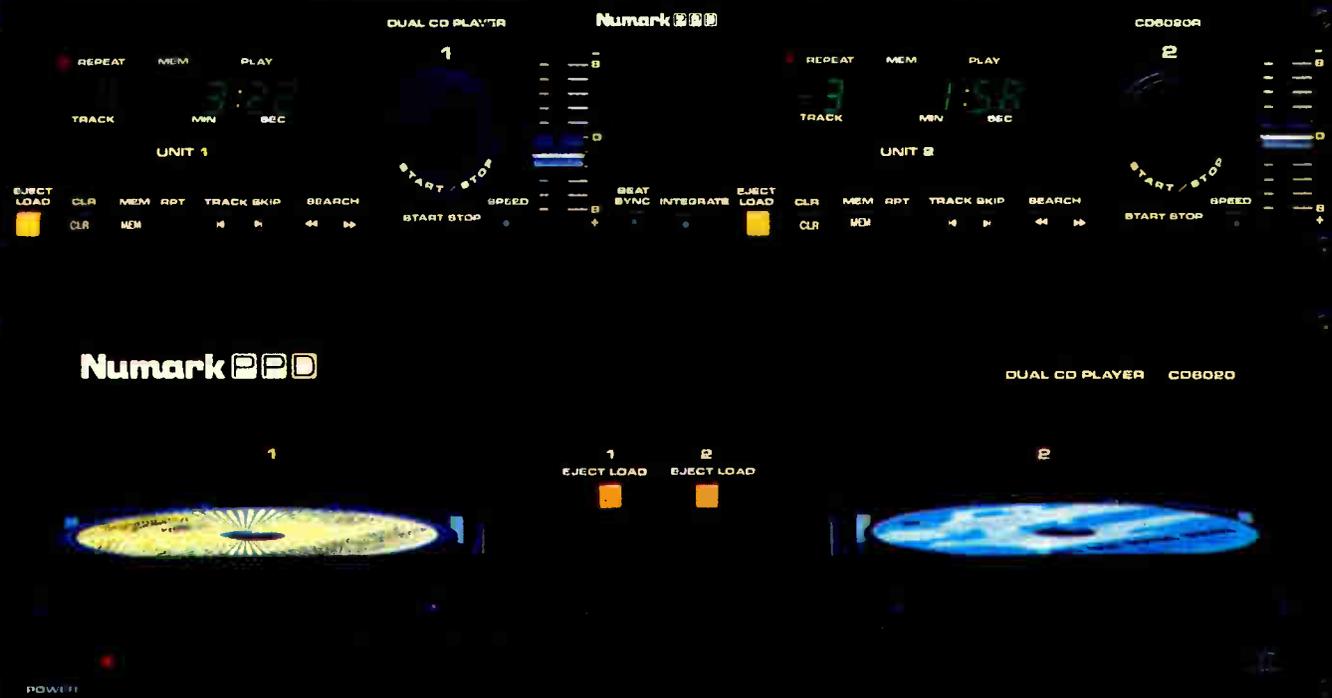
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COMMUNICATIONS

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A professional CD player that does the work of two.

Introducing Numark's Dual-Transport CD Player

Finally, there is one CD player that satisfies the mixing needs of DJs, club owners and professional sound installers... Numark's CD6020. This revolutionary player features two CD transports in a single unit. So now, with a single player system, CDs can be mixed with the same ease as LPs.

The CD6020 consists of two 19" rack-mountable components—a control unit that can be mounted neatly in the mixer console, and a transport module that mounts in an equipment rack. This design ap-

proach enables sound contractors to upgrade existing club installations to CD without touching the turntables.

For hands-free mixing, the CD6020 features Numark's patented Integrate™ feature. Push a button and it ping pongs from one disc to the other, playing programmed selections from each disc automatically, and without interruption. There's also Numark's patented Beat Sync™ feature that automatically mixes from one disc selection to another while matching the beat structure of both discs for perfectly-

matched, beat-synchronized mixes.

The CD6020's control panel features two sliding pitch controls for varying the pitch of each disc $\pm 8\%$. A matching set of LED displays, large start/stop buttons, and a full complement of search, repeat, and memory functions provide total mixing and playback control!

So, if you are looking to upgrade your installations to CD, check out Numark's new CD6020 Dual-Transport CD Player. It's the only CD player you need to do the work of two... for a lot less.

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World Radio History



LETTERS

More on Wire, Survey and Redesign

The wiring battle continues. Although most of the responses to Alex Rosner's article arguing against "esoteric" wire and cable agreed with Alex, there are some other intelligent voices in the wilderness. In addition, our contractors' survey and recent redesign are still bringing in comments. —Editor

SKEPTICAL PRO MARKET

As a Systems Consultant for a reputable esoteric audio dealer, I took great offense to Mr. Rosner's "Guest Column" in the July issue of your magazine. The subjective and very personal tone of the article detracted from the intent of his writing. Obviously, Mr. Rosner is a professional/commercial audio engineer who really does not have enough experience with esoteric audio wire to write about it fluently. He joins a long list of professional audio engineers who have voiced their disbelief in better audio cables. Consumer audio, especially in the high-end market, has experienced esoteric wire for over a decade. The professional audio market only recently has begun experimenting with better grades of cabling. And as one can plainly see by Mr. Rosner's attitude, the pro market is filled with skepticism regarding this subject. And Mr. Rosner has every right to voice his concern. But he has gone much too far by implying in his article that all esoteric cables are worthless and that manufacturers and dealers of this type of cable are trying to dupe the American public.

Major developments in audio have always been greeted with disbelief. It took several years for solid-state amplifiers to gain acceptance. Even the compact disc medium has been assaulted by a number of analog fans. Esoteric audio wire has fought an uphill battle for appreciation.

Any part of an audio system can have an effect on the system's sound quality. And as with different amplifiers, speakers, etc.,

any reputable high-end audio dealer will make available without purchase obligation lengths of esoteric wire for in-home evaluation. This type of demonstration is much more practical than the double blind tests that Mr. Rosner advocates in his article.

Esoteric wire is not for everyone. I certainly wouldn't recommend thousands of dollars of high-end wire for a simple \$800 or \$900 system. That would be equivalent to mounting high-performance racing tires on an economy car. Nor would we recommend 18-gauge zipcord for a \$10,000 speaker system.

Mr. Rosner would have better served his readers by addressing the question of the need for esoteric wire in the professional/commercial industry. With four years experience as a commercial installer prior to my consumer involvement, I believe that high-end wire is not a necessity in a great many pro/comm installs. Horn-loaded sound reinforcement systems that offer good intelligibility and reasonably good fidelity may not have the resolution to take advantage of the sound quality of better wire. The same could be said for generic BGM ceiling-speaker systems.

In the last paragraph of his article, Mr. Rosner issues one statement that I agree with: "So don't believe manufacturers. Don't believe dealers. Don't believe me. Find out for yourselves..." I encourage anyone considering esoteric wire to let their ears be their guide.

Greg Dieckhaus
Systems Consultant
Audio Consultants
Hinsdale, IL

KUDOS FOR SURVEY

I'd like to congratulate Sound & Communications on a job well done. Once again your annual Survey of Sound and Communications Contractors (July 18, 1990 issue) has proven itself an invaluable resource for professionals who design, specify, sell, and install sound and communications systems.

The industry needs this type of information — and few groups go to the lengths

that Sound & Communications does to compile the data.

Your survey states that "sound contractors have positive expectations for the future" (page 44). Dukane Corporation appreciates the opportunity to be included in that future, as much as we appreciate the good reviews we received from survey participants. To see Dukane listed among the top selling, most reliable sound product lines, and our sales representatives named among the most competent, was very rewarding. It's nice to know that during our 60 plus years in the sound industry we have built such a favorable reputation/relationship among sound contractors, distributors, etc.

I thank all those who participated in your annual survey for their continued support and confidence in Dukane Corporation, and I thank Sound & Communications for the ongoing commitment to provide your readers with the latest trends and technology available in the sound contracting industry.

Steven L. Deppe
Communications
Systems Division
Dukane Corporation
St. Charles, IL

EXCELLENT WORK

I would like to congratulate Sound & Communications for the excellent work done in 1990. I especially like the new look of the magazine starting with the September issue. It is easier to read and the ads stand out better.

I have been analyzing the contents of the magazine for many years, and the September issue contains so much information about the commercial sound industry.

You have made many changes forward in recent months and improved the quality of the magazine in a rather short time. It is so important for the industry to have quality publications to represent itself, and you are a driving force in this regard.

Hiko Shinoda
Telecall
Communication Systems
Redmond, WA

MANUFACTURER'S REPS

By Joel H. Schwartz

Smart contractors would never leave money on the table in a bid situation....right?

Why, then, do so many of these same contractors leave services on the table when dealing with their manufacturer's representatives?

Good reps offer many services and value-added benefits to the products they handle. These special services and benefits are available to you just for the asking!

Unfortunately many contractors are unaware of these assets and don't understand exactly what reps can (and want) to do for them, other than "sell" them something.

What, then, are some of these value-added services contractors should look for and receive from their reps?

EASE IN DOING BUSINESS

Unlike direct factory salespeople, representatives always carry multiple lines. The contractor benefits by being able to buy related products from a single source ... in effect, "one stop shopping," instead of spending time with a factory person who sells only one product, (for which the contractor may or may not have an immediate need). One representative can offer availability, knowledge and many lines, any of which can fulfill the buyer's immediate and/or long-term needs.

The value of Multiple Line Selling (or buying) goes much further. Reps are typically very good at integrating the lines they sell and expanding systems applications. And because the rep is familiar with so many products, sources and applications, a single phone call can often uncover that elusive item or bit of information that permits the contractor to bid a job, look up a spec or complete an installation and

get paid.

Moreover, if a rep doesn't carry the particular brand or product needed, he usually knows someone else who does and can help get it. The rep's competitive knowledge and library can come in handy when a contractor's salesperson or engineer needs to quickly cross reference part numbers for a bid.

Reps often serve as a catalyst or ombudsman in the contractor-manufacturer relationship. At times, misunderstandings and poor communication of needs, problems and objectives between the two parties create situations jeopardizing their ability to work together. Reps, who know their contractors intimately from years in the territory, will go to bat for them with the right factory people.

Unresolved credit problems, poor deliveries, unclear distribution policies, unreasonable ordering or inventory expectations, misused sales aids, field assistance and repair problems are daily issues that reps can help resolve.

Surprisingly, reps can do the impossible sometimes by expediting delivery of urgently needed orders. Reps regularly check purchase orders, confirmations and factory acknowledgments to ensure that correct products are ordered and shipped. Orders are checked against current manufacturer promotions to make sure contractors get the best possible deal. Credits and repairs are also monitored and follow up is undertaken immediately if needed.

Daily communications with a host of people at their factories alerts the rep to shipping delays, shortages, quality problems, engineering modifications plus upcoming price and policy changes. The rep who's ahead of the game can often steer contractors away from potential difficulties.

Special quotations, technical inquiries, layout requests, demo samples and field assistance are other examples of value-added benefits that may be provided by the

rep or coordinated with his factory on a timely basis.

Manufacturer's advertising leads and referrals are also generally channeled through the rep to contractors who will pursue them aggressively and report back results.

Good reps use every available opportunity to train their customers in the sale and use of the products they represent. It's just good business. When permitted to run an internal sales or technical training meeting for contractor personnel, or their end-user clients, reps are often able to discuss emerging technologies and product applications by integrating the new with their existing product categories.

Team sales calls with reps and contractors are growing in popularity and in value. These joint visits to major contractor clients or specifiers provide hands-on training for contractor salespersons plus the added prestige of factory support for the contracting company.

AN INTIMATE WORKING RELATIONSHIP

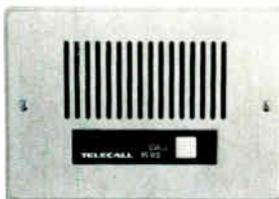
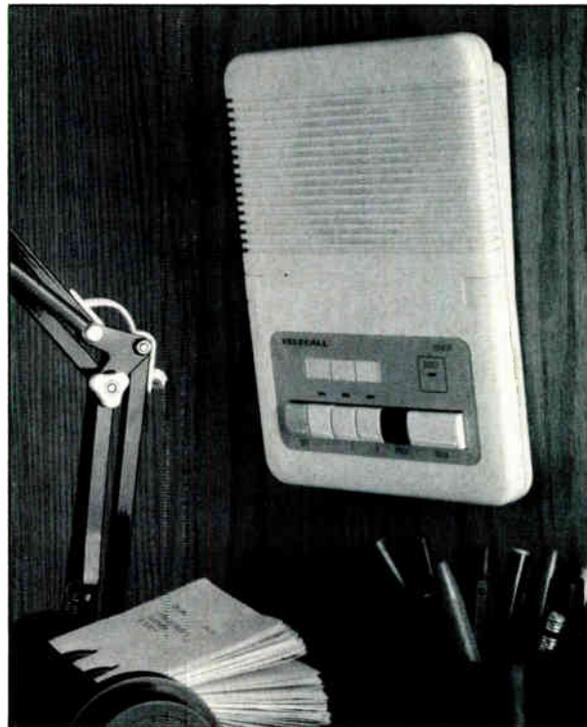
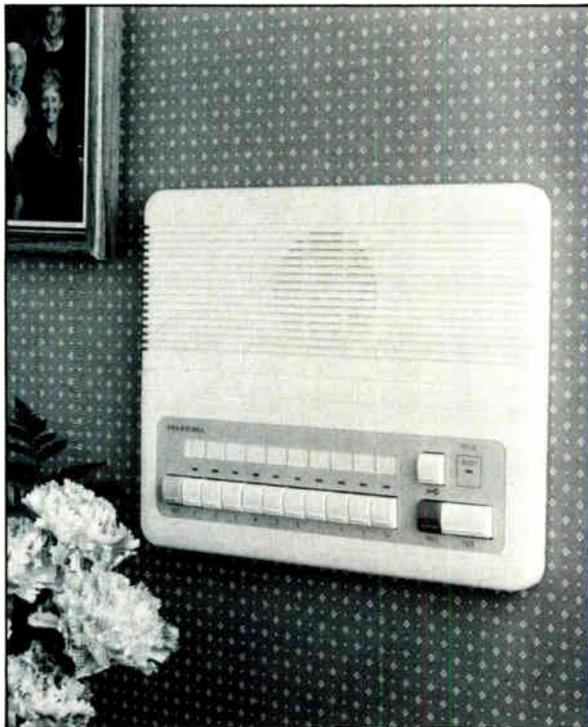
Good reps know their market and customers thoroughly, and have a long-term commitment to their territory, so they work to establish intelligent and practical long-term distribution patterns within the parameters set by their manufacturers. The rep, knowing his contractors' needs, interests, capabilities, and areas of expertise works closely with both parties to properly match contractor and product for mutual gain.

Today, larger numbers of contractors, as well as manufacturers, have discovered the multiple benefits available through a close working relationship with their rep and have used these services.

So, if you're not getting or using your fair share of these rep-provided benefits...shame on you! You definitely are "leaving services on the table." ■

Joel Schwartz is President of LCA Sales Co.

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NEWSLETTER

MARK IV BUYS KLARK-TEKNIK

Sound & Communications has learned that Mark IV Industries has reached an agreement for the acquisition of Klark-Teknik PLC in a cash tender offer valued at approximately \$22.4 million. The terms include an option for Mark IV to purchase 80 percent of Klark-Teknik's stock, which is currently held by management. Klark-Teknik has sales of \$20.7 million for the fiscal year ended July 31, 1990. Sal H. Alfiero, chairman and chief executive officer of Mark IV, said, "The acquisition of Klark-Teknik enhances the Mark IV Audio group's European manufacturing capability in combination with Dynacord," the German firm which was acquired earlier this year. At press time, no further information was available on the place of Klark-Teknik within the structure of Mark Audio, or on the reaction of Klark-Teknik management.

BASF — AGFA AGREEMENT APPROVED

BASF has announced that Germany's Federal Cartel Office has approved the acquisition by BASF of the magnetic tape business of Agfa-Gevaert AG. The acquisition includes sites in Munich, Berlin, and Avanches, France. The transaction becomes effective, provided the respective corporate boards approve, on January 1, 1991.

AKG ACQUIRES QMS

AKG Acoustics Limited has acquired Quested Monitoring Systems the studio monitor company founded in 1985 by Roger Quested who remains with the company. The acquisition follows the purchase of controlling interest in Edge Technology, Ltd. by AKG Ltd.

NAMM DATE CHANGE

The NAMM summer show for 1991 has had a change of dates — to August 1 through 4, 1991. The venue remains the Jacob Javits Center in New York. The new dates reportedly allow NAMM more space.

SOUNDPROOFING STUDY UNDERWAY

Acentech Incorporated, CityDesign Collaborative, Inc. and Salazar Associates are managing a residential soundproofing demonstration program for Sky Harbor International Airport in Phoenix, Arizona. Directed by the Aviation Department of the City of Phoenix, the demonstration program will evaluate aircraft noise mitigation measures for up to 20 affected homes in Phoenix and Tempe communities near the airport. The program is due to be completed by the end of 1991. Acentech is a wholly-owned subsidiary of Bolt Beranek and Newman Inc. and is located in Boston. CityDesign Collaborative is an architecture and urban planning firm in Cambridge, MA. Salazar Associates is a Phoenix-based architectural firm.

SMALL BUSINESS AWARD PRESENTED

Leigh Johnson, owner and president of Custom Communications Inc., was named winner of the Small Business Award by the Rochester [Minnesota] Chamber of Commerce. The sound and security installer began business in 1968.

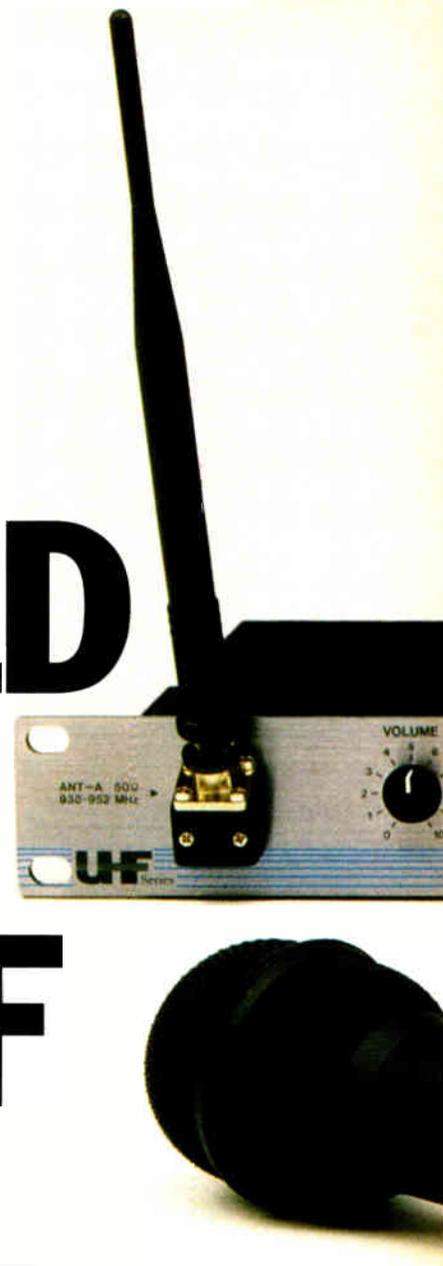
INFOCOMM MERGES WITH ITVA

Infocomm International and the International Television Association will combine their annual industry meetings in 1993. An agreement, concluded this fall, states that ITVA will hold its International Conference as a part of Infocomm International to form what the sponsors call the leading video production, presentation products and multimedia convention and trade show in North America. Infocomm is produced by the International Communications Industries Association and the Association for Educational Communications and Technology. Leaders of both Infocomm and ITVA predict that in 1993 the combined event will attract more than 15,000 participants. In the interim years both organizations continue to hold their events separately with ITVA in Boston in 1991 and Seattle in 1992, and Infocomm in Orlando in 1991 and Washington, D.C. in 1992.

RUHNKE JOINS MENELL

Bill Ruhnke has joined Menell Associates in New York as a Design Engineer. Menell Associates is the consulting division of Media Facilities Corp. Ruhnke has over 15 years experience in media technology.

EIGHT THINGS YOU SHOULD KNOW ABOUT UHF WIRELESS.



UHF's time has come.

With the introduction of the Samson UHF* Series, we thought it might be helpful to provide you with new information about this technology.

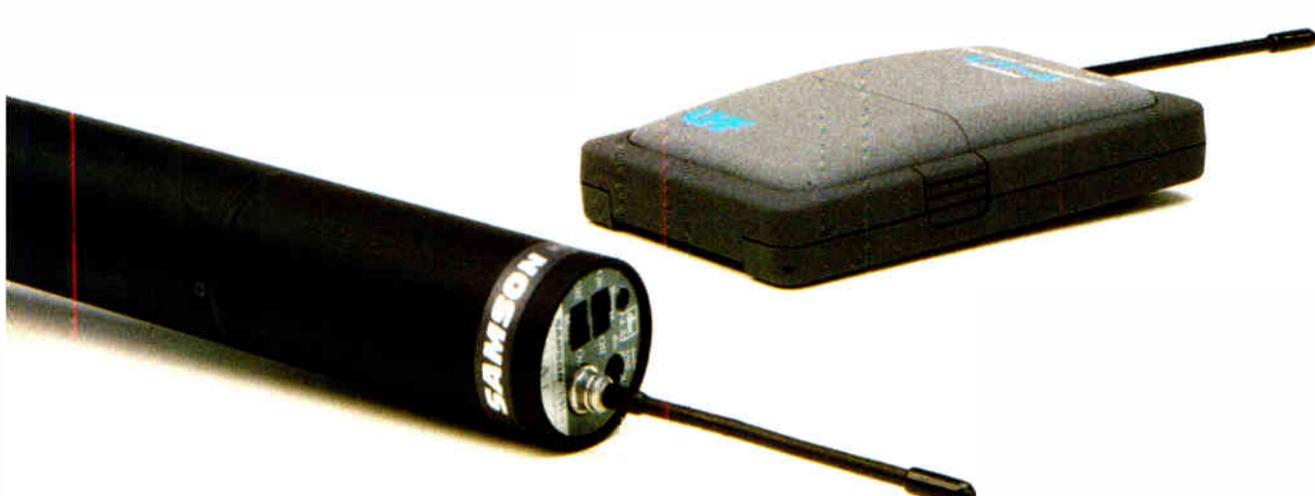
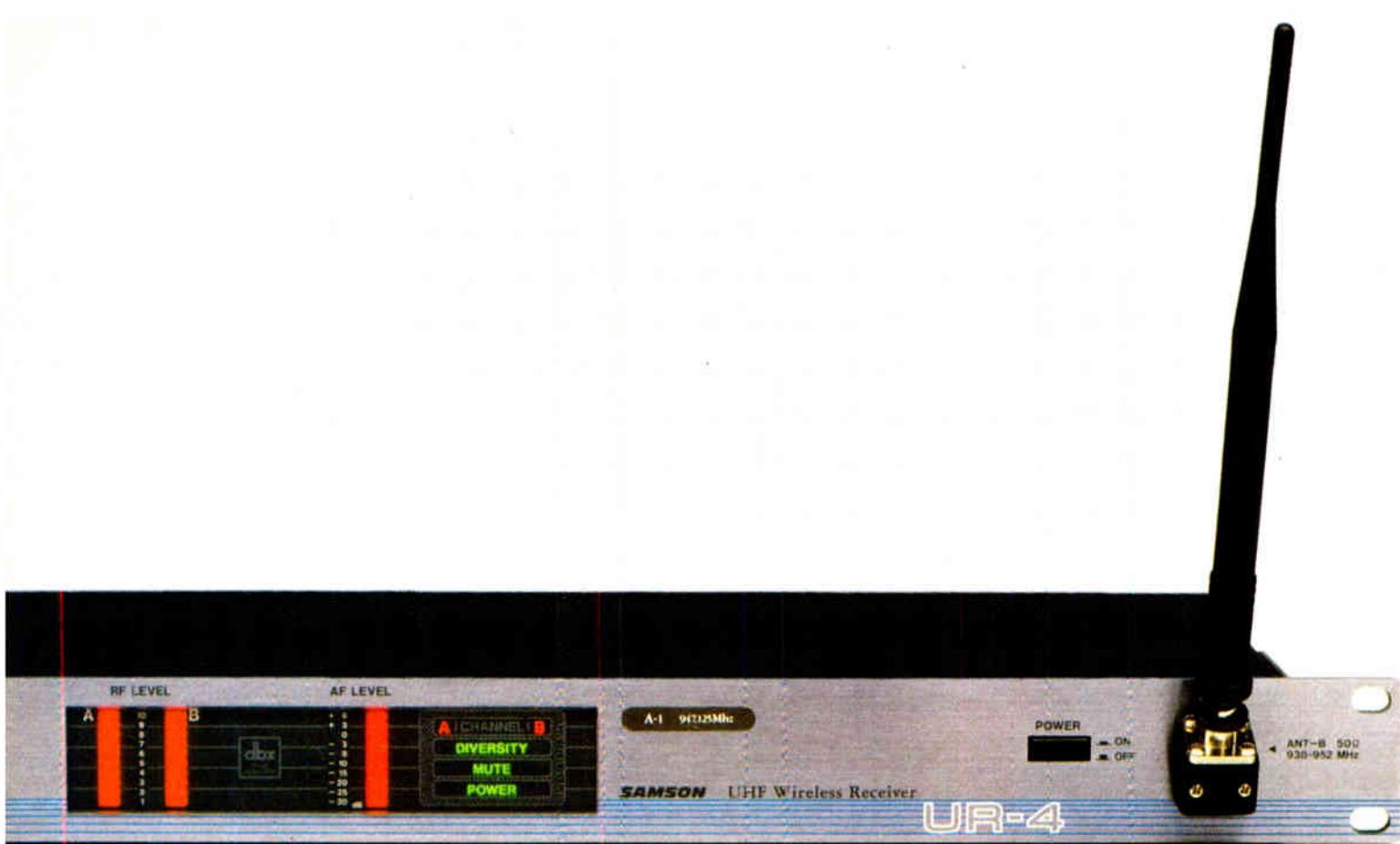
1. UHF gets better reception. Yes it does, in the sense that UHF operates at the higher frequency range of

902-952 MHz. There is a lot less *traffic* up in that bandwidth. And, more importantly, less RF interference and noise.

2. New UHF technology has recently been made available. For the UHF Series, Samson put four of our finest wireless engineers on the case. Using up-to-date developments like Di-Electric filters, Gas-Fet and new cellular technologies, they were able to bring UHF up to a higher level of performance.

3. UHF sounds better. A dangerous generalization perhaps, but it *does* have wider RF dynamic range. And because we're the first to use dbx† Noise Reduction in UHF, the resulting audio quality is even more impressive.

4. More frequencies are available. Samson offers seven UHF frequencies that can be used simultaneously. If you're already running a lot of VHF on stage, you can place our UHF frequencies on top of these without any interference.



5. Samson UHF offers more microphone options.

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8. Write for a free Samson UHF White Paper. Find out more about UHF and one company's approach to this exciting technology. A higher method that promises clearer reception for everyone in the wireless future.

In case you were reading too fast, we wanted to remind you that this ad is about UHF, not VHF wireless.

© As long as you are reading our ad this closely, we thought we'd tell you who they are: Yukinaga Koike, Doug Bryant, Takao Horiuchi and Susumu Tamura.

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Signal Processor Trends

The Possibilities Are Endless in the Fixed-Installation Market

BY RICHARD J. GRULA

The fixed-installation market of professional sound contractors is a field where anything seems possible. On one hand, leading-edge concepts in modular system design, self-adjusting computer-controlled digital processors and system-diagnostic software are close to — if not already — reality. On the other hand, demand and preference for traditional analog signal processors remains strong.

To understand processor trends in this market, *Sound & Communications* went to the source—equipment manufacturers who are currently designing tomorrow's gear. Interestingly, we found that the actual processing is not going to change nearly so much as the system organization, communication and control methods.

With most segments of the professional audio marketing turning digital, it's not surprising to hear some manufacturers say the binary world is the future for the fixed-installation field as well.

"Ultimately, it's going to be everything digital with all aspects of signal processing integrated into one modular system that's in one box," says Mark Lewellyn, sales applications engineer for IED.

"In the next couple of years, digital is going to be mandatory," agrees Chuck Lange, v.p. of sales and marketing for

Altec Lansing. "There is a demand for higher fidelity and I have no doubt in my mind you get a higher quality sound using digital."

But not everybody shares Lange's faith in the audio quality of digital processors.

"Getting into and out of the digital domain is not, on a performance basis, as good as analog implementation," counters Jack Kelly, president of Klark-Teknik.

"The user will want to be able to undo the locks and modify things themselves."

"Digital converters still don't have the dynamic range you have in a conventional analog equalizer. It's inherently good at crunching numbers for delays and reverbs, but there are usually trade-offs in performance. If you want to reduce those tradeoffs, you pay for it in price."

"We have to remember that live sound is analog," offers Larry Winter, v.p. of marketing for Rane. "When there's a reason to do a great deal of storage — delay or reverb — then the trade-off to digital is to your advantage. But in the case

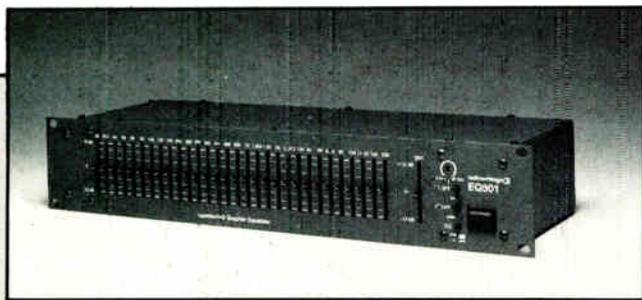
of real time signal processing, the story changes. Once you factor in costs for the A/D, D/A conversion and the anti-aliasing filtering plus the dynamic range limitations, noise and distortion, you wind up being able to build an analog unit using good components that exceeds your digital spec, with greater dynamic range and lower distortion. We make a studio grade parametric that's quieter than 16-bit digital."

"Analog is here to stay," adds Norm Kinnaugh, applications engineer of IRP. "The big thing that's coming is the computer control of analog processors."

That mixture — analog processors with a programmable, digital interface — is a blend many manufacturers see as the most important benefit of digital because, as Steve Romeo, market manager of JBL Professional explains, "Going digital has nothing to do with sound quality. It's about flexibility, programmability and freedom from user interference."

What are the practical benefits of programmable digital control? In a direct analogy to the MI industry's use of MIDI, it all depends on how much programming is done.

"EQ could be automated to the extent where it would automatically change depending on if the room is full or empty,"



The Advantage EQ 301 by Biamp is a 1/3 octave 30 band graphic equalizer.



The Ashly CL-100 half-rack compressor/limiter.



ART's MultiVerb LT, sixteen bit digital multiple effects processor.



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says William Ray, president of Quest Marketing. "And it will do it without obnoxious pinknoise being pumped into the place. That technology exists, it just hasn't been applied very much."

"End users could easily manage their systems under different circumstances," says Chuck Lange. "In the case of a church, the contractor could separately EQ the main church, the Crying Room, the parsonage. Then it would all be fool-proof so from a central location, an inexperienced operator would only have to push this button for application one, this button for application two and so on. All the amplifiers and signal processors would be preprogrammed and stuck in a closet somewhere out of sight."

The security benefit of digital programmability is also an important one, as contractors demand systems that prevent presumably ignorant end users from altering a tuned system.

"Our programmable units have two or three different levels of electronic lock-out that require a code," says Larry Winter. "They can be locked completely so that no buttons are operative, or programmed so that only two or three programs can be changed. Contractors don't want nuisance service calls every time some band member who thinks he's an expert at EQ comes in and changes settings. If you keep inquisitive fingers out of the stuff, you're less likely to have problems."

"Of course there's status monitoring, whether in-house or remote," adds Steve Romeo. "A system could be set up to give itself a diagnostic check and if anything's wrong, a chip could be programmed with a voice message like *Amplifier three is out*. Contractors could come to the site, plug in their PC and see what's going on with the system. Ultimately, the system could dial the repair station and leave a voice message giving the location and the problem."

Of course, the modem could also be used in the opposite direction.

"Any computer-controlled system we put out comes with a modem," says Mark Lewellyn. "If the end user ever needs support, he hooks up the modem and we call in to work on the system from our

factory."

Three major problems stand in the way of widespread use of digital programming and computer control — price, education and standards.

"A new technology has to come down to the price level of the average user before it becomes an all-encompassing

technology," says Bob French, senior v.p. of sales and marketing for Ashly Audio. "Even if a new technology is something everybody wants, it might not be something everybody feels comfortable using. How many people out there have VCRs they can't program that still blink 12:00? Sound contractors are the same."



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“One of the basic problems of our industry is that there are no standards,” offers Ralph Lockhart of Biamp. “It goes way beyond digital interface — it gets as fundamental as which pin of an XLR is hot and which is ground. We need to standardize and it may very well be that digital communications will be the catalyst that makes it happen.”

Regardless what style of digital communication is used (RS-232, RS-422, MIDI, etc.), its implementation raises more questions about the look of signal processors and how they function. Will they still be designed as standalone units that interact with an unlimited number of other units (regardless of manufacturer) via digital communications? Or will they be closed, modular systems, easy for the contractor to organize and repair, but with

limited capacity and unknown compatibility with the products of other manufacturers?

Well-known throughout the industry, the TOA SAORI programmable signal processor is a current benchmark of the latter. In it, signal processors are reduced to microprocessor modules (something like

“The big thing that’s coming is the computer control of analog processors.”

PC-boards) and slotted into a mainframe which includes a 32x32 bit digital processor, power supply and master control unit, which has a 240x64-bit backlit LCD and various function keys. The signal goes through only one A/D, D/A conversion, which minimizes sound degradation.

TOA’s view is toward simplicity — with self-diagnostics. The SAORI checks its status 120 times a second; replacement products are installed via two screws and are reprogrammed in 15 seconds. Systems currently being speced for four or five SAORIs may specify a spare head.

Other manufacturers envision future systems similar to this, but most with the capability to use a generic PC as the control center. In theory, an end user would minimize costs by only having to purchase the exact modules needed. But that’s not always the case.

“Originally, modular construction was to save the client money,” says William Ray. “It seems to make sense if you have only one power supply for four to six modules; you’d save money. But the additional tooling costs of making frames and supporting PC cards in a sturdy way more than offsets the savings from additional power modules. The modular approach has become one of convenience to the installer. He can repair things quicker and move things around, but it doesn’t offer any savings to the end user.”

Plus, as Larry Winter notes, “You have to decide up front how big and complicated this thing can possibly be, then you have

to build the hardware and capability to support the biggest need. The microprocessor and the software have to be able to handle the demand of the most complicated systems possible. So even if the end user doesn’t have to buy into the whole system, they’re paying for a lot of system capability up front.”

Other manufacturers expressed concern about the vulnerability of such a system to failures in specific boards or the single power supply.

“If you get a power supply failure in a unit like that, it could be catastrophic,” warns Jack Kelly. “If you use one supply for the crossover, the EQ, the delay, and that supply goes — Bingo — the whole system goes.”

For Bob French, the lack of patching alternatives, should one signal processor fail, could yield results similar to a string of old Christmas lights going dark when one bulb burns out. “If you can’t patch around a portion, it’s pretty much an all or nothing proposition.”

“Our gut feeling is we’d rather see individual, dedicated units that do their functions and have communications buses between them,” says Rolf Goehler, principal engineer for the Communications Section of Dukane. “It gives us better flexibility in terms of system size. Once you constrain yourself to a system of seven 7-inch slots, you take away your flexibility in terms of bridging back over to analog.

“Originally, modular construction was to save the client money.”

You’re saying you’d put *everything* in these same shape/form cards that slide in. Another aspect is you have one source of ac and you really have to duplicate all your rectification and dc voltage creation on every board anyway to try and minimize crosstalk and cross-coupling. It eventually restricts you in true flexibility, from a power standpoint.”

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Some manufacturers wonder if the idea of a PC brought in by a contractor to control a rack of blank, knobless signal processors will go over with users notorious for their need to tinker.

"The general inconvenience will be a problem," says Phil Betette, president of ART. "More and more places, to save money and to have some control, want to be able to modify some of their systems themselves. I know the contractor who installed it hates that, but some people still want control. There may be lock out and security codes, but the user will want to be able to undo the locks and modify things themselves."

Though Betette envisions a need for the PC-controlled system in some locations, he envisions knobless signal processors that combine all similar functions — delay,

reverb, pitch transpose, etc. in one box, with different kinds of equalization in another box. "I think there will be LCD on the unit with mode switches," he says. "Mode one will be delay and all the delay parameters will flash on the LCD. Mode two is pitch transpose or time delay. I think people want the creativity of being able to combine capabilities of the person and the processor."

"We're looking into implementing a system where a computer could generate the EQ response and at the same time it could have manual override," says Jack Kelly. "A computer can't give you all the information a person sitting in a room and listening can realize in a single instant."

Of course, for many end users, these trends are moot points. All they want to know is *Does it do what I want?* and *How*

do I work it? If the abilities of the contractor are up to snuff, the answer to the first question will be Yes. The answer to the second question will depend on results of all the industry debates now raging. The only thing for sure is that improved human interfaces will make systems outwardly less complicated and generally easier to operate.

"It will be akin to computers," predicts William Ray. "When they came out, they were overly complicated, as were sound systems and signal processors. Just as with computers, as the technology develops, the complexity remains, but the human interface develops to the point where it's very simple with only a few controls. Eventually, you'll have a very comfortable, non-technical user interface for the operator. ■

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Special Environments

A Survey of Some of the Latest New and Upgraded Jobs

No job is a piece of cake, but sometimes the special demands of a particular environment give more pause for thought. We surveyed some of the jobs being done and upgraded now — some big, some more run of the mill, and came to the conclusion that no job is run of the mill. Noise, timing, location and all the vagaries thereof go into the consideration of sound and display systems. And some people are using special applications to either promote their businesses or develop a name for themselves in specialty installations.

ELEVATOR SOUND

Talking elevators have become almost commonplace, at least for consumers and for some companies such as 360 Systems, working through contractors such as Maryland Sound. Elevators expand into moving sidewalks, and theme park rides, but the philosophy and equipment is the same. The elevator becomes a miniature theatrical production, with scenery, control room (even if it's the roof of the elevator), recording, sound effects, and microphones for interactive behavior.

Although a single reproducer card for a 360 system records 90 seconds of digital audio, cards can be cascaded, and are, so that at the Sands Hotel moving sidewalk for instance, 15 minutes of audio is available. No ride through the skywalk gives the rider a repetition of what he's heard before.

At a Shell Oil plant, digital messages are routed to the local radio station, for use in an emergency warning system. Earthquakes, rabbits (as in Roger), and other cultural events are reproduced digitally with 360 Systems equipment (that can go down to 5 Hz) for messages that assault



The Herr Foods visitors center in Nottingham, PA, was installed by Glick's Commercial Sound.

the ears and the body.

360 Systems becomes a recording facility for messages. The company burns in the audio material into EPROM, transfers the master into digital audio, and configures the board. Frequently, for smaller clients, the company can recommend the talent for the voiceover. With equipment

in the ceiling of the elevator (minimizing cable needs) and digital audio from the speakers, the elevator becomes a theater.

Some of this is being picked up by what can only be called audio artists. For instance Chris Janney of Phenomenarts specializes in audio happenings. His elevator installation for Arquitectonica has been in the Miracle Center for the past year. As you move through the elevator your body assaults motion sensors which trigger playback of audio and video program material. Four glass elevators face an 8,000 square foot curved wall that accepts visual material with different scenarios for each elevator — a jungle, an urban environment. Equipment inside the elevator includes a pitch transposer with delay — and live microphones for recording the passengers own voice.

Even ersatz elevators are including sound and video. "Unearthing New York Systems Elevator" is a new exhibit sponsored by South Street Seaport Museum at 17 State Street in New York City. The project is part of a museum done in collaboration with Spiegel-Horton Inc. and Milton Glaser. The entire elevator including computer program and effects are the creation of SMA Video. The just-opened exhibit takes the passengers down four centuries to the earth below the city. The compartment simulates an elevator through the use of audio and video program material, the video showing through mesh doors on the elevator and featuring life-size archaeologists. SMA used Dolby surround, five Polk Audio speakers and an NEC subwoofer, with a Barco projector put on its side (due to space constraints) for the video. A live camera is included in the installation to shoot the "passengers."

The entire project — software and hardware — was done by SMA, with the production recorded originally on Beta SP, edited on the D1 digital tape format and transferred to a WORM laserdisc, played on a Sony PCM model.

Since the elevator installation is situated next to the machine room for the skyscraper of 17 State Street, random noise was thought to be a possible problem. SMA recorded the machine room noise on DAT and incorporated those noises into the sounds of jackhammers, etc. (also on DAT) that simulate the sound of the archaeological dig. The sounds of the machine room now just blend in with the production.

SHIP'S BELLS

Burt Kronfeld does ships. His firm, Wavelength Systems Design has been doing sound systems for ships for the last 13 years. Having completed the Crystal Harmony in July, the firm is now working on Crystal Harmony II, and on several conference type catamarans for the Radisson Diamond Cruises in Finland. Ships stand as special even within special applications for sound. Steel bulkheads, I-Beams, welded supports present special problems, as does the presence of footfalls from above necessitating the decoupling of footfalls and sub-bass. Power conditioners are set to low level because of voltage swings. Vibration mounting of table tops and control booths and racks on vibration mounts are required. A minimum of four-zone paging is used on ships, up to 18 or 20. And always there's a bridge override taking precedence for safety. Thirteen or fourteen years ago, Kronfeld was doing some work for Princess cruises. After a couple of years, he expanded his business by sending a mailer to cruise ship lines. "All of a sudden there were contracts," he says. The company now does work for the leading cruise ship lines in the world. It's a global business, with the last Crystal Harmony being worked on in dry dock in Japan. Although much of the work is done on land, the company also works at sea — at night and quietly doing upgrades and maintenance work.



The visitors center's sound system is used for background music and paging.



Three Soundsphere 110/A speakers were suspended from the ceiling for simplicity.

ADD-ONS

Sometimes a special situation can lead to solidify business. When Custom Communications Inc. in Rochester, Minnesota was installing a background music system in a chain of groceries, it became apparent that the intercom system was decrepit. An offer was made to upgrade the intercom with the Telecall Market Page 41 system.

Although the special intercom requirements weren't part of the original job, they proved to solidify relations.

OUTDOORS

Outdoor security systems have special needs. Moving cameras can be problems. Knox's in-ground camera with pan, tilt and zoom is undetectable, with features provided by a device buried in the ground. Newest features on the camera include a nitrogen pressurized chamber for harsh environmental conditions; day and night optics; and, for military applications, a 10,000 MHz video link for fully wireless operations.

Noise Control

By MALCOLM HOWARD

Contractors who keep their noses in the air when it comes to accepting unglamorous jobs might be missing an opportunity, if a recent spot check of installation updates is any indication. These updates do prove that having a nose for high-noise environments can turn a basic job into a challenge and provide more work through updates.

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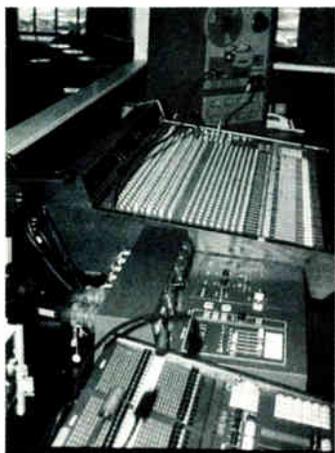
Fortunately for Vernon Glick, president of Glick's Commercial Sound, of Lancaster, Pennsylvania, there's a large snack food company in nearby Nottingham, Pennsylvania that keeps on expanding. When Herr Foods built new corporate offices and added a visitors center, which included a small theater for a multimedia history of

Herr Foods, Glick's 15-year relationship with the company paid off.

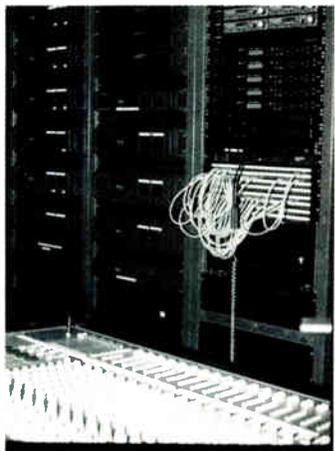
It's also fortunate for Glick that putting cheese curls and potato chips through the production cycle is noisy business — not so much from the sound of munching employees but because Herr's expansion means more machinery. The new fryers and conveyors are serving up substantially



Wavelength Systems Design completed the Crystal Harmony sound system in July.



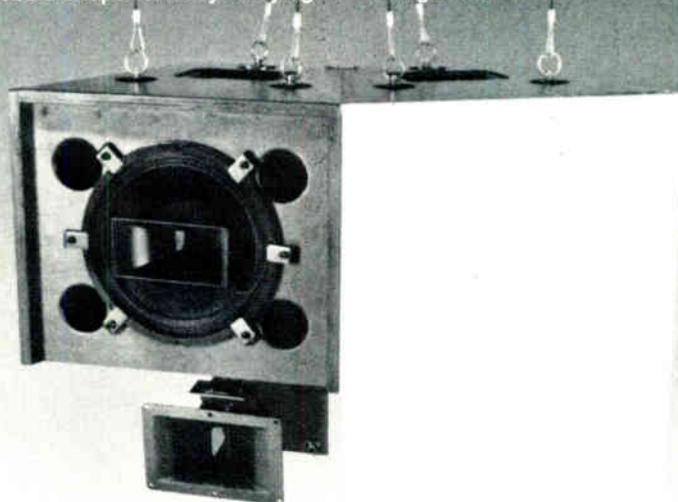
The control booth at the Crystal Harmony's Galaxy show lounge uses a 32-channel TOA mixing board.



The Galaxy's control booth also contains TOA delays and EQs.

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more noise in specific portions of the manufacturing facilities, which leaves the contractor with the job of customizing one zone of a three-zone paging system to accommodate varying noise levels. Glick's initial installation is split into three zones: corporate offices; the general offices throughout the plant; and the production area.

Because workers in some enclaves of the production area simply can't hear the information that is piped in from Glick's original installation, the contractor is proposing sound level sensing devices that would boost the signal to certain speaker zones as the noise level increases.

"It's not that there's any feedback, it's just that [some workers] can't even hear [the paging system] over the noise of conveyors," said Glick. "So, I hope to use a device that will ride the gain on the paging

system to keep the sound up with the level of the machines."

"Basically, there are two areas that Herr's is interested in [customizing sound levels]: one area is in chip production; one in the cheese curls area; and perhaps one where they make the Mexican nachos," Glick said. Mics will be placed above these areas, and the gain controls will be rigged into the speaker circuits through line boosters locally. Although it's good to have a quality microphone, there are no specific requirements in this case.

Because the sound levels vary dramatically during the day — between shifts, during breaks, and after hours — the sensing devices would spare the night cleanup crew, for example, the agony of ear-piercing night-time phone rings.

If accepted (the company is reviewing the idea for its 1991 fiscal year), the pro-

posal would be the sour cream on the chip of a job completed after Herr food finished its most recent additions in 1989. Herr added a two-story corporate office that required a 3M satellite receiver for DBS music programming, Glick said. One TOA power amp distributes signal to 3M speakers in private offices and another TOA amp powers similar speakers in the common areas of the building, Glick said.

Across a sprawling, grassy lawn from the corporate headquarters is the showcase of the installation, however. The visitors center, also finished in '89, includes a modern, high-ceilinged lobby which has ushered 26,000 snackfood tourists since December over the hard, reverberant surface of a blue and white tile floor.

Glick chose simplicity: three Sound-sphere speakers, suspended from the ceiling, he said.

"The more sound sources you have, the more standing frequencies will be present," Glick noted, adding that the Sound-sphere's 360-degree output gave him the necessary coverage for the highly reverberant room. While the globe-like speakers fit the decor of the room ("They just disappeared up there," Glick said), the simplicity kept the sound clean. Additional speakers would have only tracked in more muddy sound to the pristine corporate lobby, Glick noted. Glick also used White Electronics equalizers to identify frequencies that became too harsh or boomy because of the lobby's reflective nature.

Sound for the theater resembled a basic public address system, except that it included a rack for a VCR, one TOA A906 integrated amp, and TOA F-300 speakers for straight-ahead coverage during video, slide and general production areas.

HENRI'S STUDIO

The silent cement birdbaths, Bambis, and jockeys that adorn many quiet suburban lawns belie their noisy beginnings.

Designing a paging system for a facility that molds those ornaments of Americana "wasn't exactly brain surgery," said Ed Gomboz, president and chief engineer of Wizdum Audio, an Arlington Heights, Illinois, sound contractor. But it wasn't a routine check up either. Installing a system

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The Greater Rising Star Baptist Church

*An Example of a Changing Church Facility Design
That Required Audio System Adaptations*

BY KEITH CLARK

The design of church facilities has been evolving and changing markedly in recent years. Churches in the “classic” design are gradually being replaced by facilities that are intended for both form and function.

Traditionally, churches were designed and constructed in configurations that featured long, rather narrow sanctuaries with extremely high, arching ceilings to go along with a lot of marble and glass. From a comfort and acoustical standpoint, they were less than ideal. Parishioners in facilities of this type often were faced with poor sightlines and even poorer acoustics, especially when it comes to voice intelligibility.

More and more, churches are designed for the comfort of attendees and also to allow them to become more actively involved with the services. Facilities are now more modular in design, with wraparound seating configurations allowing closer proximity to the pulpit and altar. And with lower ceilings and more carpeting, sanctuaries don’t present quite the acoustical nightmare that they did in the past. Still, providing high-quality level of audio for an entire sanctuary can present a challenge.

The Greater Rising Star Baptist Church, located in the East Point section of Atlanta,

Keith Clark is the Public Relations Director for Electro-Voice in Buchanan, Michigan.

Georgia, is a recently completed example of modular sanctuary design. The church, constructed by Sizemore Commercial Builders of Snellville, Georgia, features a sanctuary that can comfortably accommodate more than 800 people. However, the furthest seat is less than 60 feet from the pulpit.

Seating is divided into three sections: a center section of pews directly in front of the pulpit and two sections set at angles to the left and right of the pulpit. The pews get progressively longer from the front to the rear rows in each section. This modular design insures a clear, upclose view of the pulpit for the entire congregation even though two-thirds of the seating is at an angle.

Georgia Sound Systems, Inc., Forest Park, Georgia, designed and installed the system for Rising Star, working closely with Sizemore in order to meet the various needs and demands of the facility. “In designing a church audio system, you have to know the tastes of the congregation, what volume levels they prefer, and if the services are very musical in nature,” says Ron Bradford, president of Georgia Sound. “You have to take the congregation into consideration, and not just design a system that’s suited for the room.”

Bradford speaks from experience. Begun 20 years ago as a small, family-run

operation, Georgia Sound has evolved into a prominent sound contracting firm with a heavy percentage of its business in the church market.

At Rising Star, the central speaker cluster, consisting of eight Electro-Voice FR200 speakers, is suspended from the sanctuary ceiling directly above the pulpit. Six of the speakers are directed at the congregation, with two speakers designated for each section. One speaker of the two is aimed to provide coverage for the front half of the section; the other is aimed to cover the rear half.

The remaining two speakers in the cluster act as monitors for the choir, which is located directly behind the pulpit. The hanging hardware for the cluster was custom designed by Georgia Sound to provide an exact fit for the church. Bradford uses computer software assistance programs to design his systems, but he points out that the hardware is designed to allow adjustment, so the position of the speakers can be reset to correct any acoustic problems which may not have shown up in the computer design stages.

“With the seats located relatively close to the speakers, you don’t need a lot of throw,” Bradford says. “It is important, however, to be able to correctly balance the output.”

Bradford considered constructing a



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THE SHURE WIRELESS
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screen to cover the speaker cluster, but eventually opted against doing so. He notes that E-V's FR200 enclosures, because of their compact design, oak-grain cabinets and beige grilles, blend in well with the sanctuary interior, so a distracting, bulky screen to hide the cluster is not necessary.

Two E-V CM12-2 monitors, placed on each side of the pulpit, serve as pulpit monitors. With their woodgrain cabinets and beige grilles, the units are esthetically pleasing. "The CM12-2s provide a tightness and fullness of sound, basically duplicating what the congregation hears," says Bradford.

For mic'ing the choir, he chose to suspend the E-V N/Dym N/D2308 dynamic microphones by cable from the ceiling, and directly in front of the choir section. "I chose the N/D308s for a number of reasons," Bradford explains. "The large diaphragm of the mics provides the fullness needed without a lot of padding, they come in a convenient size, and they can be set at the proper angle without any other hanging apparatus."

Three E-V 7300 power amplifiers provide a reliable level of power for the speaker system, with mixing handled by an E-V BK-1632 mixing board. "I really like to use the 7300s because they are fan cooled, which is great for situations like this, where they get a lot of hard use. I've sold 75 of the units in the past four years, and have not had one of them break down yet," Bradford says.

The BK-1632 is set up with separate outputs for each of the three areas covered by the central speaker cluster and the church's fellowship hall and offices.

All of the electronic equipment for the system, which includes a Yamaha 2031 equalizer, Furman FC3 limiter/compressor, Furman GQ15 amplifier for the monitors and the E-V 7300s, is built into a fiberglass cabinet in the sound booth. Both the cabinet and sound booth, which are located immediately behind the sanctuary, can be locked to keep unauthorized personnel from handling the equipment.

Bradford also has another method for helping to ensure proper audio besides



Exterior view of Greater Rising Star Baptist Church, Atlanta, GA.



The central cluster of the church contains Electro-Voice's FR200 enclosures. Mounting customized by Georgia Sound.

Microphones for the choir of this Atlanta church include Electro-Voice N/Dym N/D308s.



providing the proper equipment and installation. He makes sure that all personnel planning to use the equipment have been properly trained to use it.

He has designed a training course which lasts from three to four hours, teaching the use of the equipment in stages rather than just bombarding users with a mind-numbing instruction. "When you're deal-

ing with non-technical people, you have to train them carefully, and make it as easy for them to use the equipment as possible," he says.

"A good way to achieve positive results is teaching through repetition," Bradford adds. "Teaching them how to properly use the equipment makes my job easier in the long run."

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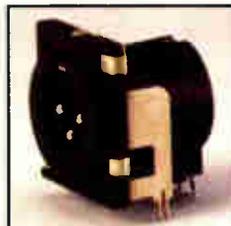


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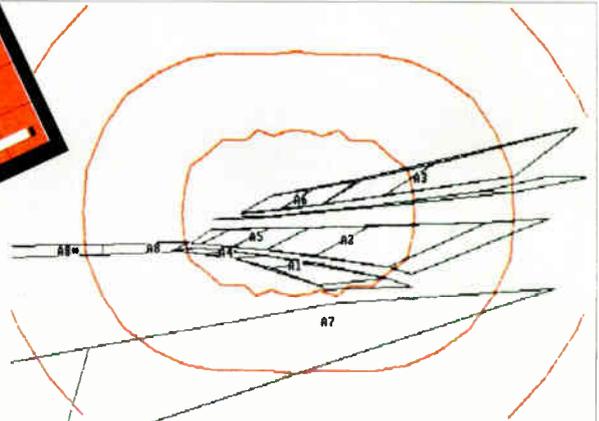
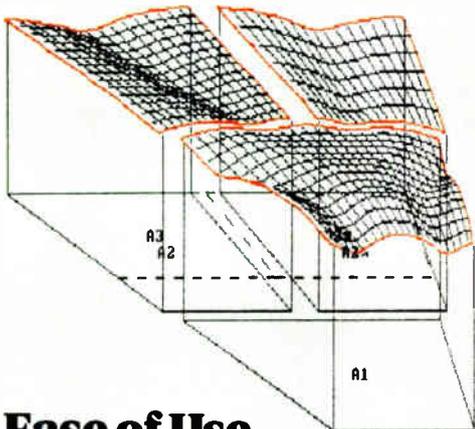
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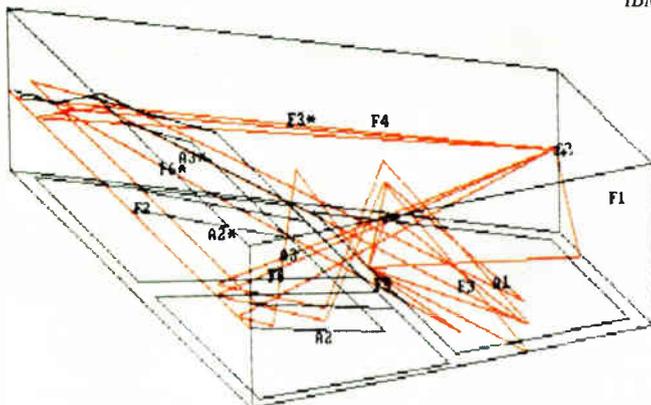
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ARCHITECTURAL ACOUSTICS — MODELING, MULTI-USE, AND THE ROLE OF THE CONTRACTOR

Crosstalk at AES is a regular segment of the daily AES-TV News program produced and disseminated by Testa Communications during the AES convention.

On the third day of the 89th AES, our Crosstalk subject was 'Architectural Acoustics.' The panel discussion was moderated by Judy Morrison, editor in chief of Sound & Communications.

The panelists were: Wolfgang Ahnert of Acoustic Design Ahnert in Germany; Neil Muncy of Muncy Associates; George Augsburg of Perception, Inc.; Hellmuth Kolbe, previously chief recording engineer of CBS International, and now an acoustical consultant in Zurich; and Don Davis of Syn-Aud-Con, who defined himself as a teacher. Our thanks to all the participants.

Excerpts from the discussion follow:

Morrison: Welcome to Crosstalk. Today we've been quite lucky in assembling a group of illustrious panelists here to discuss architectural acoustics. We talked before about modeling, and of predictive ways of dealing with acoustics. You all do modeling. What's the cut-off point? How expensive is modeling? When is it worth it?

Ahnert: Maybe that is a problem that we should avoid — that acoustics is accidental. It is very often said that you can not predict the acoustics in the hall. If you work with an architect, you hear this opinion very often. And therefore, a long time ago they started to precalculate the properties of halls and set this down, in the last century in Europe and in America too. Now I believe with computers it must be done better and better. It starts with model measurements in the middle of this

Crosstalk

century and it will finish maybe in the possibility that you can hear the property of a room if you sit in front of a computer and you have headphones on your ears and then you can say, all right, that sounds good or bad. That is not accidental, but it is determined, predetermined by the means of preinvestigation.

Morrison: Is this going to happen?

Kolbe: Yeah. The point is as you say, how expensive is it. At least in Europe, we always have the problem, or more or less the problem, that people say, well, it's too expensive, those models. In Switzerland they cost a lot of money, of course, and also in other countries. But, I've come to the point where I say, if it's a big project, a concert hall for instance, I won't do the project at all if I won't be able to get a model. Today, with all the tools we have, electronics, computers, and so on, we can really see in the model such a lot of things before we start. It's less expensive to spend some money for the model first, instead of building something and then rebuilding half of it because the acoustics are not right. Then people start to get convinced that the model is the right thing.

Augsburger: Really I think we're talking about three things that fall into play. The modeling techniques can literally be physical scale models; now we're heading into the computer age, where we're talking about some kind of computer synthesized reality, which you were talking about; and

the point that I made earlier was that most of my work is in medium size or small rooms. When you're dealing with a small room, to build a model is more expensive than building the room itself. So my approach usually is to try to build the room with enough flexibility that I can actually work in the real world. It's not quite the same thing as, for example, a concert hall, which Hellmuth was talking about, where everybody expects that on day one, when the conductor raises his baton, this is going to be a marvelous experience. When we're working in recording studios, TV studios, and one thing and another, sometimes this happens, but more often, especially with a little leaning on the designer, we have a week, two weeks or so to actually experiment or play, to get the thing to sound the way the owner wants it to.

Morrison: There you have a certain amount of prediction going on, and I know, Neil, you're dealing with rooms that may be, can be self-modified.

Muncy: In the case of performing arts venues, or I should say, multi-purpose performing arts venues, we've been working on the restoration of a vaudeville theater in Toronto which was built about ten years before sound systems were invented, and the room was deliberately made to be quite nonreverberant. They now want to use it as a multi-purpose venue, and therefore, the project was to build a reverberation enhancement system that would make it sound more like a concert hall for those occasions when that sort of sound was appropriate.

And the system as it presently stands is capable of being adjusted in real time during the music. If the musicians want to, they can even directly control it by means of a MIDI interconnect. So it has some interesting possibilities.

Morrison: Culture often changes the role of the sound contractor and the acoustical consultant.

Specifically, there are changes in the way churches are being used and what they need. Anyone want to comment on that?

Augsburger: In this area [Los Angeles], it is interesting to see a lot of churches, actually traditional churches, Roman Catholic churches, that were built roughly ten years ago or so. When they were built they first began to concentrate on speech intelligibility and deliberately made the churches fairly dry acoustically. Now they want a more traditional church sound to enhance the music. But it's not going back to the old Latin liturgical music; now they want the congregational singing, they want the sense of community, even in the Catholic church. And all this affects

**WHEN YOU'RE DEALING
WITH A SMALL ROOM, TO
BUILD A MODEL IS MORE
EXPENSIVE THAN
BUILDING THE ROOM
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the acoustics of the space. What is desirable acoustics for this kind of space?

Davis: In churches, you can go all the way from a Christian Science church or a Jewish synagogue with speech being fairly important, and clarity, and so forth, into a liturgical type church that George mentioned. Ed Long, for example, of San Francisco, drives out of his way, I think it is 30 or 40 miles, to go to an older style

church where there is still Latin, and still the organ and everything, whereas the majority of people are perhaps headed in this other direction in the Catholic church. You see churches that have rock and roll, churches that have country music, you have of course the evangelical ministers as we have in southern Indiana — where we can hear him clearly on the farm a mile and a half away, and he's not reinforced. There is the whole gamut. So all these people's needs need to be served.

Morrison: When you are designing a multi-purpose room or even a non multi-purpose room that somehow has differing uses, how do you pay attention to the demands of the music and the demands of speech intelligibility or other things for that room? What takes precedence? How do you work it out?

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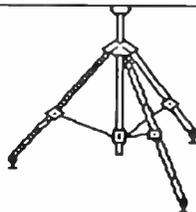
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Ahnert: That is really a difficult question because of some contradictions between speech intelligibility and room acoustics for music performance. You often have the case in a hall where you can hear very good speech from a conference table, but it's awful and impossible to perform an opera or a concert. Therefore, we need in such cases variable acoustics that can be changed, that can be done with room acoustical aids or through electro acoustics. And Neil has spoken about the possibility to transform it. It is easier to transform a dry room in the acoustical sense than in the other direction.

Morrison: Now, you guys are all designing and doing some pretty heady work. When a sound contractor gets involved in a job, and it may be small or it may be very big for him, at what point

IT'S LESS EXPENSIVE TO SPEND SOME MONEY FOR THE MODEL FIRST, INSTEAD OF BUILDING SOMETHING AND THEN REBUILDING HALF OF IT.

should he know that a consultant should be called in? Or isn't there a point or isn't that a problem?

Davis: Sharp contractors usually go out and get the consultant involved, literally. We see that again and again. They help the consultant into the job because the contractor usually stumbles across the job first. He's reading the Dodge Reports and so forth, he knows the job is coming up,

so for his own protection in most cases, he'll get a consultant involved. I think in Europe in many cases, a contractor might even hire the consultant.

Kolbe: Well we do it sometimes the other way around. If we work together with the architect and the client, then we say, let's take this and this contractor. We do it that way often because we have some contractors that do good jobs. We know the ones that do bad jobs and we try to get rid of them. Of course, if the bid is coming in, very often the bad ones are the lowest bid and are taken. But then that's another story of course.

Morrison: Can I assume that you all agree that the acoustic consultant will grow in importance and will *not* be replaced by a computer? [Laughter] Thank you all. ■



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Cinema Digital Sound

Implications for the Audio Contractor

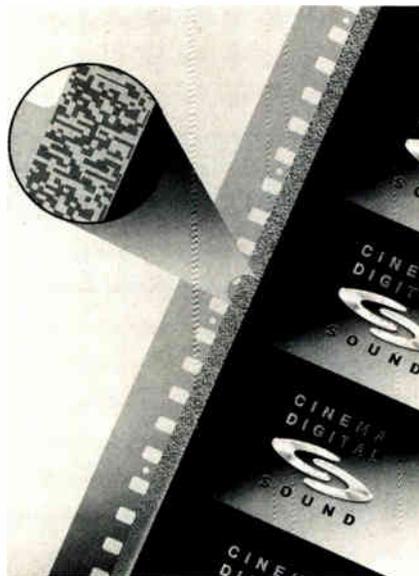
BY DANIEL SWEENEY

By now the existence of Kodak's digital moviesound system is known to almost everyone involved in film exhibition. Less well known are the requirements imposed by the new format on the theater playback system, and the nature of the challenges that digital audio presents to the exhibitor.

BACKGROUND TO A REVOLUTION

Ever since digital audio recording began to become commonplace in the recording industry in the late seventies, speculation began to develop as to application of the basic PCM encoding technology to the medium of film. When the compact disc began its rapid ascent to dominance in the mid-eighties, speculation intensified. Mightn't the consumer want the same level of reproduction in movie sound tracks? Would bandwidth-limited Dolby A optical tracks hold their own into the nineties?

Such speculation led to experiments. Doug Trumbull's Showscan Corporation developed no less than two digital sound systems for motion pictures — one using optical discs and the other professional standard digital magnetic tape. Both systems obviously ran simultaneous audio and used SMPTE time lock for synchronization. Disney also showed an experimental dual system in a special limited engagement of a digitally remastered Fan-



70mm film with Cinema Digital Sound sound track illustrating the 5.5 million bits of digital information per second which provide six discrete channels of sound.

tasia. More recently in Europe, Kinetone has shown a dual system using optical discs to carry the audio.

Neither the Showscan nor the Disney systems were ever used in a general release film, and none of these systems was ever regarded by the industry at large as anything more than an interesting experiment. Nevertheless, the benefits of wide-band, wide dynamic range digital sound were apparent, and a number of companies began to attempt to develop a prac-

tical digital format. Kodak, in partnership with Optical Radiation Corporation, stunned the industry last summer when they announced a finished system, and immediately proceeded to sell equipment and to supply sound tracks for two smash releases, *Dick Tracy* and *Days of Thunder*.

One would almost have to look back to Cinerama to find a more spectacular debut, but the fanfare should not obscure the problems attendant on the introduction of the new format. Cinema Digital Sound is expensive both to record and to play back, and it is noncompatible with the established Dolby standard. It is also likely to be challenged very soon by at least two other digital systems, one from the great arch enemy, Dolby Labs.

A look at the basic technology of CDS will give some idea of the implementation problems it entails.

First of all, CDS is a single medium system — no separate audio tracks and SMPTE lock problems with which to deal. Everything is on the film strip in optical form, and it is the first digital film system to bear this distinction.

The decision to go single format optical has obviously made the system much more palatable to exhibitors, but, at the same time, it has posed many problems, as optical systems always do. The alternative, a magnetic stripe digital audio system, probably would have been much easier to engineer, but the relatively rapid erosion

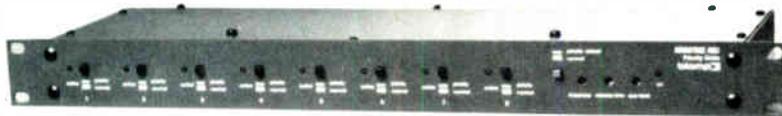
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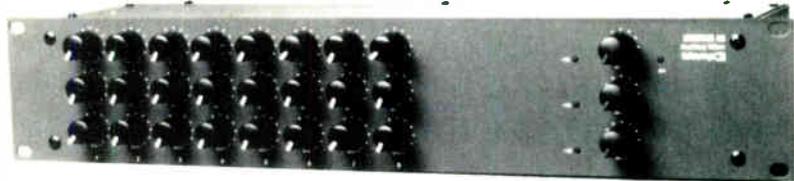
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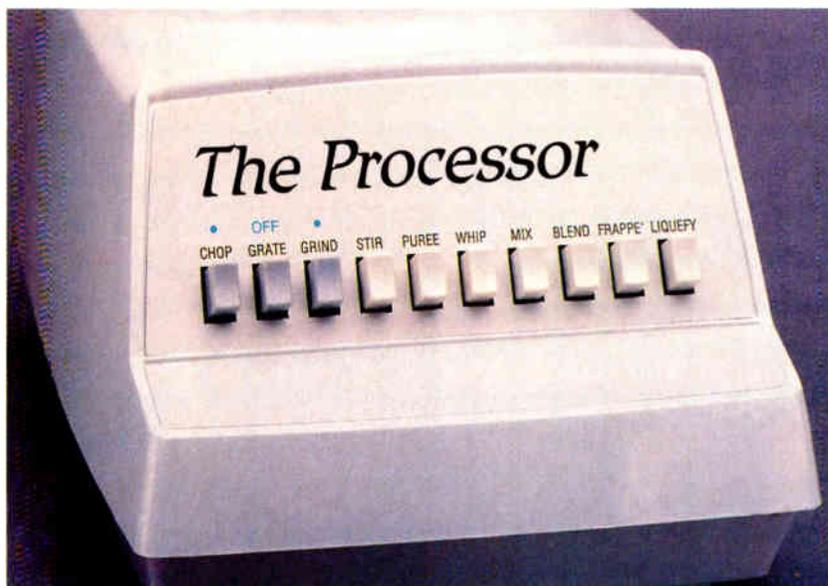
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Processed?

Processed speaker systems use a dedicated line-level electronics control unit ahead of the power amps. Typical signal processing senses the power amp outputs, and includes band pass filters, EQ, delay for offset transducers, and limiting for speaker protection.

Let's examine half space axial response recordings of a typical processed system at various input levels, beginning at 10 watts output at 300 Hz from the LF amp, increasing in 3, 5, 6 and 7 dB increments, equal to 20, 30, 40 and 50 watts in a linear system.

At 10 watts, the response was ± 4 dB from 65 Hz to 14 kHz. At +3 dB, the limiters reduce the low and high EQ. Above +3 dB, limiting has flattened the EQ and is gain-reducing the LF and HF bands independently, raising the low pass, and lowering the high pass frequencies.

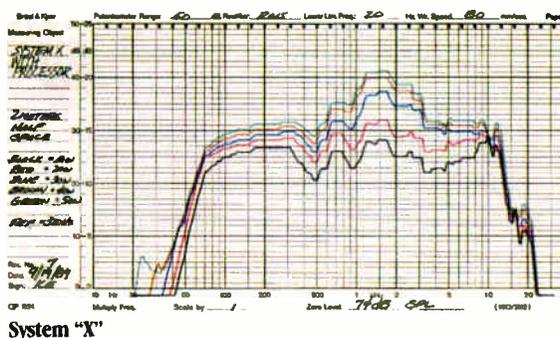
At these modest levels, the LF and HF overlap, rather than cross-over. Because the LF and HF sum coherently where they overlap, dynamic expansion results. For a 7 dB increase in input level, the lows increase 4 dB, highs only 2 dB, but the mids increase 13 dB.

This non-linearity is the result of conflicting design objectives.

High SPLs need high efficiency, but high efficiency needs lots of EQ for extended response in compact systems. The EQ improves response at low levels, but jeopardizes speaker survival at high levels. Limiting doesn't provide use protection for the speakers — limiting actually operates the components closer to thermal damage risk limits.

Here, limiting sacrifices dynamic linearity and consistency of sound quality to protect the speakers by defeating the EQ needed to make the system sound acceptable in the first place.

Slice, Dice, Mince, Chop, Grate or Puree?

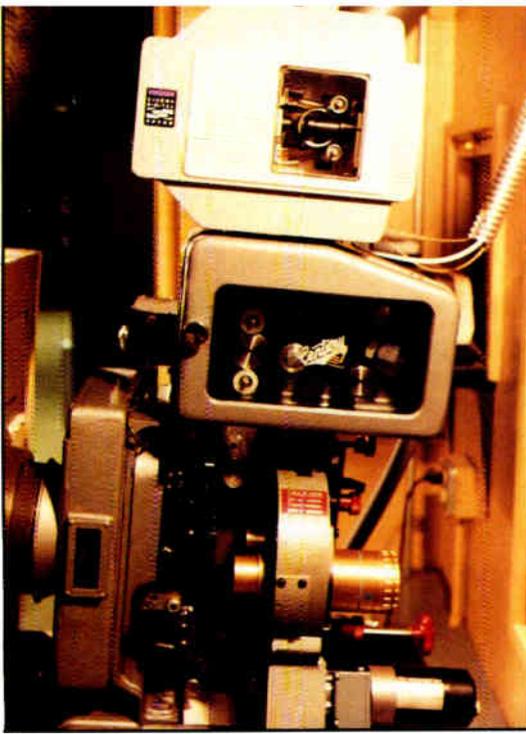


The Cinema Digital Sound processor has helped to push the optical resolution of film to its limit.

of the oxide layer, which is the most serious limitation of six track magnetic Dolby SR, would have remained. And since SR magnetic specs are roughly comparable to 16-bit PCM digital, a digital magnetic format would not have offered major benefits and almost certainly would have failed commercially. Optical it had to be, and optical it was.

Once Kodak had elected to go optical, it was faced with an immediate problem of resolution. The proven digital optical medium, that is the consumer compact disc, stores digital data in tiny specks of variable length. These specks measure in the microns — far beyond the resolution of the finest grain movie film stock. Kodak's initial research indicated that the smallest spot size practical with film stock is one half thousandth of an inch — orders of magnitude greater than the spot size on a CD. And, at that, one-half thousandth of an inch was pushing film to its absolute limit. What is more, a CD's audio track passes by the pickup at a much higher velocity than a film track's, so the quantity of data read in a second off a compact disc is even greater than is indicated by the vastly smaller spot size. Quite clearly, digital audio data could not be arranged on film strip in the same way it appears on a compact disc if anything approaching comparable information density was to be achieved.

Kodak's findings on spot size have several important implications on ultimate



The Cinema Digital Sound recorder.

system implementation. Relatively large spot size coupled with relatively low track velocity spells low density in the data stream. Bandwidth in a digital system directly relates to data density through time, and the 16-bit 44.1 kHz PCM system used in the compact disc happens to require well over a megahertz of bandwidth. That kind of bandwidth just didn't seem to be available on an optical film track, and even if it were, a conventional optical pickup with light valve could never read that bandwidth.

Kodak and ORC could have opted for a digital system with less dynamic range and frequency range than the compact disc's and thus reduced bandwidth requirements, but such a performance compromise was not deemed acceptable. So they set about looking for a way around the limitation. They appear to have found a way, but it is highly problematic in several respects.

Kodak/ORC attacked the problem on two levels. First they devised recording and playback equipment which would push the optical resolution of film to its limit. Then they decided to scrap straight pulse code modulation digital recording for a related technique known as delta modulation combined with digital compansion. Together these two strategies yield specifications equivalent to those of the compact disc for bandwidth and dynamic range, and also yield six discrete audio channels — all within a narrow optical track placed beside the sprocket holes.

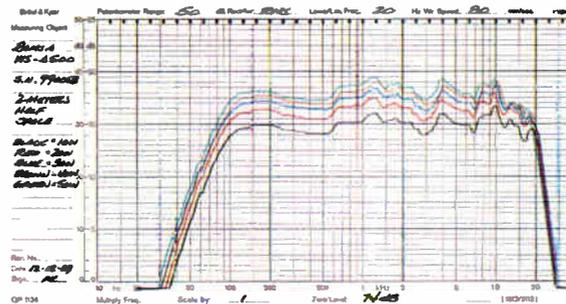


Non-processed.

True Sound, on the other hand, requires a speaker system that will render an accurate acoustic replication of its electrical input. No less, but no more.

A truly accurate speaker system does not interpret electrical signals. It has no personality, no characteristic sound. It neither adds, nor detracts from the program input. It doesn't compensate for anything—accuracy isn't negotiable at various sound levels. A speaker system is either accurate, or it is not.

Accuracy in a loudspeaker system calls for transducers that are manufactured to



Ramsa WS-A500/550 system

there are no processors that compensate for frequency response deficiencies at low levels, only to remove the compensation at high levels so that the components can survive. Performance deficiencies have been avoided by designing within realistic capabilities of high quality transducers.

Measurements of a Ramsa WS-A500 speaker system under identical conditions to the processed system recorded significant differences. Over the same range of input levels, the A-500 responses remain essentially unchanged, demonstrating linear dynamic performance. Consistent sound quality is what the 500 Series is all about.

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precise tolerances, to be sure. But it also demands that the loudspeaker systems be configured so that the transducers operate within their inherent electro-mechanical limitations.

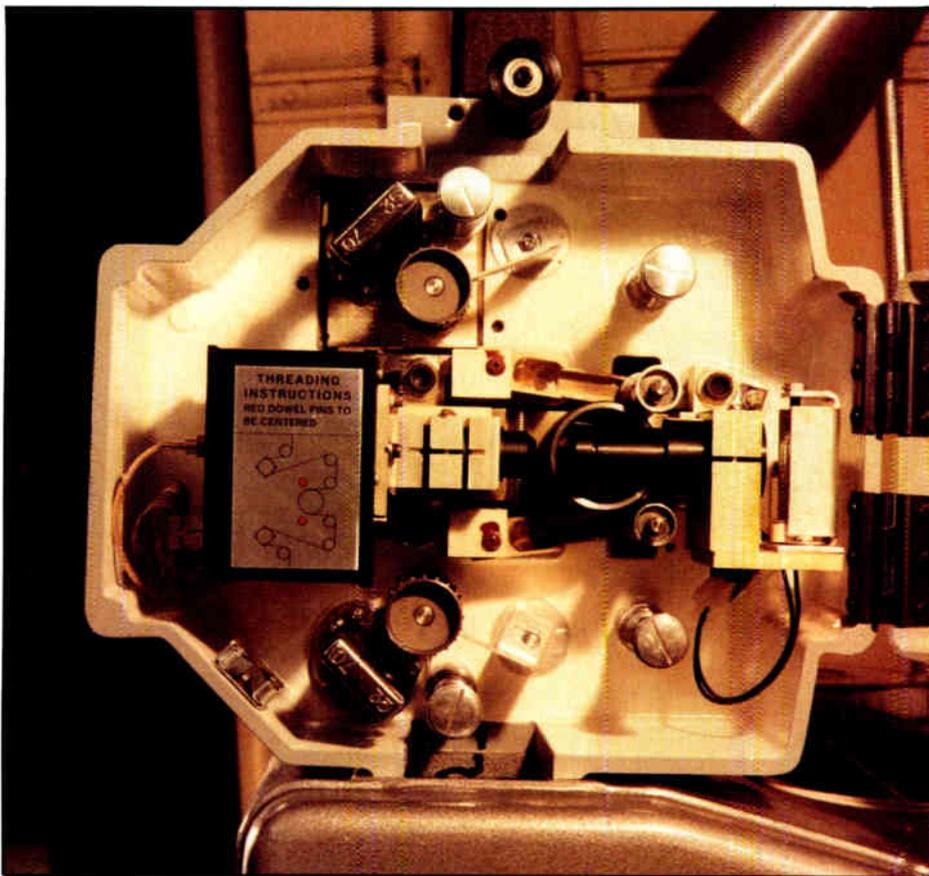
In the Ramsa 500 Series Speaker Systems,

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Circle 242 on Reader Response Card

November 1990 41



Closeup of the Cinema Digital Sound recorder.

The digital data placed on CDS films is arranged in 32 rows of information read simultaneously like a bar code. The columns do not represent channels, but rather a complex three-dimensional distribution of data intended to minimize the effect of dropouts. Sequences of data are interleaved with one another as in the compact disc audio track so that data losses in any given sample will be minimized. Powerful error correction algorithms are used to reconstruct data that may be misread or destroyed.

The soundtrack is read by a dedicated charge-coupled device that is similar in concept to a barcode reader, and is contained in a penthouse mounted onto the projector. The audio track is read before the images are projected, providing time for the complex auto-correlation, error correction, and error concealment algorithms to work. The chips required to make the system work have the computing power of a Sun workstation. As recently as three years ago, CDS playback would have been practically impossible to produce at a saleable price.

The penthouse has been designed specifically for mounting on ORC projectors, but adaptors are available for other

brands. An integral pickup is a possibility on future models of ORC projectors.

The Kodak/ORC system is fully discrete, and is not designed for integration with Dolby electronics. Instead, the theater owner purchases a special interface module with built-in equalization and six line level outputs for the power amps. Total equipment cost is presently in excess of \$20,000 for a theater already equipped for six track 70mm presentations. Non-compatibility comes at a steep price.

The CDS system is currently only available in a 70mm format. Kodak/ORC indicate that a 35mm version is in the offing, and will be offered before the beginning of 1991 — probably in a Christmas release. According to Howard Fleming, the engineer in charge of the project at ORC, the 35mm version will be much cheaper, with pricing in the \$10,000 — \$12,000 range.

Fleming also relates that more than 80 CDS systems have been installed. If that figure is correct, one has cause to be impressed, because it represents about a seven-percent penetration into the body of 70mm houses in the U.S. Nevertheless, in the context of the total exhibitor market, 80 installations is not significant, nor is the entire 70mm business very significant.

Kodak's challenge to Dolby in the 35mm market will inaugurate the real competition, and the results of that competition are likely to affect the exhibition industry profoundly.

THE INSTALLATION FACTOR

Kodak/ORC is unlikely to be able to maintain a monopoly in theater digital sound. Dolby Labs and Strong-Ballantine have both announced digital systems of their own.

But for now the competition is confined to the Dolby A and SR analog systems and the Kodak/ORC format. Kodak/ORC's avowed intention is to capture ever increasing marketshare among 35mm venues, and effectively to obsolesce the Dolby analog systems.

The specifics of the 35mm Kodak/ORC system have not been announced, but the basic encoding and optics of the system are said to be essentially the same as for the 70mm version, even though a somewhat smaller film area is available for the optical track.

It should be pointed out that for the 35mm as opposed to the 70mm house,

A digital magnetic format would not have offered major benefits and almost certainly would have failed commercially.

changes in the B chain may be required as well, thus increasing installation costs. Let's take a look at the nature of the requirements posed by CDS.

CDS dynamic range is over 90 dB, the same as the compact disc's. If we assume peak transient program levels of about 115 dB, then passively crossed over speakers of less than 95 dB efficiency would tend to pose excessive power demands, and might well be driven to the limits of their power handling. "Most movie theater speaker systems just aren't up to digital standards," asserts John Allen, President

of H.P.S. 4000, a Boston based sound installation company. "Surround speakers are especially apt to be a problem," Allen adds. "Most speakers used as surrounds today are a joke, and aren't up to reproducing Dolby, let alone digital."

Eugene Patronis, an audio consultant who designs theater sound systems for AMC, concurs. "It could be a problem with some systems, though not with the high performance system we put in the AMC theaters."

Fleming of ORC is, not surprisingly, more sanguine. "THX systems will certainly be up to the demands of the format. Full range surrounds are already specified. And it's ultimately how the films are mixed which will determine whether there are problems with older sound systems."

But dynamic range is only one of the aspects of CDS that challenges the

Many theater owners may be able to get by with a less extensive upgrade in an existing stereo system.

capabilities of existing B chains. CDS is specified to be a fully discrete six channel system with full range left and right surround channels, and a separate subwoofer channel which rolls off above 100 Hz. True six track magnetic recordings have been configured in the same way, and pose similar dynamic demands when encoded with Dolby SR, but then relatively few theaters are set up for SR magnetic, and that format was never intended for wide distribu-

tion. SR magnetic, like the old Todd-AO system from which it is indirectly descended, is basically a road show format. CDS, on the other hand, is evidently intended for mass distribution, and Kodak/ORC aim to make it the standard format.

CDS is also said to have room for a control track, as was the case with the old Cinerama format. It also lends itself to use with the new DSP processors. So far these expanded possibilities in signal processing have not been exploited.

Most existing theater B chains are in fact inadequate for the reproduction of SR six track magnetic. Very, very few theaters are set up for split full range surrounds, and most stereo movie theaters lack subwoofers, and do not run enough amplifier power to reproduce undistorted program peaks exceeding 110 dB. Indeed, most movie theaters in the United States are

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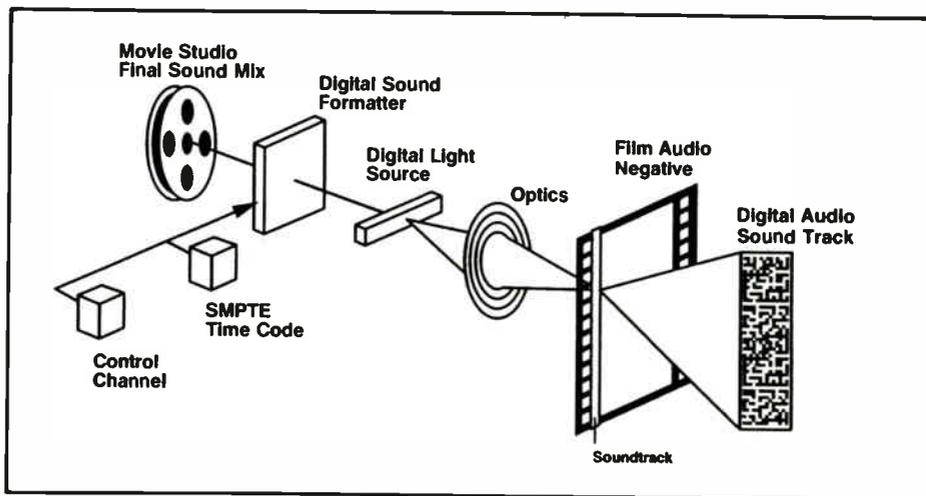


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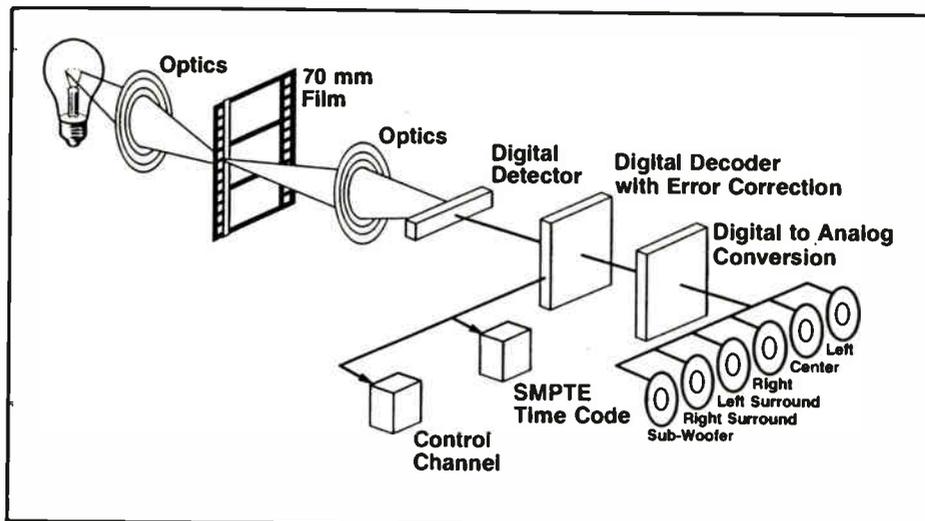
still monophonic, despite Dolby's tireless campaigning to convert the exhibition industry over the last 15 years. The real competition facing Kodak/ORC and the other digital contenders waiting in the wings isn't Dolby stereo. It is mono, and mono currently enjoys overwhelming dominance.

This being the case, most exhibitors face major expenses if they choose to upgrade their facilities to handle CDS. Not only must they invest \$10,000 — \$20,000 in the A chain, but they must also make major modifications in the B chain.

A certified THX system, which should be adequate for CDS, may cost as much as \$40,000 all told. The rival H.P.S. 4000 systems are somewhat less expensive, but are still likely to exceed \$20,000 in price. A Bose Cinema Sound system, the



Cinema Digital Sound encoding process.



Cinema Digital Sound decoding process.

cheapest high performance turnkey system, is slightly less. Of course, many theater owners may be able to get by with a less extensive upgrade in an existing stereo system — electing, perhaps, to purchase a subwoofer, or biampify a formerly passive system. But except for the few hundred up-to-date 70mm SR houses, everyone else is looking at several tens of thousands of dollars to get into CDS — at least to do in a way that is going to demonstrate the capabilities of the system.

And not everyone is willing to make that kind of commitment. "It's too much money," objects Larry Jacobson of AMC. "There's no return to the exhibitor. We already have stereo in every room in our chain, and it would cost us thirty-four million dollars to convert to CDS. I would like to see a digital system, but I can't see paying that much."

Indeed he may not have to. CDS is the only digital system currently available but it is unlikely to remain so. Two rivals are waiting in the wings. One of them will cer-

tainly have a much lower price than CDS, and the other will probably be cheaper as well.

THE RIVALS

Both Dolby Labs and Strong-Ballantine have announced digital audio systems for motion pictures. We may expect these rivals to appear soon, and for a format war to ensue.

Dolby Labs is definitely known to have a system under development. Dolby management will say nothing about it other than that it will use a CCD scanner as is the case with the CDS system, and that it will also use some sort of data compression technique — in other words, it will not be a true 16 bit PCM digital system. We may speculate that Dolby will attempt to adapt their digital system developed for broadcast for use in motion pictures. The system, which functions somewhat analogously to Dolby SR, though it is digital rather than analog, divides the audio frequency into bands, and allocates bits dif-

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ferentially to the various bands on a dynamic basis. Maximum 16 bit resolution is only applied where the strength of the signal requires it. Sampling rate also varies according to frequency band, with low frequencies being sampled at a lower rate.

Most movie theater speaker systems just aren't up to digital standards.

The system is said to use adaptive Delta modulation rather than PCM, to carry a simultaneous analog track, and to place the digital data between the frames.

Rumor has it that Dolby's system will be somewhat cheaper than Kodak/ORC's. Rumor also has it that the system will be matrixed, (like the old SQ Quad system) permitting backward compatibility with existing Dolby cards. We can only wait to find out.

Strong-Ballantine, which manufactures Simplex projectors and has been involved in motion picture exhibition from the earliest years of the industry, has also developed a system, one that is supposed to be introduced in a matter of weeks. Strong-Ballantine's proposed format is a dual system using a 12-inch optical disc time-locked to the film. The system itself has been engineered by Digital Excellence, Inc. Playback machines will be made by Pioneer.

What differentiates the Ballantine system from the Showscan experiment is that film itself will carry a normal Dolby track, while the time code will be printed on unused space on the print. If the laser disc has serious dropouts or malfunctions, or if sync is lost or cannot be established, the Dolby analog track will automatically be switched on, so the system will always be backed up, and the theater owner will not be obliged to carry a double inventory of prints. The disc itself has full 16 PCM bit audio sampled at 46 kHz rather than 44.1, and the audio track has the capacity to store up to 24 bit PCM. The digital

audio information occupies the video bandwidth of the disc as in the F1 system. Each disc holds up to two hours and forty minutes of audio, and there's said to be no data compression. The basic disc format is proven technology in that it has already been used in special venues at Disneyland such as Captain Eo and Star Tour.

Strong-Ballantine representatives would not reveal all particulars of system configuration, but indicated that options were available in the system to adapt it to theaters unequipped with subwoofers or split surrounds. In full dress, the system is similar to CDS with split surrounds and a subwoofer channel. Projected system cost is \$7,000-\$10,000.

Strong-Ballantine is not new to the exhibition business, and their system seems eminently practical, but it does appear to betray a certain lack of confidence in the current feasibility of digital, as evidenced by the backward compatibility and analog fallback provisions, and the tacit admission that Dolby A is likely to be around for a long time. Then too, the technology itself is not revolutionary. But perhaps the biggest obstacle to acceptance for the format is the ingrained distrust of dual systems among theater owners. Anyone who remembers Cinerama from the fifties and sixties also remembers the frequent malfunctions of the time-locked tape recordings played simultaneously with the film. True, optical disc is a much less finicky medium than reel-to-reel tape, and modern computerized time-lock equipment is relatively failsafe, but still the prejudice is there.

CHANGES

Some digital sound format will establish itself in the early nineties. That, combined with an increasing public awareness as to theater sound quality already simulated by Lucasfilm's THX and TAP programs, will increase the demand for stereo installations in the theater, and certainly increase the demand for complex bi- and triamplified systems. Digital may lead to a basic rethinking of the basic setup of the B chain, and a return to control tracks of

Cinerama as well as to the simulation of complex reverberant fields. If the B chain changes fundamentally, the cost to the exhibition industry could be very considerable, but the opportunities for the sound industry could be very promising.

Bandwidth in a digital system directly relates to data density through time.

In the past, sound has tended to be very secondary in theatrical presentation, and certainly in the minds of most movie goers. That may be changing for good. ■

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Holy Transformation!

Multi-Purpose Gym Gets Church Sound in Three Days

BY ALAN HARPER

In mid December 1988, I received a phone call from Ed Mitchel, administrator of Horizon Christian Fellowship in San Diego, California. He needed some help pulling together the final installation of the sound system and acoustic treatment for the new multi-purpose room. It was already the 15th of December, they had an opening service scheduled for Christmas Eve, and due to extensive construction delays we could not start any work inside the building until December 22nd. I stopped by the site to get a better understanding of the situation.

The church had recently acquired a junior high school campus from the city of San Diego. Among the extensive remodeling projects on the campus, Horizon had built the largest possible gymnasium they were allowed (110 feet x 90 feet x 30 feet) and planned on using the same space for their Sunday morning services.

The transformation from basketball to praise and worship would include first putting out a large rubber mat covering the basketball floor. This would reduce noise and protect the playing surface. Then 2,200 padded chairs would be placed on the floor, a portable stage rolled in, amplifier and dimmer racks placed under the stage, the house mix position rolled into place — and presto, the gymnasium was a church (smaller services throughout the week were to continue in the small auditorium, part of the original junior high school campus).

Much planning and preparation had gone into the project. Sandy Kravett, the staff technical director, had the job well mapped

out, but due to the extensive construction delays, no one thought it would have to be installed in just two and a half days, so I was hired to make sure it was done on time.

The only items to be left in permanently were the speakers and associated speaker wiring, and the snake cabling to the house mix position.

At the same time, a full lighting package was to be installed. I was not to be concerned with this portion of the installation; the staff had made arrangements to do the work themselves (meanwhile I briefed a lighting director friend on the installation and he said he would stay on call). The other item to be addressed was the acoustic treatment of the room.

Mike Klasco of Menlo Scientific Ltd. (and technical editor of this magazine) was called in early on in the design of the building. Horizon has a very active music ministry, and high SPLs must be capable from the speaker system and be made intelligible to the audience without the usual gymnasium acoustics. He determined that the building would have to be treated with add-on acoustic devices; no structural changes were feasible or cost effective. Mike provided complete specifications for these devices and their placement.

The walls would have large, broadband absorber/reflectors (4 feet x 8 feet x 2 feet) mounted on the two side walls and the one rear wall. (The stage was set up at the east, narrow end.) Foam panels (12 feet x 4 feet) would be applied to the ceilings and areas between the broadband absorbers. In total, about 30 percent of the

wall and ceiling areas would be treated, leaving some of the natural ambience intact.

Mike Klasco had already run several computations on the speaker array. The components were already owned by the church and were to be used in clusters left and right of the stage, flown and permanently splayed. Originally, a split cluster was specified for music and a high performance center column was specified for voice, but budget limitations prevented the column design from being implemented. Klasco determined the correct angles for each component and achieved even coverage throughout the room. Seating areas directly under the speakers and next to the stage were to be covered by a pair of small JBL cabinets as needed.

SCOPE OF INSTALLATION

The following was to be hung:

- (2) Community Boxer Bass Bins (1 per side horizontally).
- (4) EAW 12-inch MF cabinets.
- (4) JBL 2445 HF drivers on Community RH-60 horns.
- All speaker cable runs and conduit installed.
- (30) 200 lb. Acoustical Devices mounted to the walls.
- (300) 4-inch Acoustical Foam Panels in 4-foot x 8-foot sheets.
- Snake Multipair run in conduit and terminated.

All systems were to be checked, tuned and working for a 9 PM service on December 24.

A TIME OF PREPARATION

I had two days to look at any details of the room; then the people doing the floors would come in and no one would have access until the morning of December 22. As many portions of the installation as possible were completed in a "staging area" in a nearby room.

Steve Conrad and Bill Mohelsky, from Audio Installers, were assigned the task of pre-rigging the speaker clusters. The speakers were assembled and pre-hung using Genie Super Towers to simulate the hang points. A sheet of $\frac{5}{8}$ -inch plywood was mounted to the underside of the (60 inches x 30 inches x 45 inches) bass cabinets. To this, unistrut was placed and spring clips employed to hang the MF and HF components. Each component had its own length of chain to give us maximum flexibility in the angling of the separate speakers. Additional hang points were added for safety cables to be attached after the speakers were in place.

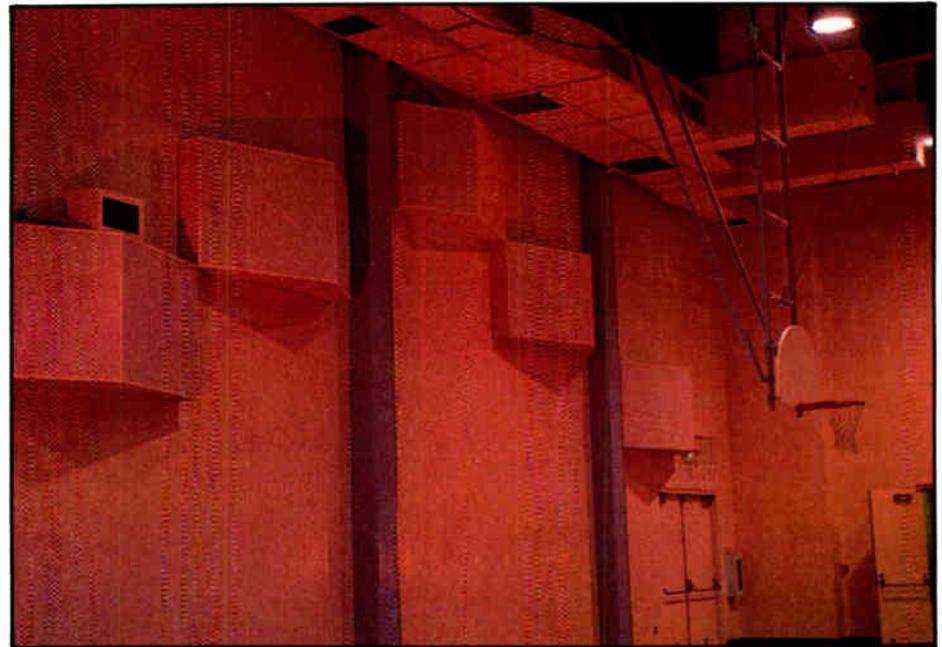
All speaker components were checked for correct operation and polarity, all electronic components were checked, and the overall system was pre-wired. We could not afford a moment of down time working on something that could have been completed in the staging area.

The acoustic devices came in during this week of preparation. They had to be painted and made esthetically as pleasing as possible (this is one of the nicest looking gyms this writer has seen). The units are made out of fire-treated $\frac{3}{4}$ ply. A 4-foot x 8-foot sheet has a box built to it measuring about 12-inches to 24-inches deep, coming to a point off center 1 foot. Inside, a low frequency diaphragmatic absorber panel is floated in a bead of silicone spaced from the rear panel. The one key factor here is not to make perfect boxes, each one a clone of the next, but to have some random differences in order to stay away from "tuning" these absorbers to only one band of frequencies. A thick blanket of Spin Glass (8-inches thick) acoustical fiberglass is placed in front of the diaphragmatic absorber panel and a perforated steel cover following the angle of the outside shape is attached to the front.

The area behind the diaphragmatic ab-



Front stage wall is lightly treated with Armstrong acoustical tile to minimize reflections from stage monitors.



A view of the acoustical foam behind the basket.

sorber provides back volume compliance tuned to the bass frequencies below 200 Hz, the blanket insulation provides absorption for the rest of the frequency range, and the perforated grille reflects the upper frequencies to be diffused. These units were to be arranged in a stair-stepping fashion on the walls, not to overlap. The bottom of the lowest one was to start at +12 feet, the next at +16 feet, and the last at +20 feet. The pattern would then continue down and back up until the wall was covered. In the gaps left by this stair stepping pattern, acoustic foam was to be applied for additional

absorption.

These cabinets were painted the same color as the walls, a color coordinated cloth was selected to cover the perforated steel grille, and was pre-drilled to brackets for mounting.

Carpenters were also busy constructing a large, portable, roll-around booth to contain the house mix position.

Equipment is as follows:

- (1) Pulsar 24x4 mixer
- (4) Rane Graphic EQs (utility)
- (1) 2-chnl dbx 166 Comp/Lim (utility)
- (4) HME System 22 Wireless mic units

- (2) Nakamichi Cassette Machines
- (1) Revox A-77 Open Reel Recorder
- (1) HME Handheld Intercom Station to the stage

Amplifier Rack Contents:

- (1) Ashly Stereo 4-way Crossover
- (2) Rane ME-30s for system tuning
- (4) QSC 1400 Power Amplifiers
- (1) 2-chnl dbx 166 Comp/Lim for system protection

THE INSTALLATION

Day 1:

We attacked the acoustical treatment first, as it had the most number of man hours involved. Four eight-man crews worked in two shifts to install the large, broadband absorbers. Four two-man crews installed the foam on the ceiling, also working in two shifts.

This left the electricians to the installation of the conduit for the speaker connections and power to the four light positions.

Sandy Kravett and his team worked on the pulling and termination of the multipair snake going to the house mix position and the setup of the house mix position.

Day 2:

The installation of the acoustic treatment continued. This had to be completed today as they would need to lay out the rubber mat and the chairs on the following day.

Late in the afternoon we started to hang the speakers. Genie Super Towers erected the speakers to their 25-foot height (scissor lifts were too heavy for the tender floor) guided by men on scaffolding. The speakers hung from heavy chain attached at two points to bolts running through the glue laminated beams supporting the roof. To pick up the third point, a bridle was formed to a secondary beam running parallel to the main beam.

Mike Klasco flew in that evening for some on-site consultation. We fired up the main speakers to verify the coverage, check for system operation, and set rough amplifier and crossover settings. Mike made some minor changes to speaker angles and our first impression was, "the room sounds great."

Now, you have to understand, when we



Acoustical absorber/diffusers are mixed with acoustical foam on walls. Note the acoustical foam on the ceiling.



Aside from a meeting place for worship, the space doubles as a gymnasium.

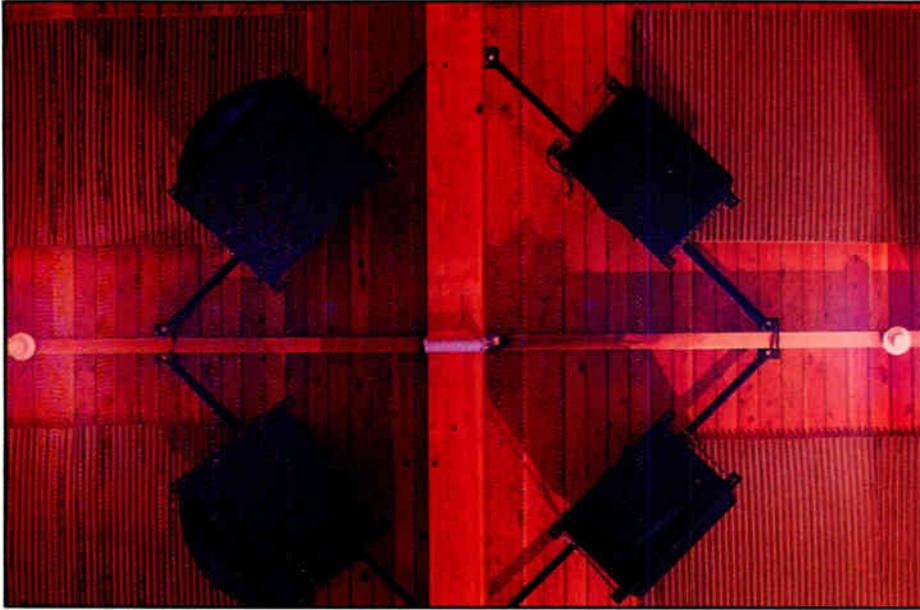
started the installation on day 1, we were not able to communicate across the room because our voices would be lost in the massive quantities of reverberation. If you were standing face to face with one another discussing some point, one of us would turn our head and all intelligibility would cease. Now, with all of the acoustic devices on the wall and the foam on the ceiling only, we were able to hear the system at rather high volumes with high intelligibility!

We ran out of time and could not put up the foam in the spaces left on the wall between the absorber's stair-stepping pat-

tern. This was an acceptable compromise, as the reverb decay was very smooth and natural. The rubber mat had been put down, but no chairs had been set up yet. We made the decision that once 2,200 padded chairs had been placed and 2,200 people occupied them, the reverb time would be quite appropriate. If needed, the foam could always be added.

Day 3:

The day started off with a not-so-unexpected surprise. The lighting was behind schedule, and the man in charge of



Speaker cluster consists of Community bass horns, EAW cone-driven midrange and JBL driver/Community horn top end.

the project had become suddenly ill. Some electrical connections had been made up at the light positions, the conduit was in place, some wire was pulled, but nothing down at the stage had been tied in.

All circuits were to be terminated with stage pin connectors. As the portable stage rolled into place, the dimmer packs, as the amplifier racks, would be hooked up and placed under the stage. All of the pin cables needed to be terminated, the camlocks installed, the light bars on the beams placed and mounted, and the instruments mounted and focused.

We were all waiting for the stage to be put into place, and the lighting was holding us up. I got Gary King (the lighting director friend) on-site immediately to add some finer points to the lighting installation. We all pitched in for the rest of the morning and afternoon to complete the lighting.

Once completed, we rolled the stage into place and hooked up the amplifier and lighting racks.

At 5 PM Bill Mohelsky and I started tuning the system. First we used white and pink noise; this helped us establish amplifier and crossover levels. Next we set up three mics on the platform, mics they typically used for their services. One SM57, one SM87 on the HME hand held wireless system, and one MKE2 lav on the HME wireless system.

We talked the microphone and rung the

system, reaching for high gain without losing the quality that many cuts on a third octave EQ can give you. For the extra high gain situations using a lav mic, we set up a separate EQ path at the mix position on the individual input. This allowed us to optimize the tuning for speech while maintaining full frequency response for the system as a whole.

The service started on time; now I had a chance to listen to the room filled with 2,200+ people. Mike MacIntosh, the pastor of Horizon Christian Fellowship, took the platform, and before he said much else, he commented on how great it sounded from the stage. Later, during a musical number, he walked out to the mix position and was rather ecstatic about the system, but more so the acoustics. Rather high intelligibility was achieved with what I would consider to be a very small investment towards the control of the reverb time.

Subsequent concerts and theatrical productions held in this venue have netted similar results from some very respectable performers and ministers. One thing I noticed immediately was that less monitoring was needed on the stage. I would attribute this to the lack of confusing reflections coming back to the stage off the back wall or elsewhere. We did not put any of the acoustical foam over the stage area to keep it live for the performers.

For each of us, this installation ran well

beyond 50 hours in the span of three days, plus all of the prep time, yet the work was very gratifying. All the parties concerned were then, and are today, very happy with the installation. Now the only problem Horizon is faced with is that they've outgrown the building. With three packed Sunday services and several overflow rooms, they are now planning on starting a Saturday evening service to ease the congestion.

The acoustical benefits are quite clear for a church: using a gymnasium for a sanctuary, the lack of confusing reflections, high intelligibility; etc. The same benefits are also available to the basketball player and coach: easier communication, easier coaching. Imagine attending a game where you can understand the announcements over the roar of the crowd. Wow, what a concept. ■

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The AES Convention

The Latest Trends for Creating Illusions in Sound

BY ALLAN VARELA

The 89th AES convention took place in the Los Angeles Convention Center September 21 through 25. The mood of this show was very upbeat and followed closely the theme of "Creating Illusions in Sound — The Fusion of Art, Technology and Imagination."

Papers were omnipresent and covered everything from the modeling of acoustic spaces, to a panel discussion about women in audio. The standards committees were busy dealing with the complex issues of modern recording and live sound applications. Digital audio workstations and their total non-compatibility from machine to machine was one issue addressed.

The more complex, thorny and never ending issue of pin two vs. pin three hot, the turmoil that won't go away no matter how hard we try, was focused on as well.

A walk of the convention floor showed several trends, some surprising and some inevitable. The most striking trend in audio today, and I mean all of audio, is how much the audio industry is becoming a side show of the computer industry. There are computers up and running every facet from the actual recording of sound through the compiling of information to set a speaker array in a particular acoustic environment, to everything in between. Another trend is the inexorable push of the Macintosh computer as the computer platform of

choice. This popularity increase is partly because of the Macintosh interface, which people like because it is "friendly," and the fact that the Mac has been a real contending machine for only about two years.

The trend towards computers is reflected most of all in the presence of the Digital Audio Workstation (DAW). The DAW is exploding out onto every facet of the market and at every price point. Although they all accomplish the same task, *i.e.*, record, manipulate and playback audio, the machines themselves all have very different interfaces and complexities.

Alpha Audio, the Richmond based company known for its architectural acoustics products and the Boss line of automation systems and recording services, showed its DR-2 hard disk recorder/editor. This system stands out from the others because it works, and feels like a two-track tape recorder from the interface standpoint, and doesn't get into many levels of Digital Signal Processing (DSP). Akai had several entries with the S-1100 sampler, and the new DD-1000 dual stereo optical recorder and editor. E-mu systems showed its Emulator III digital sound production system. These products are on the unique side of the DAW market.

The more mainstream DAW category erupted with many new companies showing their wares. Roland Corporation, noted

for its MI gear, showed a new unit, the DM-80. This unit uses a Macintosh front end and provides for eight tracks of simultaneous recording. Symetrix debuted its DPR44 device that provides four tracks of simultaneous recording with four layers of editing and soundfile manipulation per track. The Macintosh is the front end of this unit as well.

Turtle Beach Systems showed its plug-in system for the IBM PC, and Digidesign showed its system for the Macintosh. A noteworthy fact here is that Digidesign enjoys the largest installed base of DAWs of any company, with over 2,500 systems in the field.

The high end of the DAW market, both in facility and price, seems to be heading toward networking. New England Digital announced its plan to let multiple users address their PostPro recorder/editor, dividing the tracks among the different users. The Mac is the front end of this system as well.

Solid State Logic debuted an option for the Screen Sound DAW which allows multiple Screen Sound stations to address one common library of sound files. All across the board from Lexicon with the Opus system, to WaveFrame with the AudioFrame, from AMS with the AudioFile to Digital Audio Research's SoundStation II, the high end is bursting with new

features and capabilities.

The only dark cloud covering this rosy picture is the total lack of compatibility between any of the well over 40 different systems on the market. The end user for these systems is changing from large post production houses to industrial, educational, and church oriented in-house production facilities. Buying the right system for now is easy, but buying with an eye toward the future is less obvious. This is a real contractor-beware situation. New England Digital published its file and audio interface information; and standards for interchange between these machines is, hopefully, on the way. Because of the large majority of machines that use the Macintosh as a front end, perhaps the first interchange standard will happen between these systems.

The next largest category of equipment at the show was control boards. New product lines were shown by: Soundcraft featuring the Delta 8 console, the Delta Monitor, and the Venue; Roland; Soundtracs; and Aries, from England, by Goutam Electronics Products Ltd. Studiomaster redesigned its entire line and is featuring its Pro-Line Gold mixer series. The trend for all of the cost effective console manufactures is to build a mixing desk series and "accessorize." Most of the manufacturers like Studiomaster, Peavey, Yamaha, Tascam, and Panasonic/Ramsa also offer other audio devices such as speaker systems, amplifiers, microphones, and rack effect boxes to go with their consoles. This "one stop shopping" approach is very popular.

On the Rolls Royce side of the console market, Neve was present with various incarnations of the V Series control board. This line of boards can come configured for rock 'n' roll or post production, and everything in between. Solid State Logic (SSL) showed off its G series consoles. SSL features the SL 4000 G and the SL 6000 G. SSL boards can be configured for music, film and video applications. Harrison, Amek/TAC, Trident, and Studer were among the high end companies showing their wares.

Two hybrid companies presented their consoles as well. API and Focusrite



The Yamaha DMC1000 digital mixing console is a fully digital board.



Solid State Logic debuted their option for the Screen Sound DAW which allows multiple Screen Sound stations to address one common library of sound files.

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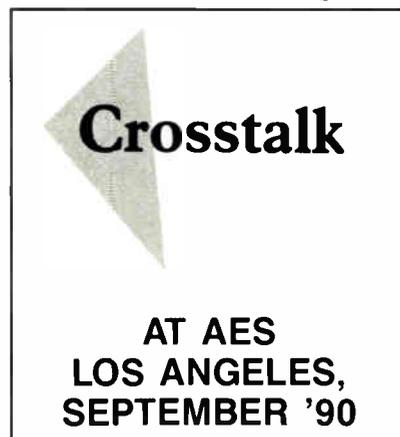
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The DR-2 edit controller from Alpha Audio.



The Soundcraft Delta 8 was shown at AES for the first time.

showed off their modules, as well as their boards. These products are all discrete component mic amplifiers, equalizers, and compressor/limiters. Both companies offer individual modules and full blown custom built consoles. This trend of high-end electronics in a box is supported by Neve with the Prism series, SSL with the Logic FX series, and Amek with the Medici series.

Although new things were shown by nearly every category of equipment manufacturer, every show has a winner and this show was no exception. Yamaha gets this year's prize with the introduction of the Yamaha DMC1000 digital mixing console. This board is a fully digital board, and represents a major leap upward in capability from the earlier DMP7D series. The first thing unique is that there are no microphone inputs for this board; it is up to the user to provide the board with line level digital or analog inputs. All popular digital formats are supported including AES/EBU, S-DIF2, ProDigi, and Yamaha on the inputs, and AES/EBU, S/PDIF, and Yamaha on the outputs. All parameters of the board are automated including real-time automation of EQ, pan, aux sends, and bus assignments. The DMC1000 employs linear 100 mm touch-sensitive, motorized faders on the 14 input channels (8 mono and 4 stereo). The cost of the unit is around \$25k. This board represents a major breakthrough in digital technology — a whole lot of bang for the buck. The next nearest competitor rings in at around \$100k for similar capability. The all digital



The DR-2 recorder.



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studio is now one giant step closer to being commonplace.

Tannoy rewrote the book on monitor speakers, and showed off the Studio Monitor Series. These speakers are based on Tannoy's Differential Material Technology (DMT). Essentially, any moving part or piece that may vibrate is isolated from the cabinet by a surround or mount made from a different material. This form of construction, according to Tannoy, defeats unwanted speaker biases, characteristics, and acoustic signatures. In addition, the cabinets employ different materials, sealants, and glues to defeat sympathetic vibrations. The new speakers feature Tannoy's newly designed dual concentric speakers. These speakers use different cone material that is best suited for the different size bass cones available. The high frequency horns are redesigned as well, with all new materials and new phase plug.

New cabinets were shown by Electro-Voice using their folded manifold technology. An impressive show was made by TAD with speakers that were truly massive and much too big for the small room

that they were placed in. Bose chose to show all of its existing technology in one room — from speakers to CAD programs for acoustical analysis.

Amplifiers for these speakers received a face lift. A new entry was shown by Crown with the Macro Reference amplifier. This is an amplifier that is made for the dynamic range of digital recording and playback in the recording studio. Hafler showed a new line with the PRO2400. Carver showed the PT-2400/PT-1800 prototype. Soundcraftsmen and QSC showed new product as well.

Tape recorders, both digital and analog, were featured items at this show. Otari introduced a new R-DAT prototype and a major upgrade for its digital 32 track recorder, the DTR-900-II. This machine is fully compatible with the Mitsubishi X-850 and X-880 ProDigi recorder. Otari also showed a complete upgrade for the 5050 family of recorders with the introduction of the MX-5050 series. Studer showed its DASH format 48 channel digital recorder, the D820-48, along with the A807-4 TC analog four track recorder. This machine

is a ½-inch tape, analog recorder with a SMPTE time code track. Sony showed its line of professional time code reading R-DAT machines the PCM-7010, PCM-7030, and the PCM 7050. Sony and API announced new upgrade modules for Sony control boards. The modules consist of a mic preamp, and the famous API equalizer. API found a way to fit its 550 equalizer into a retrofit module for the Sony product.

The focus of the show was definitely towards audio for video and film. Many manufacturers showed their wares, but one thing did stand out. The impression left by the show is that most equipment is becoming a refinement of previous equipment. Major breakthroughs are few and far between. For instance, most of the control boards, designed for any purpose, are refinements of the last refinement.

One product that bears some investigation is from Sabine Musical Manufacturing Company, Gainesville, Florida. Its called the FBX Feedback Exterminator, and it does just that — exterminates feedback automatically without radical signal degradation. A truly new and interesting product. ■

A Personal View

BY T.G. McCARTHY

September, 1990 — It's Audio Engineering Society Convention time again. This one, the 89th, is the west coast version. It's in the Los Angeles Convention Center and will run from September 21 to 25. The organizers seem to have done a very good job of site selection and logistical planning. The Center itself is of ample size and is conveniently located to a number of downtown hotels. The Convention Committee has set up a shuttle bus system which is excellent, running continuously between the Convention Center and a number of the hotels. On the several occasions I will ride a shuttle during this

visit, I will find it to be ready to go when I am. The lack of crowds around the loading stops indicates that others are having good luck with transportation too.

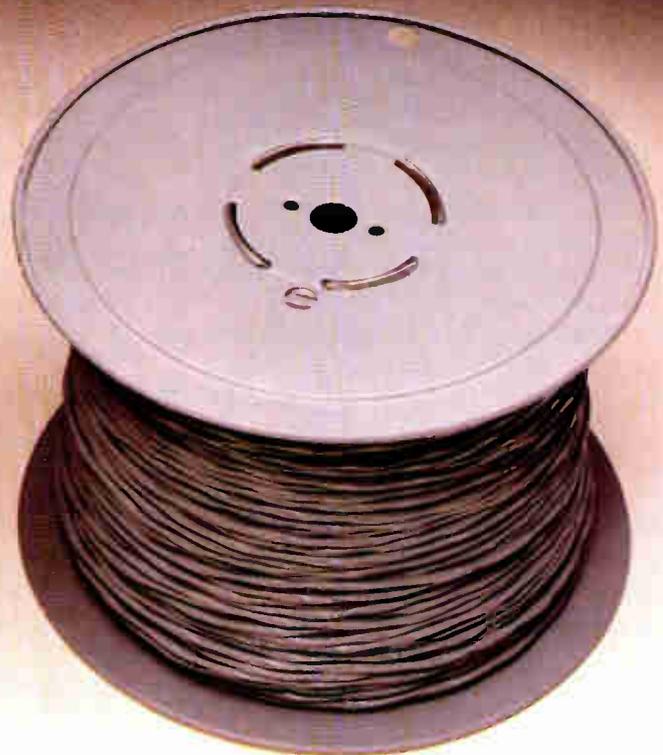
The registration process is also well organized. Signs in the lobby indicate where to get a registration form, how to fill it out and what to do with it. When an attendee turns in a completed form at the desk, clerical processing is fast and efficient. I have arrived at what is probably the busiest time, right after the doors open for the day, and though there are lines, they move rapidly. Within only a matter of minutes of leaving my hotel room I have been transported to the Convention

Center, have filled out a registration form, had it processed and been given my badge.

In addition to the well placed signs, clearly labeled information people are circulating through the registration lobby too. As a test, I ask one of them for directions to an obscure meeting room that I know to be in one of the hotels rather than in the Convention Center. Without hesitation she directs me to the correct hotel and tells me where to catch its shuttle. This will be a show in which i's are dotted, t's are crossed and SNAFUs are held to a minimum.

I enjoy Audio Engineering Society Conventions. Not so much as a Sound Con-

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tractor, because I don't think AES is really for Sound Contractors. It's more because I perceive AES as kind of a grand old lady. It's like roaming through an old theater or the ballroom of a hotel famous as a place where things happened in the 1930's but a little off the beaten track now. This is the organization that helped spawn today's audio industry, but times have changed. We have become a service economy, pretty much turning production over to others. The audio industry has adapted to the situation and matured. As part of the maturing process it has divided into many specialized sub branches: Motion pictures, broadcasting, sound contracting, electronic musical instruments, consumer products, instrumentation and underwater acoustics are a few that come immediately to mind. Each of these groups does a good job communicating with and meeting the particular needs of its members, and many of those members are also members of AES. Oddly, some of today's audio engineering thinkers and innovators are not in any of the groups, or even under the audio industry umbrella at all. They may send messages back from time to time, but their real work is over at NASA or somewhere.

That's now; but historically, in case after case, the concepts, standards, and products that are still operational today were introduced here at AES years ago. Today's thinkers and innovators may be somewhere else, but the ghosts of their predecessors are here.

AES is still very much a viable organization. Those cutting edge companies of yesteryear whose names are still around still maintain offices here, though some of the people who occupy them now may tend to be much more political.

It's been suggested that some of the people in old guard companies feel that they have a special right to new developments. If that were the case, and they were desperate for new ideas, an "embassy" in AES could provide an opportunity to sit upstream in the idea flow and cherry pick. They would be in position to feed good ideas to their organizations' own engineering and marketing departments ahead of time and/or side

track them until their own people had a chance to introduce them properly.

I'm not sure I buy into that completely, but it is something I consider when deciding which technical sessions to attend. I also occasionally ask myself: If all but one time slot were filled, which would win; the good paper by the unknown author or the mediocre paper by the established company personality?

It might be practical to get our blueprints from architects on computer disk rather than paper.

At any rate, the traditions of equipment exhibits, delivery of papers, awards banquets, committee meetings and all the rest are faithfully preserved and observed. I think that's good. Even if it doesn't set the world on fire, it still gives us a sense of history.

As other segments of the industry evolved into specialized groups, AES seems to have staked out audio recording as its territory. The result is that an AES convention is the place to see recording consoles, multitrack recorders, digital recorders, cassette recorders, cassette duplicators, cassette loaders, cassette boxes, cassette packagers, cassette label imprinters, compact disc production equipment, studio multiplexing systems, audio tape, audio alignment tape, tape editors, effects libraries, analog to digital converters, studio signal processing equipment, SMPTE interfaces, and SMPTE synchronizers. The other things — microphones, amplifiers, loudspeakers and other hardware — are represented too, but to a lesser degree.

I see a few things that interest me as a sound contractor. One of them is the fiber-optic snake by Lester Audio Laboratories of Dallas, Texas. Their DAS 2000 series, which is scheduled to ship in November, supports 64 channels and 16

returns on two cables approximately $\frac{3}{8}$ inch in diameter.

Another thing is the portable flexible cable troughs from Trouper Industries Ltd., Gardena, California. Just the thing for protecting temporary power and audio cables as they cross doorways and streets.

Oxmoor Corporation, Birmingham, Alabama, has added a system for multi-configuration rooms to its line of remote level controls. The new system lets a room with sliding partitions be set up any number of ways with the level controls tracking the changes.

Acoustical Supply International, Chattanooga, Tennessee, is a kind of sound contractors' hardware store. They don't have anything unique, but they do have a lot of items that I need once in a while and that cause me to burn a lot of time trying to find a place to buy. Their prices seem right, and if they don't have a catalogue yet, they tell me they soon will have.

The recording equipment is major. The incredible amount of expensive and esoteric equipment gathered under one roof helps attendees plan growth and, perhaps, triggers an artistic concept or two. At the very least it presents an opportunity to quickly gain a working familiarity with equipment that an attendee might otherwise never come in contact with and it does it in surroundings that tend to portray a certain amount of glamor to those not already working in the industry.

That brings up another valuable function of the convention: a clearinghouse for job shoppers. This can be a very effective place to meet the person who can open the entry level door for you, or it can be the place to upgrade your employment. I see informal oral resumes being freely traded both on the exhibit floor and in the corridors outside the meeting rooms. Not only is this a good place to feel out what's available and who's available, but if I want a more concrete job offer, the United States Air Force has a booth, recruiting audio engineers to serve with bands scattered around the country.

If I want to upgrade my formal education in audio, several institutions have booths on the exhibit floor and are more than willing to describe their programs.

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- 1.a. Title of publication: *Sound & Communications*
- 1.b. Publication No.: 943-140
- 2. Date of Filing: 10/1/90
- 3. Frequency of Issue: Monthly
- 3.a. No. of Issues Published Annually: 12
- 3.b. Annual Subscription Price: \$15.00
- 4. Complete Mailing Address of Known Office of Publication: 25 Willowdale Avenue, Port Washington, Nassau, New York 11050.
- 5. Complete Mailing Address of the Headquarters of General Business Offices of the Publisher: 25 Willowdale Avenue, Port Washington, New York 11050.
- 6. Name and address of the publisher: Vincent P. Testa, 25 Willowdale Avenue, Port Washington, New York 11050; Editor: Steve Jacobs, 25 Willowdale Avenue, Port Washington, New York 11050. Managing Editor: N/A.
- 7. Owner (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given. If the publication is published by a nonprofit organization, its name and address must be stated.): Sound & Communications, Inc., 25 Willowdale Avenue, Port Washington, NY 11050; Vincent P. Testa, 25 Willowdale Avenue, Port Washington, NY 11050.
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10. Extent and Nature of Circulation	Average Number Copies Each Issue During Preceding 12 Months	Actual Number Copies of Single Issue Published Nearest to Filing Date
A. Total No. Copies (Net Press Run)	20,410	21,686
B. Paid and/or Requested Circulation		
1. Sales through dealers and carriers, street vendors and counter sales	None	None
2. Mail Subscription	16,572	17,681
C. Total Paid and/or Requested Circulation (Sum of 10B1 and 10B2)	16,572	17,681
D. Free Distribution by Mail, Carrier or Other Means: Samples, Complimentary, and Other Free Copies	3,146	3,112
E. Total Distribution (Sum of C and D)	19,718	20,793
F. Copies Not Distributed		
1. Office use, left over, unaccounted, spoiled after printing	692	293
2. Return from News Agents	None	None
G. TOTAL (Sum of E, F1 and 2 — should equal net press run shown in A)	20,410	21,086

11. I certify that the statements made by me above are correct and complete.

Vincent P. Testa
Publisher/Editor

One of the main reasons I go to an industrial show is for the chance to talk to the people. If I am inclined to theoretical debate, I will find fertile ground at this convention. Whether I want to discuss the merits of 20 bit sampling versus 24 or how many angels can dance on the head of a pin, there will be ample opportunity for my viewpoints and everyone else's to be heard and discussed.

I also like to attend technical sessions. I find that the papers generated outside the industry, within small organizations in the industry, and those generated overseas tend to be the most worthwhile (in that order). Unless I have a special interest, I usually skip the fad subjects, especially in the second year of the fad. That seems to be an effective way to avoid balderdash and rewrites of earlier work. I generally consider the major manufacturer presentations interesting but optional. Their papers will be published in the Journal and/or made available as advertising material. I can pick them up later if I want to.

It's encouraging to attend some of the sessions and sense the tremendous amount of original work that was done in preparing the paper. I come away from a session like that thinking that life is more than just a great big slick sales campaign after all, and that there really are enough new ideas to go around.

SPECIAL ENVIRONMENTS

(continued from page 29)

rigged the system to chime (via a TOA SOIS tone generator) during key times during the day — lunch break, or quitting time.

Using a University ZP-4 zone controller, the operator's Bogen TAM Page Access Module can relay messages to any or all of four main zones: the UPS room, receiving, main manufacturing floor and a large outdoor office. A Crown PS-200 power amp sends out the signal through a University UMX-300 output transformer to the speakers zones throughout the plant.

Wizdum used University PA30BT speakers in most areas: 19 in the low ceilinged factory; 11 on a mezzanine area; six in the UPS room; and one in the receiving room. In the lunchroom and locker rooms Wizdum used three wall speakers and one Quam ceiling speaker, while the outdoor warehouse area is covered by University PA430T horns.

One thing that relates to me as a sound contractor is the continuation of discussions about setting standards for interfacing professional computer aided design drafting programs with sound system design programs. If interfacing can be accomplished, it might be practical to get our blueprints from architects in AutoCad, Generic Cadd or some other CAD file on computer disk rather than paper, with the data they contain capable of flowing right into our sound system design programs. The sound contractor would then run through his or her design routine and ship the revised disk back to the architect, coordinating system designing with fewer chances for errors and omissions.

The main progress that was made in this CAD interface meeting session was the realization that there are important differences between sound system design programs that are intended for use as engineering tools and sound system design programs that are sales and presentation aids. It was pretty much agreed that true compatibility between CAD and sound system design will not come easily or inexpensively, but that it is worthwhile to pursue.

Well, AES was fun. Even as a sound contractor, it was worthwhile. Schedule permitting, I will plan to attend the next one. ■

The "house mix" was controlled on a TOA M-900 mixer, chosen largely to work along with the TOA tone generators, Gomboz said.

The other half of the Henri's Studio installation job was a bit simpler, largely because the factory's corporate offices, showroom, and computer room are decidedly more subdued than the factory. A University MR-355 commercial receiver in the heart of a completely separate background music and paging system for those rooms, Gomboz said.

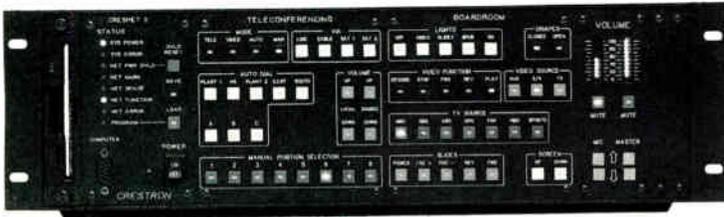
Controlling the sound during different levels of ambient noise — including conversation and the noise of the show — comes into play during theatrical endeavors in restaurants.

SUMMARY

Engineered systems are ubiquitous. The challenge for the contractor, the designer and the manufacturer is to fit the need to the equipment and do it easily and efficiently. ■

PRODUCTS

Crestron Module System; Beckman Handheld DMM



A/V Control System

Crestron Electronics, Inc. has introduced its modular audio visual control system, Cresnet II, for use in a variety of presentations. Origination comes from the master computer. Crestron's LAN technology permits the centralized system software in the master computer module to download the necessary configuration information and programming to the individual control modules.

The card rack design houses system components and control modules that can be added, removed or replaced without removing the card rack from an equipment rack. A selection of modules is available for audio, video and environmental applications.

Circle 1 on Reader Response Card

Pen-Type DMM

The Instrumentation Products Division of Beckman Industrial Corporation has added the DM73 to its line of digital multimeters.

The DM73 is a handheld, pen-type meter that features a three and 1/2 digit display with 0.5-percent accuracy (DC 2V range) and autoranging. It is designed for troubleshooting or installing electronics in tight places.

Circle 2 on Reader Response Card



Audio Ferrofluid

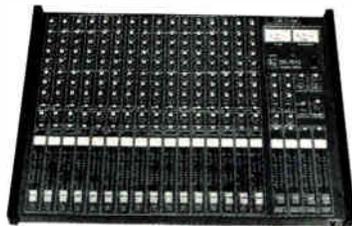
Ferrofluidics Corporation has introduced a series of audio grade ferrofluids which have been designed to withstand extreme temperatures while maintaining stability. The APG 900 Series is designed to operate at voice coil temperatures of 200-degrees Celsius for an extended period of time without significant evaporation.

Circle 3 on Reader Response Card

High End Mixer

Electro-Voice has introduced the BK-1642 stereo mixing console aimed at the high end of the pro music market. It includes such features as a humbucking ground design, high-speed opamps and active servo-balanced outputs to eliminate noise pickup from cables.

Circle 4 on Reader Response Card



Timelapse VCR

Toshiba Video Systems' KV-6110A is a four head, timelapse VHS VCR designed for security and industrial applications. Features on this model include a recording time of up to 360 hours on a single tape. The KV-6119A includes a remote control and RF modulator, which allows the unit to be used with a standard television set.

Other features include a CCD comb filter which automatically switches the unit from extended to standard mode, and an alarm memory function which includes auto freeze frame and replay from the start of alarm recording during fast forward and rewind.

Circle 5 on Reader Response Card



Standalone Access Control

Schlage Electronics has introduced the SE 22 standalone access control system for small businesses and light manufacturing needs. The SE 22 is housed in a wall mount enclosure with keypad or mag-stripe, and will have proximity capability by 1991. The system handles 2600 key holders and has two building control modes as well as three access authorization levels.

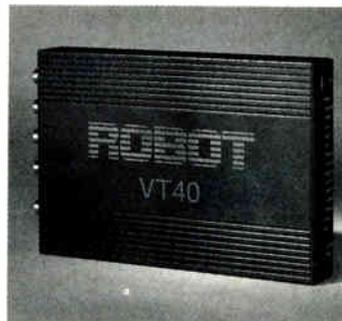
Circle 6 on Reader Response Card



Phoneline Video Transmitter

Robot Research Inc. has introduced a four camera Phoneline Video Transmitter. When used in conjunction with a Phoneline Video System, video, audio, access control, and alarm signals can be transmitted over normal telephone lines. In addition, the VT40 includes built-in sequential switching with programmable dwell time, auto-answer and auto-dial.

Circle 7 on Reader Response Card



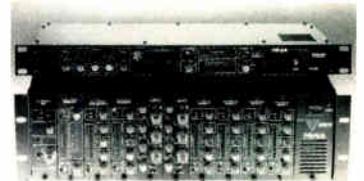
Powered Racks

Valley International's PR-2A and PR-10A Powered Racks are third generation rack enclosures designed to complement the 800 Series modular signal processor units.

The PR-2A is designed to accommodate one or two 800 Series modules in a 1μ rack space. Identical stereo processing modules may be linked via the front panel link switch.

The PR-10A accommodates up to ten 800 Series signal processors in a 3μ rack space and provides XLR connectors as the standard interface for all audio inputs, outputs, and external inputs.

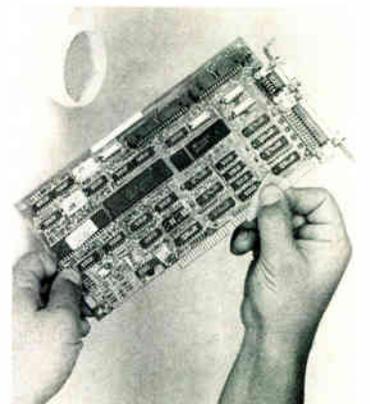
Circle 8 on Reader Response Card



DeOxidizer Wipes

Caig's Cramolin DeOxidizer is now available in wipe applicators that are non-flammable, non-toxic and ozone safe. The kit contains 50 wipes in a recloseable polypropylene container.

Circle 9 on Reader Response Card



Karaoke Key Controller

Denonet Karaoke has introduced the SKC-300 Digital Key Controller which allows its user to change pitch by two half steps, sharp or flat, without changing the tempo. The SKC-300 features two-channel stereo, 12-bit PCM Phase Sync System and nine key control pads.

Circle 10 on Reader Response Card

Portable Sound System

Anchor Audio has unveiled the Liberty 4500, a portable sound system designed for use as a voice projecting system or a "high fidelity" system. The Liberty can be used in and outdoors and can be used with or without ac power.

Features include an automatic protection circuit, treble/bass controls and line level output.

Circle 11 on Reader Response Card



Compressor/Limiter

dbx Professional Products, a division of AKG Acoustics, Inc., has introduced the dbx 160XT Compressor/Limiter, a "next-generation" version of the 160X.

New features include separate active balanced and single-ended outputs, XL-type connectors, a ground-lift switch at the balanced input, and additional matched RMS detectors for power summing when stereo strapped with another 160XT.

Circle 12 on Reader Response Card



Small-Size CCTV

Gyyr, a division of Odetics, has introduced its EZCAM-224. Measuring 50 x 53 x 139mm, the EZCAM-224 features both an internal zoom lens and built-in isolated ground transformer.

The manual zoom lens includes four screwdriver-accessible adjustments: focus, zoom, automatic gain control and line phase. A 1/2-inch CCD image chip contains 250,920 picture elements. A line-phase adjustment system allows a vertical video synchronization signal to be adjusted 200 degrees for use with multiphase power systems.

Circle 13 on Reader Response Card



Mini Matrix System

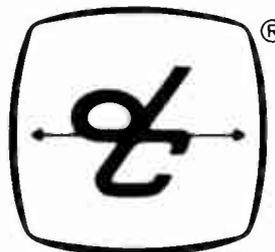
Javelin's JO440/10 and JO430/5 Mini Matrix System is designed to incorporate matrix switching, alarm switching, pan/tilt/zoom control, remote relays, among other functions, into one package about the size of a desktop computer.

The Mini Matrix is available in two camera monitor configurations: 40 cameras to 10 monitors (JO440/10) or 30 cameras to five monitors (JO430/5).

Circle 14 on Reader Response Card



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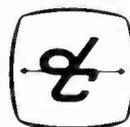
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Circle 259 on Reader Response Card

Matrix Switching System

Sanyo has introduced the SMS 328 Matrix Switching System. Its basic configuration of 32 cameras by eight monitors is expandable up to 96 cameras by 16 monitors. The SMS 328 is color compatible and capable of handling high resolution video with 12 MHz bandwidth while producing a signal-to-noise ratio of 66 dB.

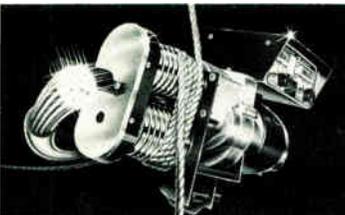
Circle 15 on Reader Response Card



Fiber-Optic Puller

The Model 805 controlled force, variable speed fiber-optic puller from Greenlee Textron Inc. is designed to meet pulling requirements of fiber-optic and other types of communication. It provides operator control over both pulling force and speed and includes a force limit feature that shuts down the puller when the preset force level is reached.

Circle 16 on Reader Response Card



CCD Camera

Burle Industries, Inc. has introduced the TC650E and TC650EX Series solid state CCD cameras. This 1/2-inch format camera requires 0.15 lux scene illumination for useable video. The variable gain AGC circuit provides up to 30 dB of additional amplification for increased sensitivity at low light levels.

Circle 17 on Reader Response Card



Modular Wiring

The AMP Innergy modular wall wiring system incorporates junction boxes, duplex receptacles and cable assemblies for electrifying modular office walls in new or retrofit applications.

The system is rated at 20 amperes, with duplexes at 15 amperes, and meets UL 183, 498 and 1,286 standards.

Circle 19 on Reader Response Card



Video Transmitter

Northern Information Technology (NIT) has introduced a two camera remote slave transmitter, Model 1100T, that is designed to serve as a self-contained, remote controlled, phone line video surveillance transmitter, with the addition of one or two video cameras.

When used in conjunction with an NIT automatic tele-imager receiver, the 1100T can be used for look-in surveillance, with the receiver being used to call the 1100T and commanding it to send one picture or a series of pictures at two, eight, 16, or 32 second intervals from one or both cameras in sequence.

The 1100T also provides an Alarm Zone for each of the video cameras, an accessory speakerphone, and two remote control relays.

Circle 18 on Reader Response Card



Fiber-Optic Link

ORA Electronics has introduced a fiber-optic link for use with video signals. The Model TRX400 consists of the TX200 transmitter and the RX200 receiver. The TX200 takes standard composite video via its female BNC connector and converts it to an optical signal. The optical signal connects via standard optical SMA connectors and 70-100 Micron fiber-optic cable with the RX200. The receiver converts the optical signal back to standard composite video signal.

Circle 20 on Reader Response Card



Cardioid Minis

University Sound is introducing two miniature cardioid condenser gooseneck microphones, US-1700 and US-1718. Both models are phantom powered and designed for mounting to a lectern, pulpit or podium. Features include a frequency response of 70-20,000 Hz and the "Back Electret" feature which is for sensitivity, frequency response and handling noise considerations.

Circle 21 on Reader Response Card

Switching and Expansion

FSR, Inc. has announced the production of a power switching unit, the SP-ES, and a companion expansion unit, the SP-2ES.

The SP-ES provides delayed sequential turn-on of rack ac and amp ac, the reverse on turn-off. The SP-ES features supervisory status, fault indications of ac power, full remote control and all UL-listed components.

The SP-2ES provides expansion of two additional loads, as well as local LED indication of fault and channel status. The SP-ES can directly handle up to 15 SP-2ES units.

Circle 22 on Reader Response Card



Overhead Projector

Apollo Audio Visual has introduced the Apollo Cobra, a reflective overhead projector that is designed for quick set-ups and stores in an attache' case. The Cobra weighs seven and 3/4 pounds by itself and 14 pounds when packed in its case. Features include an extra lampchanger cartridge, a three-element lens, a halogen lamp, a fan and an automatic thermal cut-off switch.

Circle 23 on Reader Response Card

Character Generator

Multiplex Technology is introducing a full screen character generator for commercial applications. The model FSC-1 displays individual "pages" or "slides." Each page has 16, 32-character wide lines of information.

Additional features of the FSC-1 include the capability of storing information, placing the pages in a specified order and adding a crawl line and/or a time and date display to a page. Automatic and custom sequencing of pages, and the addition of up to a 960 character long crawl line or time and date display at the bottom of pages are among user-selected options.

The FSC-1 can be used as a "house" channel in hotels, hospitals and cable television systems, among other applications.

Circle 24 on Reader Response Card



Bud Catalog; MultiLink Teleconferencing

Cabinets and Enclosures

Bud Industries, Inc. has developed a 50 page catalog featuring its line of standard enclosures and accessories. The catalog provides full color illustrations of many of the standard products and design features, technical data and ordering information on various standard product combinations.

Also included is information on Bud's custom fabrication services and enclosure accessories.

Circle 25 on Reader Response Card

Teleconferencing Options

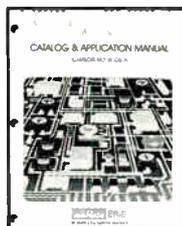
MultiLink has announced the availability of a brochure to assist organizations in evaluating the use of audio teleconferencing. "New Perspective on Teleconferencing" discusses current trends and presents the factors to be considered in deciding between the use of a service bureau and the purchase of equipment.

Circle 26 on Reader Response Card

Surface Mount

Murata Erie North America's new 44-page surface mounted components catalog and application manual, No. G-05-A, includes detailed specifications and application information on surface mount capacitors, potentiometers, inductors, EMI/RFI filters and ceramic filters and resonators. The manual also includes information on Murata Erie's design engineering kits for surface mount prototyping applications.

Circle 28 on Reader Response Card



Disconnects

USD Products offers a 20-page fused and non-fused disconnects catalog that includes illustrations, ordering information, photographs and specifications for its line of fused and non-fused disconnects.

Products featured in this catalog include: fused current interrupts for telecommunications; fused disconnect assemblies; fused and non-fused dead front pull-apart switches; disconnect block and sectional 600V disconnect block assemblies; and battery disconnect switch.

Circle 29 on Reader Response Card

Transmission Tester

The Instrumentation Products Division of Beckman Industrial Corporation is offering a six-page, full-color brochure for the TMT-1 transmission medium tester. The TMT-1 is a portable instrument designed to verify the capability of installed LANs to conduct information traffic. It performs a series of electrical tests in automatic sequence (AutoTest) or individually under operator control (Diagnostic mode).

Circle 30 on Reader Response Card



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Circle 252 on Reader Response Card

NEWS FROM AROUND THE INDUSTRY

Corporate Video Networks; New Installations

SONY SATELLITES

Sony has developed an "Intelligent Satellite Distribution System" which allows corporate video networks to control Sony recording, playback and display devices throughout their networks from a centralized uplink site. Full motion and still video images can be received and stored automatically at unattended satellite downlink sites. Two new Sony products give the system its capabilities: the FSR-2000A Addressable Satellite Receiver and a programmable decoder/controller. Both units are designed to be installed in a rack system at each downlink site.

REP NEWS

WestTech Awards

WestTech Marketing held a party during the recent Audio Engineering Society convention, during which the company presented its own awards. The awards went to: Sales Manager of the Year, Tim Dorwart, Bose Corp.; Best Pro Audio Manufacturer, Jeff Wetherell, Telex Comm.; Best New Product 1990, Scott Miller, AMX; Best Leadership by a CEO, Peter Tarlton, Wheelock Inc.

Warren Associates

Warren Associates has been named Aiphone Corp. representative for the Hawaiian Islands. Warren Associates also serves Northern California and northern Nevada.

Spencer Appointed

John M. Spencer has been appointed vice president of Applied Audio Marketing, Inc., the manufacturer's representative firm serving the southeastern United States. Applied Audio president Bob Edsall commented, "John's territory sales have consistently been above quota, and his commitment to both our dealers and manufacturers merit his promotion."

Jones Audio Appointed

Hill Audio has signed Jones Audio Sales to represent its line of mixing consoles and power amplifiers, covering Texas, Arkansas, Oklahoma and Louisiana.

Calendar Available

The 1990/1991 Electronics Industry Calendar is available from the Electronics representatives Association. The 16-month, at-a-glance calendar includes dates, locations and contact telephone numbers for more than 100 national and international electronics industry trade shows.

New Office for Components Sales

Communications Components Sales has opened a new sales and support office in Quebec. In conjunction with the new location, Jocelyn Bournival has been appointed CCS regional manager for Quebec and Eastern Canada. Components Sales represents Burle security products. The new office covers all of Quebec and the maritime provinces.



Jocelyn Bournival

Tannoy Seminar

Over 40 people representing 15 different U.S. sales rep firms met in Kitchener, Ontario for an orientation on Tannoy's new Monitor Series. The weekend included a tour, an in-depth training session on speaker technology and on Tannoy's Differential Material Technology, and A-B comparisons of the new speakers.

Central Marketing

The Professional/Industrial Division of Maxell Corporation of America has added Central Marketing, Inc. to its rep force covering the states of Illinois, Wisconsin, Iowa, Michigan, Nebraska, Kansas, Minnesota, North Dakota and South Dakota. The announcement was made by Jim Ringwood, General Manager of Maxell's professional division.

Dimtrex Appointed

FSR, Inc. has appointed Dimtrex the exclusive stocking distributor for its product lines in Canada.

JBL INSTALLS

JBL has announced several new product installations. TSI has completed a new system installation for General Signal in Stamford, Connecticut, using JBL 4412 monitors in the facility's Conference room for playback purposes. Aspen Audio, Inc. has installed a new main house system at the Silvertree Hotel in Snomas, Colorado. The system includes two 4871A Concert Series systems. Up With People has pur-

chased 24 SR4725 systems and six Soundcraft 200 Delta consoles for their performances. The equipment was purchased from Consolidated Audio Visual Services in Tucson, Arizona.

CONFERENCING SYSTEM

Tradestar Network Systems, Inc. has begun offering its "audiographics" conferencing system to businesses nationwide. The company has begun providing the service to three companies in the brokerage investments business. The system provides addressable voice and image broadcasts. Voice broadcasts can be sent to an unlimited number of locations. Image transmission is used to send presentation materials directly to printers.

NEW PROGRAM

A program to help electronic/electrical designers select proper wiring and other interconnection products is planned for unveiling by Alpha Wire corporation at Wescon '90. Designated "Wire Management," the program groups non-wire products for interconnect needs into six distinct families — harnessing, shielding, handling, connecting, identifying, and routing. Alpha has introduced a number of new interconnection products in support of the program.

FSR AWARDED CONTRACT

FSR, Inc. has been awarded a contract to produce 20,000 Keypad Response Systems for the Academic Information Systems of IBM. The system provides an individual keypad per student, which is used to answer questions, ask for help, or participate in discussions. The system gathers the information and displays the results on a monitor or projector screen.

OXMOOR MOVES

Oxmoor Corporation has relocated to 2111 Parkway Office Circle, Birmingham, Alabama. According to national sales manager Richard C. Mitchell, "The larger space permits us to increase our research and product development staff." Expansion plans include additions to sales and support staff.

RCI MOVES

RCI Sound Systems is moving to larger facilities in Rockville Maryland. The move, effective October 1, is to a 14,000 square foot headquarters 10 miles outside Washington, D.C. RCI Sound Systems is affiliated with RCI Systems, the audio engineering company and pro audio dealer. Major clients include Marriott Hotels, Busch Gardens, and the U.S. government.

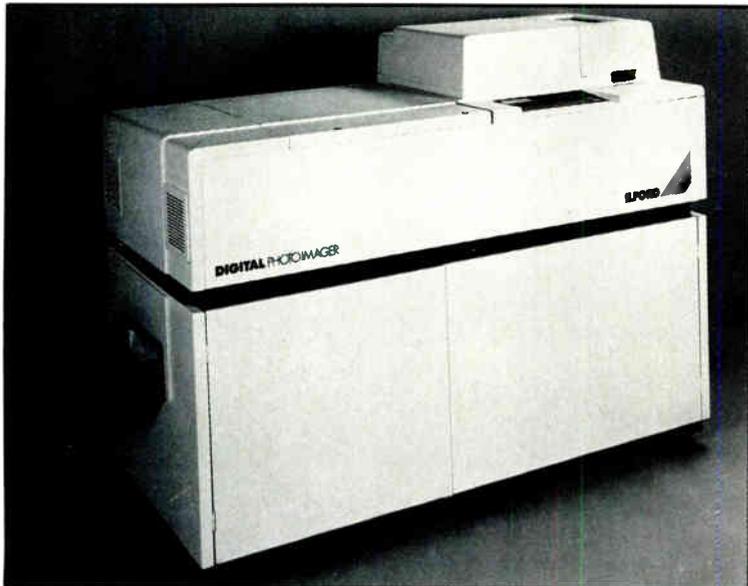


ALT president Jury Altov (left) and vice president Mati Vaarman (right) with EV president Paul McGuire.

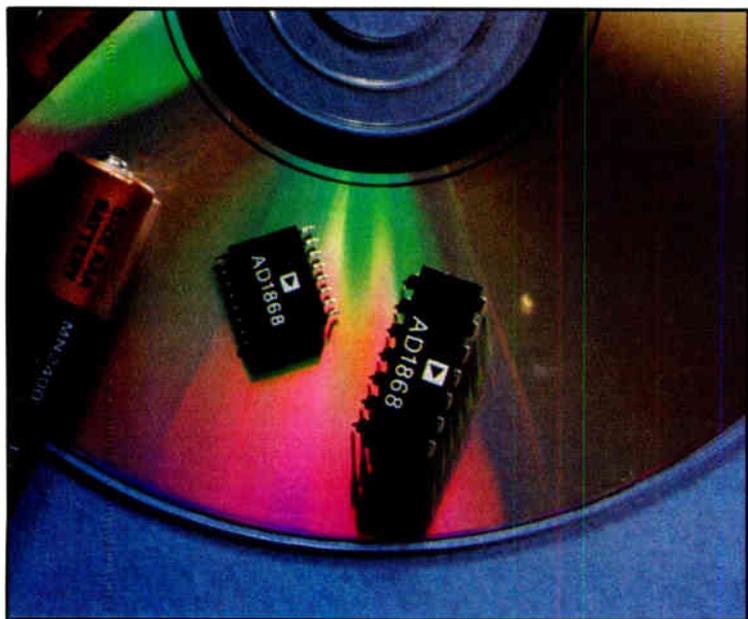
E-V SALES TO SOVIET UNION

Electro-Voice has announced that the largest private audio company in the Soviet Union, ALT Show Service and Management, has purchased 42 Electro-Voice MT-4 concert speaker systems. ALT President Jury Altov has indicated, according to E-V, that his firm plans to purchase 32 more MT-4 systems later this year.

ALT provides audio and lighting systems, as well as transport, rigging systems and full-service audio crews to the country's concert market. Among the events for which ALT has provided audio are a concert held last year at the Moscow Olympic Stadium which drew more than 150,000 people.



The Ilford Digital Photo Imager.



Analog Devices 18-bit D/A converter.

DIGITAL-TO-ANALOG CONVERTER

Analog Devices, Inc. has announced a monolithic dual 18-bit digital-to-analog converter designed for single-supply audio applications. Measured according to EIAJ standards, the AD1868 reportedly offers .004 percent total harmonic distortion plus noise, and 97.5 dB signal-to-noise ratio. Channel separation is 108 dB minimum.

DIGITAL PHOTO IMAGER

Ilford Photo Corporation has introduced the Digital Photo Imager, a digital color printer that produces continuous tone prints, overhead transparencies and 35mm slides directly from computer-based digital input with photographic quality. The unit marries the Ilford photographic processor with a laser-addressed liquid crystal light valve imaging engine.



Ernie Eudy, CEO of Horizon, and Jerry Freed, Freed International.

HORIZON SIGNS FREED INTERNATIONAL

Horizon Mfg. Co. has announced the establishment of Freed International as exclusive sales agency for the export market; and as Horizon's exclusive selling agent to the U.S.A distributors and OEM clients. Horizon Manufacturing's wire and snake factory is located in southeastern Missouri. Freed International is located in Fort Worth.

RUSS BERGER DESIGNS

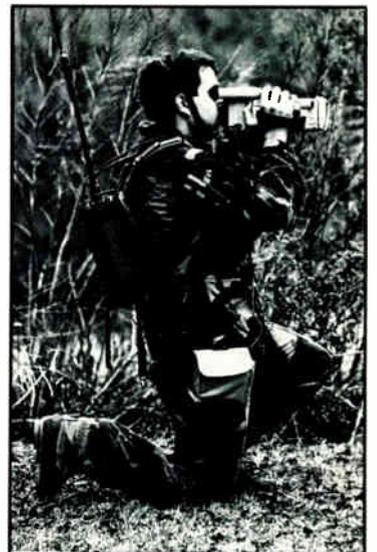
Several new jobs have been designed by Russ Berger Design Group, Inc. Edit 7, an audio post and support space dedicated to the Saturday Night Live show is made up of an audio control room, voice-over booth, machine room and support area. Sound isolation and HVAC noise control proved to be key considerations in the project design, as the space is located directly above the David Letterman Band set and adjacent to the Saturday Night Live studio support areas. Russ Berger Design is providing additional edit suites and acoustical direction at NBC facilities. In addition the company has completed work for ABC, Bill Young Productions, and General Television Network.

SURROUND AUDIO

RCA Victor Records is issuing audio-only discs recorded and mixed in Dolby surround. The discs will be supported by posters at Yamaha dealers, where the discs will be available for in-store audition. The new discs feature the music of Henry Mancini.

MOBILE COMMAND

Harris RF Communications completed construction and delivery of a Mobile Command Center for an unspecified customer in the Middle East. The center consists of a custom communications shelter on a four-wheel drive vehicle, with a companion generator trailer. The shelter provides voice, data, fax and data communications via HF, VHF, UHF and telephone links. The system uses dual live video links from forward observers for field surveillance activities. Video images are transmitted through a backpack-mounted UHF low-power, color, full motion transmitter, and are recorded and monitored on multiple screens in the command center.



Bose Modeler Revisited

Part 1: The Sound System Software Series Ships Its Annual Update

BY MIKE KLASCO

Bose Corporation began shipping its latest version of Modeler, release 3.1 in July of this year, as part of the company's annual update program. Modeler is part of the Sound System Software series of programs from Bose Corporation. Two other programs supplement Modeler and include SpeakerCAD for mechanical design of clusters and other speaker arrays, and Rackmaker for rack layout drawings and bill of materials. The Modeler Design Program was introduced in 1985 at the NSCA Expo in Las Vegas. Tom Birkle, the program's author, was then working with the acoustical consulting firm of David L. Adams Associates. In 1988, Tom became a full-time member of the Bose engineering staff. Modeler 2.0 was reviewed in *Sound & Communications* during 1989 in the March and April issues. Modeler 2.0 was a milestone for Bose, as the program really had begun to come together with enough useful performance simulations as well as bug-free operation. In May 1989, we reviewed SpeakerCAD. At the 1989 NSCA, Modeler 3.0 was previewed, and in a capsule review [*Sound & Communications*, June 1989] I reported on the dramatic enhancements made to the program. I promised to review Modeler again when the intelligibility prediction module was included with the program.

The software developers at Bose have been very conservative in adding this module, as this topic is controversial and as yet unresolved. Apparently the fellows at Bose now have enough confidence in this area that it has finally been included. In fact, since the inception of Modeler, Bose engineers have conducted experiments and comparisons of intelligibility algorithms in use. Ken Jacob, the lead engineer on this project, has received a Fellowship Award from the AES for his work on speech intelligibility. Many other additions and refinements have been added to Modeler, including an expanded software manual, an optional audio engineering manual and short training course, along with such niceties as color graphics (both for the video monitor and hardcopy printouts).

SOFTWARE LICENSING REQUIREMENTS

Modeler is available to acoustical consultants, educational institutions and sound contractors. Essentially, for a sound contractor to use Modeler, he or she must be a Bose dealer. Other considerations are that you are not buying the program, only licensing it. You must renew your lease on Modeler every year, and it is up to Bose to decide if the lease is to be renewed. Bose Corporation's position on this mat-

ter is two-fold. One is that given the substantial advances this project has shown, Bose would like anyone associated with them on this level to have only the latest version available. Reason two is that engineering software is expensive to develop and support and the user licensing fees do not begin to cover the real costs.

So, as a contractor (or dealer), if your long term plans do not include Bose products, this may not be the program for you. I will briefly remark on two points: one is that Bose is completely upfront about this philosophy, and secondly, that regardless of this marketing stance, the program is just as effective in modeling central clusters as it is in dealing with distributed systems. Nevertheless, the fact that you must remain "in the good graces of Bose" is a factor to consider in light of the initial monetary commitment for the software (and perhaps the Mac computer) as well as the time you must invest in learning the program.

HARDWARE REQUIREMENTS

Modeler runs on the Macintosh computer, including all currently available models and the new, less expensive models that will be introduced shortly. Modeler+ is a faster version that is included in the basic license fee, and this

program will run on Macs with a coprocessor, such as the MacSE and Mac II series. The intelligibility STI module is only included in Modeler+, as calculation time would take too much time to be practical without a coprocessor. Adding a coprocessor to a Mac is an expensive proposition, although all MacSE and Mac II series computers have a coprocessor as standard equipment. Color monitors and color printers are supported. Dual 800 K floppy drives are required to run Modeler, but a hard disk is recommended. While the program will run on an old 512K Mac, to get the real advantages of this type of computer you should have a minimum of 1 meg, if not 2 or 4 meg of memory. By adding 2 or more meg of memory (RAM), you can then use the Macintosh Multifinder which allows more than one program to be open at the same time. This gives you the ability to quickly and conveniently move from one program to another in the course of a days work. Even better, it will allow you to quickly move data from one program to another.

USER INTERFACE

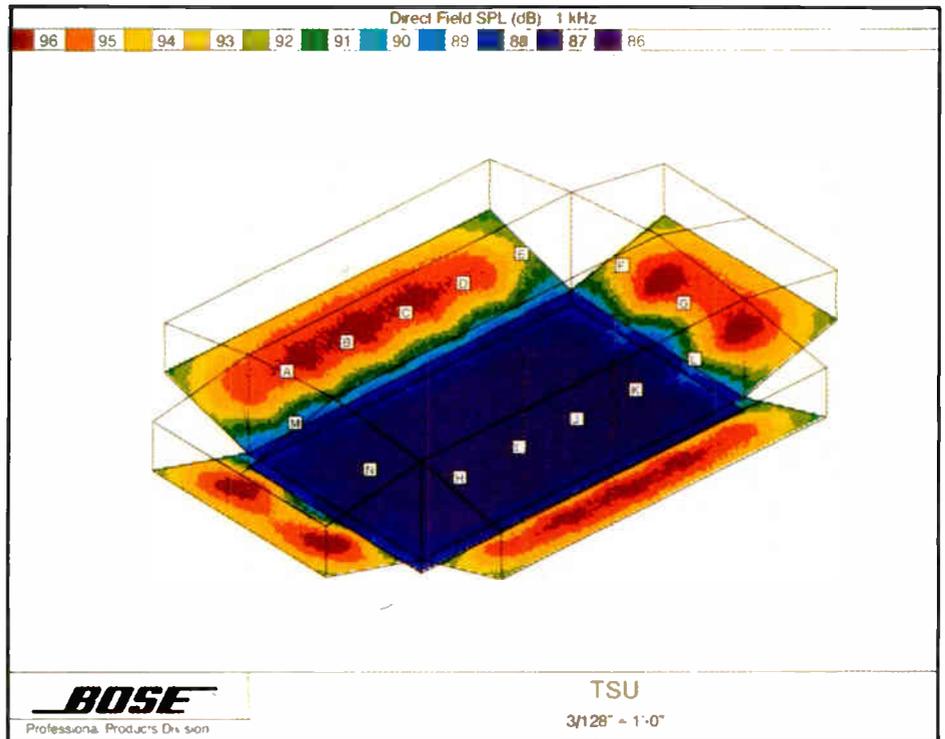
Modeler 3.1 uses the standard Mac user interface, which means overlapping windows, pointing with a mouse and pull-down menus. Almost all Mac programs follow this format which means once you become familiar with one program, all mundane functions from printing, to saving to disk, to editing, to quitting the program are basically the same. Each release of Modeler has more closely embraced the Mac standard and 3.1 is not only compatible, but takes full advantage of the interface's strong points.

The primary window in Modeler is the Room Model window which enables creation of a three dimensional room model, location of multiple sound sources and prediction of acoustical performance.

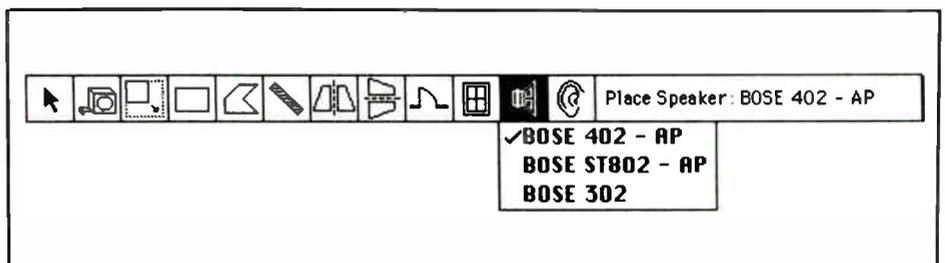
The Room Info window maintains and displays a list of the room surfaces, Z coordinates and associated surface materials.

The Speaker Info window provides control over the loudspeaker database.

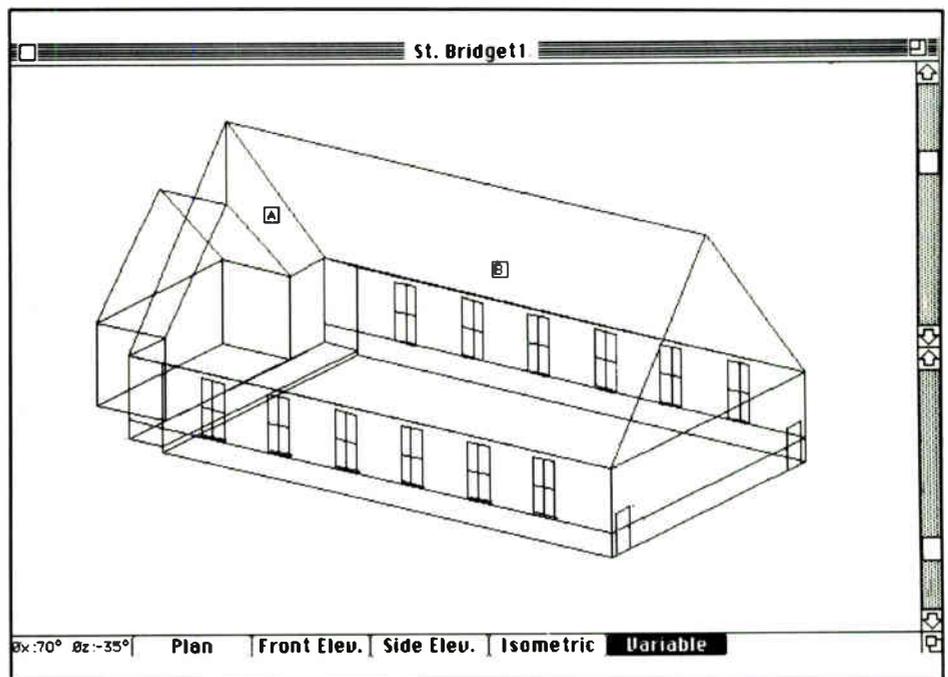
The Aiming Info window maintains and displays a record of aiming angles, power levels, time delay and equalization for each



Sample of a Modeler printout showing the 12,000-seat basketball arena at TSU.



The Drawing Tools palette provides on-screen drawing tools.



The primary window in Modeler is the Room Model window which enables creation of a three dimensional room model, location of multiple sound sources and prediction of acoustical performance.

loudspeaker currently used in the system design.

The Materials Info window maintains and displays a list of surface materials that may be applied to the room model.

DOCUMENTATION

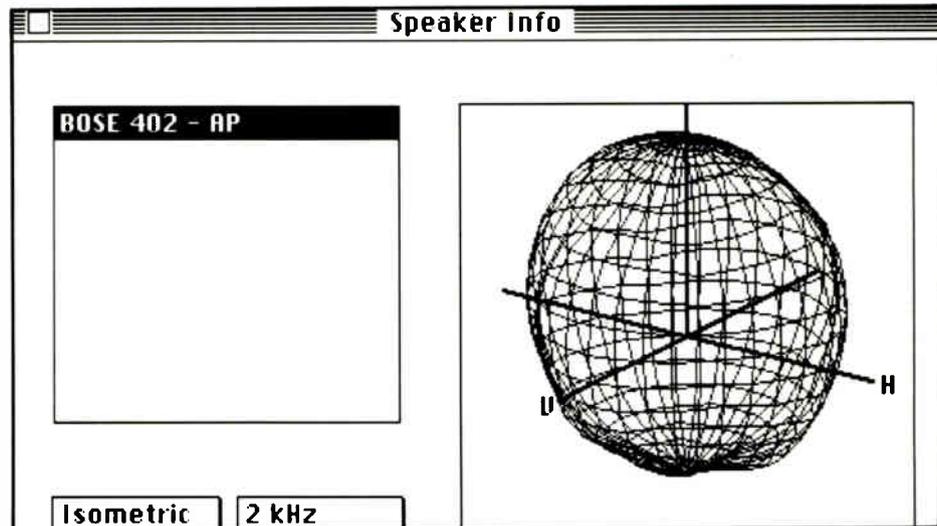
The Modeler package includes a well-written manual plus a number of supplementary documents. The manual is comprehensive and contains both simple and sophisticated tutorials, detailed instructions and reference index and appendices. When I previously reviewed Modeler 2.0, I lamented the omission of practical guidelines for engineering sound systems with the program. Bose has recently introduced an engineering manual in conjunction with a short course on sound system design. Within this concept, Modeler and the other Bose software are conceived of as a practical way to implement this approach. Other collateral documents are both simple design proposals (for a gym) and a comprehensive data package detailing the 1988 Olympics at Calgary. Still other supplements include a comparative study of alternative solutions to various types of installations using centralized, decentralized and "water-fall" configurations of speakers. Price, performance, and esthetics are compared. Finally, a quarterly technical bulletin has just been initiated, which will deal with the various aspects of using Modeler. All in all, this is by far the most extensive support program that has been implemented for sound design CAD programs.

FEATURES AND CAPABILITIES OF MODELER

In reviewing sound system design programs, I mentally use a check-off list of desirable attributes. Modeler has more of these "wish list" items than any other program I have reviewed to date. How Modeler copes with my wish list follows:

AN OVERVIEW

As part of the Sound System Software family from Bose, Modeler allows the design of any type of sound system indoors or outdoors. It allows the designer to work a comprehensive library of competitive



The Speaker Info window provides control over the loudspeaker database.

	Speaker	Status	Cluster	Height	Roll°	Pitch°	Yaw°	dBW	Time(ms)
1	BOSE 802 - AP	On	A	40.0	0.0	24.2	89.8	21.0	0
2	BOSE 802 - AP	On	B	40.0	0.0	24.2	89.8	21.0	0
3	BOSE 802 - AP	On	C	40.0	0.0	24.2	89.8	21.0	0
4	BOSE 802 - AP	On	D	40.0	0.0	24.2	89.8	21.0	0
5	BOSE 802 - AP	On	E	40.0	0.0	24.2	89.8	21.0	0
6	BOSE 802 - AP	On	F	40.0	0.0	21.1	15.7	23.0	0
7	BOSE 802 - AP	On	G	40.0	0.0	21.1	-15.7	23.0	0
8	BOSE 802 - AP	On	H	40.0	0.0	24.2	-89.8	21.0	0
9	BOSE 802 - AP	On	I	40.0	0.0	24.2	-89.6	21.0	0
10	BOSE 802 - AP	On	J	40.0	0.0	24.2	-89.6	21.0	0
11	BOSE 802 - AP	On	K	40.0	0.0	24.2	-90.2	21.0	0

The Aiming Info window maintains and displays a record of aiming angles, power levels, time delay and equalization for each loudspeaker currently used in the system design.

loudspeakers, from SoundSpheres to JBL, E-V, and other raw components, to "one box" systems from Apogee and others (even Bose products have been included!). Modeler is intuitive and allows for rapid system design and editing of system parameters, as you will see.

Efficient creation of 3D models.

Modeler uses a powerful combination of "rubber band" lines moved about with the mouse, a coordinate spreadsheet, and entry of surface materials during the creation of the 3D room model. Added tools, such as easy plugging in of windows and doors (25 of each), and up to 256 surfaces of up to 10 sides each. Symmetrical rooms can be created quickly by generating one quarter of the space and mirroring the remaining quarters. In the category of room modeling, both in terms of sophistication and ease and speed of use, Modeler 3.1 has not only corrected the weaknesses

mentioned when I reviewed 2.0, but has the lead on any other program I have reviewed to date.

Obstructions can be shown.

Aside from efficiently creating room models, Modeler has the ability to show the effects of overhead seating shadowing lower seating areas (or the effects of other obstructions). The ability to shadow obstructions has been a unique feature of Modeler and has not been achieved by any of the other programs reviewed to date. Another capability is reflection analysis and predicting and setting time offsets between speakers.

Ability to view simulations while changing parameters.

The use of the Mac's overlapping windows allows spreadsheet windows to be superimposed over the graphic image of your design, so data can be manipulated without leaving the design.

Room Info									
z2		13.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
	Material	Type	Interferen	z1	z2	z3	z4	z5	
1	Plaster	User 1	No Obstr	0.0	0.0	13.0	13.0	-	
2	2" Decoustic Panel -	Wall	No Obstr	0.0	0.0	42.0	13.0	-	
3	Plaster	User 1	No Obstr	1.0	1.0	30.0	13.0	-	
4	Plaster	User 1	No Obstr	1.0	1.0	13.0	13.0	-	
5	Plaster	User 1	No Obstr	1.0	1.0	13.0	13.0	-	
6	Plaster	User 1	No Obstr	13.0	13.0	30.0	42.0	-	
7	Wood Parquet	User 1	No Obstr	13.0	42.0	42.0	13.0	-	
8	Wood Parquet	User 1	No Obstr	13.0	30.0	30.0	13.0	-	
9	Plaster	Wall	No Obstr	0.0	0.0	13.0	13.0	-	
10	2" Decoustic Panel -	Wall	No Obstr	0.0	0.0	42.0	13.0	-	
11	Plaster	User 1	No Obstr	1.0	1.0	30.0	13.0	-	

The Room Info window maintains and displays a list of the room surfaces, Z coordinates and associated surface materials.

Materials Info									
Title		Gypsum over 2 x 4 - 16" oc						<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Title	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz		
1	Carpet on Conc.	0.02	0.06	0.14	0.37	0.60	0.65		
2	Linoleum	0.02	0.03	0.03	0.03	0.03	0.20		
3	Wood Parquet	0.04	0.04	0.07	0.06	0.06	0.07		
4	Plaster	0.01	0.01	0.02	0.03	0.04	0.05		
5	Plywood Paneling	0.28	0.22	0.17	0.09	0.10	0.11		
6	Brick Unglazed	0.03	0.03	0.03	0.04	0.05	0.07		
7	Concrete Block - Unpainted	0.36	0.44	0.31	0.29	0.39	0.25		
8	Velour - 18 oz - 50% Fullness	0.14	0.35	0.55	0.72	0.70	0.65		
9	Concrete	0.01	0.01	0.02	0.02	0.02	0.02		
10	Gypsum over 2 x 4 - 16" oc	0.29	0.10	0.05	0.04	0.07	0.09		
11	Glass	0.35	0.25	0.18	0.12	0.07	0.04		
12	Marble or Glazed Tile	0.01	0.01	0.01	0.01	0.02	0.02		
13	Partition - Accordian	0.33	0.20	0.15	0.10	0.05	0.05		

The Materials Info window maintains and displays a list of surface materials that may be applied to the room model.

Fast and easy speaker manipulation for locating, aiming and moving speakers and clusters.

This is another area where Modeler excels. Use of the mouse and a spreadsheet combines fine and coarse adjustment. The use of both data coordinates and visual image is the best approach I have seen to date.

Clusters can be moved simply by "clicking" and "dragging" with the mouse. This is a very important capability although a few other programs now offer this feature. As with "mirroring" a room, using the standard Mac "copy" command, you can duplicate and paste clusters without the tedious data/coordinate entry required of all previously reviewed programs.

Easy to compare performance at different frequency bands.

While all programs allow the operator to

view the results at different frequency bands, this typically is time consuming, and careful viewing of wide band coverage is generally awkward. Only Modeler calculates as many bands as the operator assigns so each band can be viewed without excessive effort. Beyond this, the program will average the results over multiple bands as well as sweep the results of the simulations over various bands ("animation").

File import and export.

Modeler is intended to predict acoustic performance and therefore displays the room model along with the specified speaker locations. SpeakerCAD can then be used to display the physical properties of loudspeakers and arrays by importing a design from Modeler. SpeakerCAD will then create high resolution speaker or cluster drawings, including renderings of the room. Both Modeler and SpeakerCAD

can export PICT format files to AutoCAD. With PICT format files you cannot manipulate components once you are in AutoCAD. Even so, with AutoCAD you can send your drawings to a plotter for large format C or D size color plots or re-export your files to MS-DOS AutoCAD.

Modeler 3.1 pretty much addresses the criticisms I had of release 2.0 and that was almost two years ago. For 1991 I want more!! It would be great to have the following enhancements to Modeler:

Clearer indication of each speaker's coverage within the room during the initial speaker selection process. A spot-check for the direct sound level is provided, where the user clicks the mouse for a point-by-point indication of SPL. Although Modeler allows the designer to see the on axis "Hit Points" of any speaker used, I would like to see some variation of the "isobeam" coverage balloon used by AcoustaCADD and NEXOCAAD. Modeler actually does generate a coverage balloon in the speaker window, but not in the room model.

An indication of critical distance. I think this is an important bit of information that would aid a sound system designer in gauging the type of speaker he should be using.

Gain-before-feedback is a complex task to implement in a sound system engineering program. It is a common wisdom that simple PAG-NAG equations usually will not yield meaningful results. Bose engineers do not believe that simple gain-before-feedback equations exploit the sophistication of existing computer models and are therefore working on a new algorithm. Gain-before-feedback is also covered in the Bose textbook that accompanies the Bose Sound System Design Seminar.

With such sophisticated room modeling capabilities, it is a shame not to be able to use diffusion devices (*i.e.*, RPG among others).

Next month we will take a closer look at Modeler's acoustical and sound system simulations, including its unique intelligibility prediction capability, its expanded speaker file library, and Bose's supplementary sound system engineering manual. ■

CAD PERISTROIKA!

By Mike Klasco

In the July 18, 1990 issue [Technically Speaking: Audio Software Compatibility] of Sound & Communications, I reported on a meeting held by audio software engineers last April at the NSCA.

The purpose of this meeting was to start a dialogue among the software developers in order to try to begin to sort these differences out. Readers of *Sound & Communications'* software reviews are used to hearing me wistfully long for speaker directional file compatibility and room model interchange between programs.

Last year I saw the beginnings of a trend that threatened the future viability of CAD software. First and second generation programs either included various brands of direct radiators, drivers and horns (PHD, Umbulus, Bose Modeler) or had an open database that allowed the user to add other components. But new releases of a number of programs have "locked out" the user from entering any additional speakers into the library files. In some cases only the "members" (components) of a corporate family were included, while in other cases the software would include data submitted by other manufacturers. From the software developer's side, some are worried about other manufacturers incorrectly creating the directional data files for their programs and want an opportunity to review the data used with their software. The software developers who do not include competitive products and who also lock out new data within the program itself appear to be doing themselves the most harm.

Compounding these problems is the fact

that each program has different resolutions (and different definitions of resolution!), measuring distances are not defined (such as how to compensate for differences in distance), bandwidth of the directional measurements varies between $\frac{1}{3}$ octave and octave band. With these differences, the thought of file format standardization enabling transfer between programs seems hopeless.

For example, what is the sense of including "headers" within the speaker directional files for frequency centers in a particular location in the file if in one program it is octave while in another it is $\frac{1}{3}$ octave. Even when software developers allow (competing) manufacturers to submit their products, the complexity of each manufacturer re-measuring his speakers to three or four different standards would be an incredible waste of time. If this sort of effort is to be expended, it would be better spent documenting the typical performance of arrays rather than redundant measurements of single components. I feared the energy spent at cross-purposes would slow the further growth of CAD tools for audio, just as the battles over standards for quad sound in the 70s and stereo AM in the 80s damaged those developments.

Concurrently with these developments I heard from various software developers of their efforts to develop the capability to import and export to AutoCAD, the industry standard for mechanical and architectural drafting. It would seem that instead of a half a dozen audio engineers duplicating their efforts trying to interface to the same drafting program, they might coordinate their efforts.

With these thoughts in mind, most of the audio software industry met informally last April at NSCA. The bottom line of the meeting was that there was general agreement to try to find some common ground and to meet again. Joel Lewitz (of Lewitz

and Associates, the acoustical consulting firm and Dr. Walter Black (of VDP) worked with me to coordinate the effort.

I spoke to Joel about another meeting during the AES and we agreed that this would be timely. Folding this project into an AES Standards subcommittee was discussed. I asked Dr. Black to poll the participants and the interest was high. Various other engineers who had contacted me about this project were also invited. The meeting was set for 6:30 Sunday morning, the only time the entire group was available. I had severe reservations about anyone showing up (including myself!).

THE THOUGHT OF FILE FORMAT STANDARDIZATION ENABLING TRANSFER BETWEEN PROGRAMS SEEMS HOPELESS.

At the AES I discussed the project with Daniel Queen, chairman of the technical council and secretary of the standards committee, and at the Sound Reinforcement Components Standard Meeting. The turnout for that meeting was disappointing and I was worried about the unofficial CAD software meeting the next day. We made the best of the Standards Meeting and planned for both the 6:30 AM meeting and the Architectural Acoustics standards meeting at 9 AM chaired by David Klepper, chairman of the working group on Architectural Acoustics. Architectural Acoustics Standards would be the best place for standards on room modeling and materials characteristics. Perhaps we would even be able to begin to deal with diffusion, an element yet to be included with CAD software.

At 6:20 the next morning as I walked
(continued on next page)

ONE MAN'S CHOICE

By Don Davis

We have convinced ourselves here at Syn-Aud-Con that instrumentation intended to be used in conjunction with personal computers is our best choice.

As a result we have been using an IBM clone 386-33 with 4 MB of RAM with caching, a 100 MB Conner hard drive, a math coprocessor along with 5¼-inch and 3½-inch floppies — all in a tower configuration. A Paradise VGA card drives a Sony multiscan HG monitor. A Suntouch numerical pad keyboard makes control easy.

Because of our highly satisfactory experience with TEF analyzers over the past eight years, the choice of the TEF 20 as the first instrumentation add-on came without undue worry. The TEF 20 is easily the king of the hill for two-port measurements.

We also require a two channel FFT for single port measurements. Initially, the marketplace seemed flooded. We knew from experience that we wanted: a DSP-based unit; to work with a manufacturer capable of fully supporting the basic engine we would buy; a unit, hopefully, that would be compatible with the TEF 20; a system

that would be likely to receive software support from the better academicians such as Dr. Greiner, Dr. Patronis and Dr. Humes; and men like V.M.A. Peutz.

Once these criteria had been articulated, the choice narrowed rapidly to the Ariel SYSid plug in card and accompanying software.

The Ariel SYSid uses the same DSP as the TEF 20. SYSid came out of Bell Labs and we can rely on their integrity in acquiring the real and imaginary parts of the analytic signal. We sincerely hope and expect that Techron and Ariel cooperate so that measurements made on each can be processed, when desired, on the other.

Most of our electronic audio measurements and our one-port acoustic measurements will be made on the Ariel SYSid and our two-port acoustic measurements will be made on the TEF.

Both the TEF 20 and the Ariel SYSid are extremely user friendly and we already know that third party programming is in advanced stages due to the integrity of their basic DSP chips. The TEF 20 is a small external box. The Ariel SYSid is a plug-in card (full length). With our PC and these two inexpensive add-ons (if you don't believe they are inexpensive, price some of the all-in-one-box professional analyzers) we can perform any audio and acoustic measurement worth doing at an

accuracy equal to or, in many cases, better than any other analysis system available at any price. In the future it may be that both Techron and Ariel will make both one- and two-port analysis systems.

The acquisition of new tools is followed rapidly by new questions which, in turn, produces new answers to old problems.

Colleges teach subjects that are teachable, subjects that can be arranged in an orderly manner, subjects for which there are recognized text books and questions and answers that are able to be solved and graded by professors who have had years to master the subject. Most meaningful measurements don't fall in that category, and what we are measuring today and what we are measuring with won't reach academia in a manner suitable to them for another decade. One time I asked a friend who was teaching a college class that was remarkably advanced for its time and place if the faculty was behind him. He replied, "Yes, way behind me."

There are a few individuals, and they are "individuals," ready and willing to share their hard won knowledge with you. Seek them out and pay attention.

If your ear-brain system is excited by good sound and annoyed by poor sound get involved in the computer measurement age. You will learn fast, have fun, and learn your fundamentals from a new viewpoint. ■

CAD TOPICS

(continued from previous page)

the deserted hallways of the LA Hilton toward the meeting room I felt a bit silly, expecting to sit alone for the next hour. Imagine my surprise when I turned the corner to find a few engineers sitting on the floor in front of our locked meeting room in animated discussion!

The meeting was well attended, with representatives from every major audio soft-

ware developer, plus a number of acoustical consultants and sound contractors. All the major issues were discussed, proposals for an intermediate standard for directional data were made, and common ground was searched for by all.

At 9 AM the attendees shifted to the meeting room for Architectural Standards. David Klepper, the Chairman of the Standards committee, suggested that we continue the discussion.

By 11 AM the Acoustics and Electroacoustics Standards Committee had been formed, with three working subcommittees: Speaker Measurements, Materials Measurements (including diffusion and absorption), and Architectural Acoustics CAD Transfer.

As Chairman of this committee (David Klepper is Vice Chairman) I will be reporting on our progress directly in the AES Journal. CAD Peristroika? Could be! ■

Ariel's SYSid, Part II

Living with a System Identification Acoustical Analyzer

BY MIKE KLASCO

Ariel's acoustical analyzer package consists of SYSid software and their DSP-16 hardware. SYSid, for SYStem identification, is a combination of the functions of a spectrum analyzer that measures the frequency response and background noise; a distortion analyzer to measure harmonic and intermodulation products; a digital storage oscilloscope to measure time (impulse) response; as well as impedance, group delay, phase, and more. Last month we discussed the background of Ariel's SYSid acoustic analyzer and a brief overview of its capabilities. In Part II of our review we will take a closer look at living with SYSid.

SYSid SET-UP

Hardware installation is simple, requiring opening your computer and plugging the Ariel DSP-16 board into any one of the slots on the motherboard. The DSP-16 is an IBM compatible 8-bit/XT bus interface, but will plug into 16-bit/AT slots. If you do not have a coprocessor in your computer, then this would be the time to install that device as SYSid will not run without it. Installing the coprocessor entails buying a coprocessor chip compatible with your computer, finding the correct empty IC socket on your computer's motherboard, and plugging in the chip. On XT computers you will have to turn on a dip switch, while

AT computers either will automatically recognize the coprocessor or can be switched on with software. After you have closed up the case you are ready to run SYSid. The hardware installation is identical to DRA's MLSSA and should not be daunting to anyone familiar with working with circuit boards with one warning: that computer equipment is more sensitive to static electricity and you should discharge yourself before touching the "innards." If all this sounds foreign to you, then you should make arrangements for installation by your computer dealer or buy a turnkey system from a 'VAR' (Value-Added-Retailer) that sells SYSid.

Installation of SYSid software requires modification of the computer's auto.exe file. While this is a relatively simple matter, most casual computer users will need to refer to a DOS manual and use a file editor. Ideally an automatic installation utility should have been provided. Ariel promises that this will be taken care of in the near future, and as the "demo" disk already selects the correct graphics mode automatically, the "program" cannot be far behind.

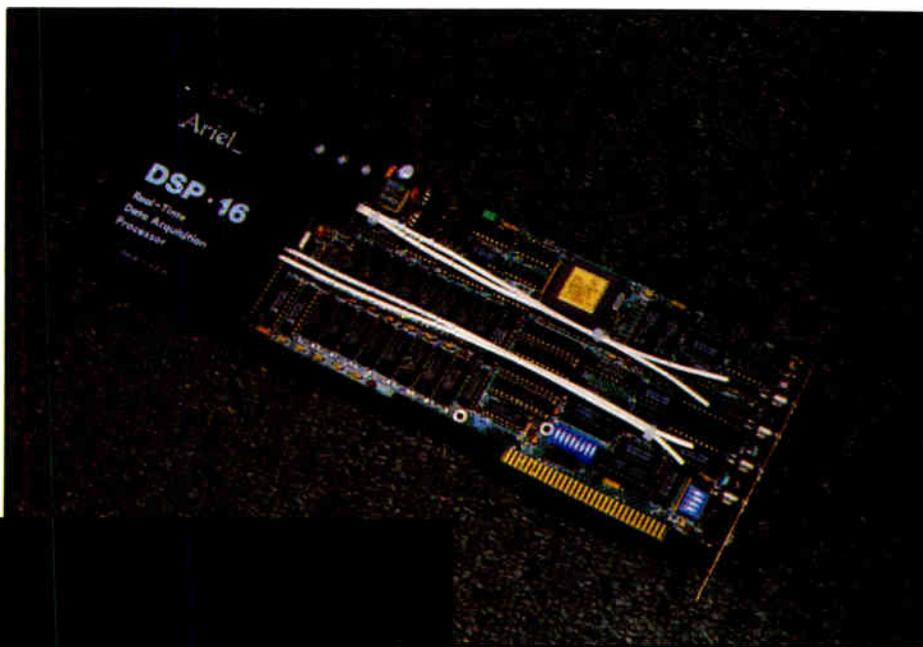
Last month I mentioned the advantages of using Pizazz+ a print utility. When I attempted to use the older version and SYSid I did not have enough space in my computer's memory to load both. Neither SYSid nor Pizazz will work with extended

memory above 640 K (i.e. LMS, EMS, EEMS, etc.). I can happily report Pizazz+ works fine in the Overlay mode. Instead of the entire program loaded into memory (Resident mode), only enough of the program is loaded to pop up when you hit the shift/print screen key; the rest of the program is kept on your hard drive. The Overlay mode in Pizazz+ is simply selected during the installation process. The color printouts were created by a combination of EGA video resolution and a Cannon 1080 color ink jet printer. If you are looking for high quality color hardcopy, you could use Pizazz+ with an HP Paintjet for screen dumps from VGA, super VGA (800 x 600), or even higher resolutions.

OPERATION

Once you have entered the SYSid you will see a screen image composed of operating parameters at the top of the screen, a frequency response graph below it, and the main menu on the bottom. Your choices on the command menu are for submenus, such as Measure, Process, Screen, Parameter and Disk input/output. Secondary functions are listed below the main options under "Misc." including Help and Quit. Contextual help is always available, although the explanations are a bit too brief to help the hopelessly befuddled! Selecting the Measure submenu

switches the menu listings into two categories. The upper selections are the Measure Commands. These are Frequency response; Tone (to specify a test tone to be generated), Distortion (harmonic distortion tests), Intermodulation distortion, Delay (for telling the analyzer how long to wait until the test signal reaches



The DSP-16 hardware for Ariel's SYSid.



Stewart Electronics' mic/preamp has balanced input/output and EQ settings which can be used as anti-aliasing filters with SYSid.

the microphone from the speaker), and Noise floor. Under "Misc." are the various other submenus that the operator would want to jump to (Process, Screen, Parameters, disk input/output, as well as secondary functions such as Replot (replotting the screen), Clear (clearing the screen), Label (for notes that become part of the screen image and part of the printout or to be saved to a disk file).)

Once you are in the Measure submenu, you will normally do a frequency response measurement. You will have set up your measurement mic, a mic preamp, and connected this to Channel A on the Ariel DSP-16 board. SYSid, like the MLSSA system, has a calibration procedure for obtaining absolute spl measurements (in test equipment this capability separates the men from the toys). The signal generator on the DSP-16 board will be connected to a power amp and whatever else is to be included in the test. Hitting the F key (Frequency response) will cause SYSid to

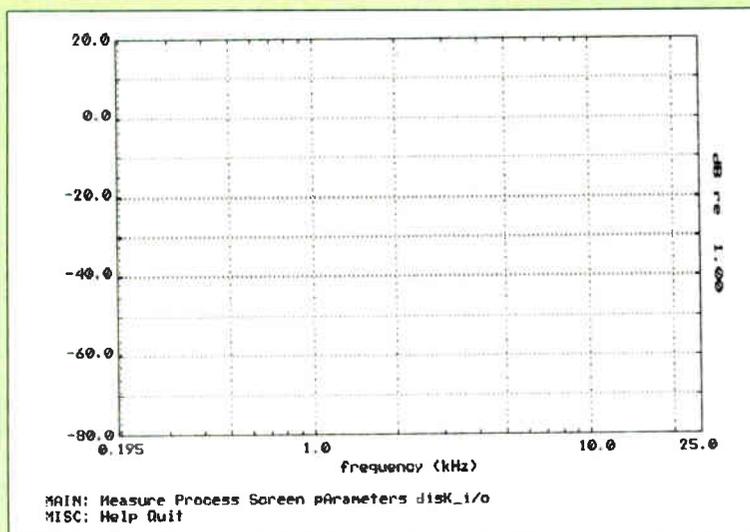
generate 20 sine wave sweeps. These sweeps are very fast and this process takes literally a moment. The system's response to this stimulus will be picked up by the mic, and synchronously summed and averaged. SYSid will then do an FFT analysis (frequency response) and display the results on screen. The entire sequence is automatic.

SYSid requires the user to first measure the frequency response before the analyzer can derive the time response. On the initial setup it would be more convenient to be able to first display the time response. This would enable the operator to set the delay time/distance (between speaker and microphone) and to determine the appropriate settings for the time duration to analyze. To automatically obtain the time response without stepping through the various keystrokes you can prepare a "macro." Essentially a macro is a recording of the keystrokes needed to carry a particular chain of operations.

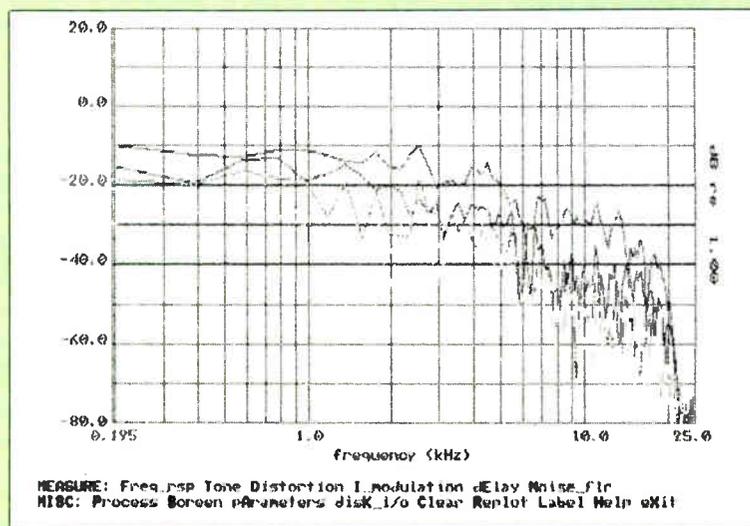
SYSid will remember up to 10 macros, which can be triggered by hitting a function (F) key. Aside from providing the time response with a single keystroke (or the energy-time-curve, which would otherwise require still another keystroke), complete production line testing can be worked into one or two macros. Five macro "templates" are included on the "demo" disks and these can be edited to match the user's particular needs. Alternatively, the user can roll his own macros from scratch.

If the speaker's response decays quickly, such as in the case of a tweeter, then the time duration the analyzer "takes in" can be short, but if you are measuring a room with a long reverberation time, the settings must be appropriate or you will not get the entire signal. A crude analogy would be fast and slow ballistic settings on a 1/3 octave real-time analyzer (a more complete explanation of all this will appear in next month's Technically Speaking).

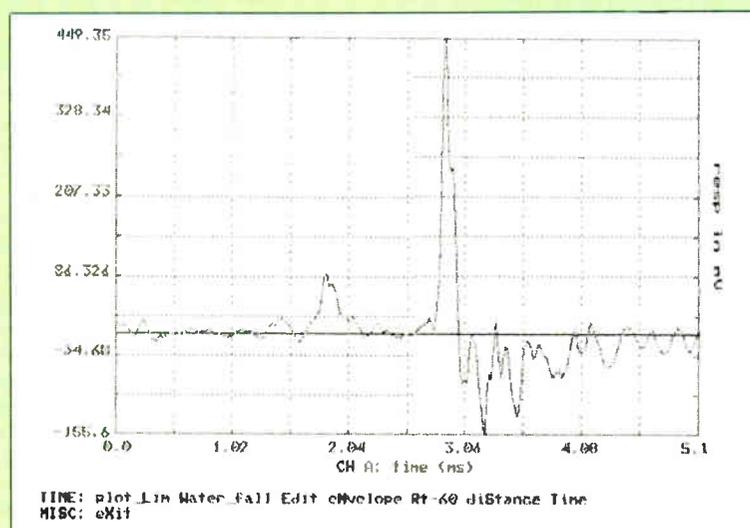
SYSid (like MLSSA) uses a setup file. Version 3.0 of SYSid (also like MLSSA) can accommodate different setup files, some for speaker testing, others setup for small rooms or large spaces. New setup files are easily customized and saved. The setup operating parameters are always displayed above the graph on the top of the screen. Before testing, the operating parameters should be scanned by the operator and inappropriate settings adjusted, for example, testing a tweeter with the top end set to cut off above 10 kHz rather than 25 K. For noisy environments you may want more



Main Menu on bottom of screen.



Measure Menu includes frequency response, harmonic and IM distortion, noise floor. Graph shows multiple frequency response curves at different mic locations.



Time Domain menu includes: impulse response (shown on graph); waterfall/3D Time-Frequency-Energy plots; Envelope; and RT-60 reverb time.

than 20 averages. Or perhaps you want to select a different stimulus signal and use an MLS signal, such as used by the MLSSA system, or an impulse (SYSid offers all three). The standard DSP-16 is dead accurate to 16 kHz, with its guard-band filter's ripple causing a bit less than 1 dB ripple at 18 kHz, but consistent and meaningful measurements can be made to just over 20 kHz. For sound reinforcement work this ought to be enough. SYSid allows for a normalization procedure which would compensate for this minor ripple, but the user must decide to use it. With the MLSSA system, this "calibration" is not left to the discretion of the user. I have been also testing an upgrade version of the DSP-16 which has a daughter-board with 9th pole Apogee filters. This enhancement was developed by Scientific Conversion, Inc. and has perfect frequency and phase response to just over 20 kHz. While the standard hardware/software package of SYSid costs \$3,000, the addition of the super linear filter enhancement package brings the price to \$3,800.

You do not have to use the full bandwidth of the SYSid system, but even at the lower settings (down to 1 kHz bandwidth) the input filters are still fixed at 25 kHz. The test signal is automatically bandlimited to the bandwidth settings, but if there is high noise in the test area, or if the equipment being tested has very high level spurious noise, then you may end up with aliasing problems. Aliasing is when the signal contains frequency content more than half of the sampling frequency. To get around this I use a Stewart Electronics mic preamp which combines the phantom power supply for the mic, more than enough gain to drive the DSP-16 board, and a parametric filter (for user controllable cutoff frequency). Ariel left off adjustable cutoff filters because the typical switched capacitor programmable filters would degrade the noise floor of the system. The Stewart Electronics preamp is low noise analog, and successfully goes where digital fears to tread. Perhaps we should not dispose of all the analog engineers just yet. (A survey of relatively inexpensive "calibrated mics," calibrators, mic pre-amps

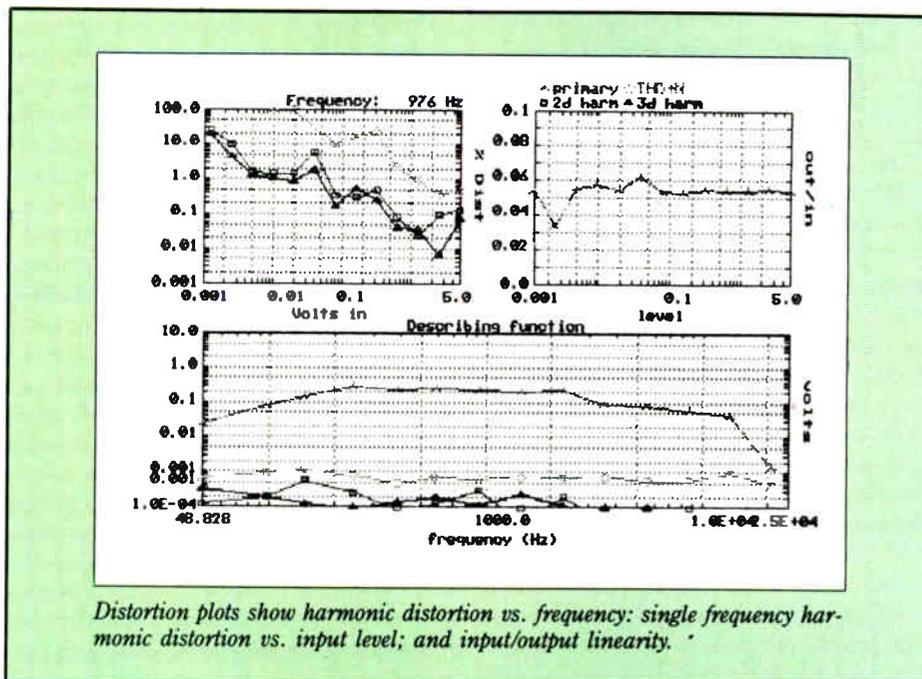
and phantom power supplies is being prepared and will appear early next year.)

BACK TO TESTING....

After you have acquired the frequency response, you would typically jump into the Process submenu and select Time response. The time response is the impulse response of the speaker (or room). Using the cursor you would check the transit time from the speaker to the mic. Leaving the Process submenu and back to the Measure submenu, you would select Delay and enter the transit time in milliseconds. Actually, for lab work you could simply measure the distance (between mic and speaker) and enter this in meters without using the system to measure the distance. For field use you can get a good estimate with an electronic rangefinder, especially when aligning clusters to underbalcony speakers. For those of you used to ETC, the time response can be displayed in this format (log and linear) by using the Envelope command. Once you have told the program the transit delay (in meters or milliseconds), it will remember it, unless you instruct it otherwise.

Now that you have the frequency response, you might want to look at how much smoother things would be without wall reflections, or even diffraction effects from the grille cloth frames. Jumping through the Process submenu, you will select the Time response submenu. Here your Command options are 3D waterfall, Edit, and Envelope (ETC options). Selecting Edit, the large graph on the screen is replaced by two graphs, one for the frequency response, the other for the time (impulse) response. Using the cursors (mouse operation is also supported and faster) you can mark off the portion of the signal of interest, electronically creating an anechoic chamber. Or you can analyze the frequency spectrum of problem reflections. The edit function lets you keep or discard any or all of your edits. The resulting data can be displayed on the full screen, using the Replot command.

Overall operation is fast, especially after you have had a week to play with the system. An improved manual is on the way,



Distortion plots show harmonic distortion vs. frequency; single frequency harmonic distortion vs. input level; and input/output linearity.

and will be helpful. A short course in SYSid operation would also speed learning (Don Davis, are you listening!).

Zooming in on portions of the response curve or of the time response is more natural on the MLSSA system. On the other hand, measuring harmonic and IM distortion is no contest, with SYSid the clear winner both in ability to generate test signals and 20 dB+ superior dynamic range. SYSid can aid in testing electronic crossovers, parametric (or other types of) equalizers, limiter/compressors, or even microphones. While the DSP-16+ has a measurement limit of .005% distortion and a noise floor of 90 dB, the use of time averaging techniques can yield a real dynamic range of 120 dB! This is more than adequate for proof of performance documentation of both electronics and loudspeakers.

HARMONIC DISTORTION

Harmonic distortion measurements are performed automatically. THD + noise, 2nd and 3rd harmonics are plotted simultaneously, in separate colors. Distortion measurements are taken on octave centers. For me, this is barely exploiting SYSid's capabilities and Ariel promises the next release will allow the user to specify the density of measurement points. Other distortion tests include distortion vs. level which requires the user to specify the frequency. SYSid cannot save the distortion data to disk, but you can use the screen capture-to-disk on Pizazz for this purpose.

Calibration of levels and acoustic requirements of testing speakers for distortion

are not adequately defined in the SYSid manual. For example, harmonic distortion is tested conventionally, with single frequency tones. The need for an anechoic chamber, or at least for an adequate signal-to-noise ratio is not mentioned, nor are any technical papers referenced. You can increase the number of averages used to partially compensate for extraneous noise, but again, no guidelines are provided in the manual. I just received a well prepared application note on mic calibration, with additional data on applications promised shortly, so these gaps are being closed.

INTERMODULATION DISTORTION

SMPTE and CCIR intermodulation distortion measurements can be made using the "DSP" waveform generator within the system. In the measure submenu, the user selects IM and is asked what frequencies and their amplitudes. The manual details what the industry standards are, or if you are tracking down a problem you might want to use more relevant non-standard frequencies.

REMOTE CONTROL

The benefit of using the computer's co-processor for analysis is that SYSid (like the MLSSA system) can be used without the plug-in board for post processing. If you want a second opinion on your work, you can modem your raw measurements to a mentor who can help you interpret the results. Or you can use a program like Carbon Copy where your computer (and SYSid) is remote controlled through the

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phone line! Remember, only the software is needed at the remote location, saving the cost of a second system. Other benefits of not requiring the hardware to use the software for analysis is that any laptop that can accommodate a coprocessor can be used for post processing and preparing reports.

CONCLUSIONS

When I first began to look at Ariel's SYSid 2.0 I saw a gem in the rough. Although it was first commercially introduced barely two years ago, it has really come together in the last few months. Release 3.0 is a turning point where user interface and functionality have begun to take advantage of the inherent superiority of this system. Ariel has not completed their job yet, as RASTI, STI and ALcons are not supported, nor are pre and post trigger and autoranging, and more intuitive graphics operation is needed (for zooming in on a signal). I have met with both Ariel and Bell Labs and this rather formidable coalition has convinced me that they are committed to adding these features (and a good deal more) in the near future. In version 3.0 the reverb utility has just been included, the 3D mode has now become useful with user defined start and stop points. Choice of the number of spectra (resolution between response curves) and 3D cursor are not yet supported. BUT! SYSid offers dynamic range equal to, and (in some conditions) beyond TEF analyzers, and SYSid has a no-compromise hardware package with real world distortion analysis.

Still another significant factor has not been touched upon in this review, and that is the popularity of the Ariel DSP-16 hardware for third party software. SYSid is shipped with a real-time FFT/scope soft-

ware program. I found this useful for using test CDs for room measurements. And a digital storage scope program is also thrown in. With these programs you can use their pre/post trigger capabilities and import the file into the SYSid package. SYSid also is compatible with MathLab, MathCAD ASCII, and binary formats, and TEF 20 compatibility is anticipated by the time you read this.

SYSid boasts the single board portability of MLSSA and its dedication to acoustical analysis, but with much of the dynamic range and distortion measurement capabilities of the Audio Precision One. SYSid does not yet have all the capabilities of MLSSA, such as RASTI, or the elegant graphics manipulation, nor all the test bench measurement capabilities of the Audio Precision One. Overall, considering the superior grade hardware, the rapid maturing of SYSid software and the commitment of Bell Labs and Ariel, and the range of software already developed for the DSP-16, I think this system would be a wise investment for the sound contractor, acoustical consultant, and transducer manufacturer.

Next month we will review another exciting system for audio and acoustical analysis, the Hyperception Workstation. Although Hyperception Workstation runs on the Ariel DSP-16 and has file interchange with SYSid, it has been developed and is marketed by Hyperception, Inc. of Dallas Texas. This program is capable of 3D real time displays of audio signals, spectrograms, auralizing, and a good deal more. Auralizing is the ability to import a ray tracing from a CAD program and send music (from the Denon anechoically recorded CD and other sources) and listen to how the room will "sound" from various seating locations! ■

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AMX Appoints Johansen; Blick at Eastman

Johansen Moves to AMX

Eric Johansen has been appointed to the position of Director of Marketing for AMX remote control systems. Johansen is responsible for marketing, advertising and public relations.

Johansen, during the past 20 years has owned his own marketing consulting firm and has been responsible for the marketing and advertising of a number of companies.



Johansen

Sales Manager at Eastman

Theodore J. (Ted) Blick has been named national sales manager for Eastman Wire & Cable Company of Pennsauken, NJ. Blick is responsible for the sales and marketing of Eastman's products for the sound, electronic, fire and burglary and security markets.

Prior to joining Eastman, Blick was national sales manager for Triboro Electric Corporation's Wire and Cable Division, and has held sales and marketing management positions for several wire and cable manufacturers.

Pine is Digital Marketer

New England Digital Corporation has promoted Ted Pine to the position of Director of Marketing. Pine assumes complete responsibility for the development and implementation of all advertising, public relations, trade show and direct mail marketing programs, while assisting in the development of long term business and product development programs. Pine has been with New England Digital since 1987.

IRP Names Dalzell and Kinnaugh

IRP has announced the addition of systems specialist David Dalzell to a field training position where he works with IRP's National Sales Rep Network, acoustic consultants and major sound contractors. Dalzell has experience in the sound contracting and touring sound industries through the operation of his own consulting businesses DPD Systems and Core Systems.

Applications Engineer, Norm Kinnaugh also joins IRP in an inside customer service position concentrating in the layout

and design of sound systems for sound contractors. Kinnaugh has design and installation experience from the contracting firms of Ancha Electronics and Comco Systems, and manufacturing experience from Rauland-Borg.

Casi-Rusco Controller

Joseph F. Restivo has joined Casi-Rusco, a manufacturer of computerized access control systems, as controller.

Prior to joining Casi-Rusco, Restivo was Director of Accounting for Harris Corporation's Computer Systems Division. Restivo was with the Harris Corporation for twelve years in a variety of financial management positions.

Sony Tape Marketing

Kenneth F. Wiedeman, has appointed director of marketing, Professional Tape Division, Sony Magnetic Products Group of America. He is responsible for the national marketing efforts of professional video and audio tape.

Wiedeman was formerly director of marketing, Sony Magnetic Products Company and prior to that, held the position of national sales manager for Sony Professional Tape.

Walborn Promoted at Burle

Burle Industries, Inc. Security Products Division has announced the promotion of Greg Walborn to Technical Applications Specialist. This position provides Burle with technical and product support. Walborn is responsible for handling incoming customer application questions, training and equipment demonstrations, reviewing specifications and providing technical support for Burle video products.

Walborn has been with Burle for 12 years and has held a number of positions prior to this assignment.



Wiedeman



Walborn

Executive Promotions at Denon

Denon America, Inc. has announced the promotions of five of its executives: Takyasu Yoshida moves from President of Denon America to become General Manager, Second Sales Division, Overseas Business Group, of Nippon Columbia; Robert



Furst

Heiblim moves from Executive Vice President to become President of Denon America; Akira Saito moves from Treasurer to Executive Vice President; Ted Sakai, previously manager of Denon's Western Regional Office becomes Senior Vice President; and Ken Furst moves into the new position of Vice President, Marketing from his previous position of Director of Marketing.

Product Manager for Shure

Shure Brothers Inc. has promoted



Lyons

Christopher Lyons to the position of Product Line Manager, Wired Microphones. Lyons is responsible for product management of all non-communication wired microphones, including those used in sound reinforcement, etc.

Lyons has been with Shure since 1985 and formerly held the position of Technical Markets Specialist. In addition, he has authored the Shure "Guide to Better Audio" handbook.

Sales at Terk

Buzz Delano, formerly Vice President/Sales & Marketing for Moroder Audio Electronics/SAE, has been named National Sales Manager for Terk Technologies. Delano is experienced in the sales and marketing of consumer and professional audio equipment through both chain stores and independent audio specialists. With Terk, Delano will be involved in the launching of the company's Leapfrog wireless audio component system.

AMSC Appoints McCleary

American Mobile Satellite Corporation has appointed Christopher R. McCleary to the position of Vice President, Sales & Marketing. McCleary was previously President of the Network Antenna Group of RSI in Atlanta, and of Laux Communications, Inc. of Cincinnati.

CALENDAR

Upcoming Events

JANUARY

ISC WEST: Anaheim, CA: Contact: (312) 644-6363. January 9-11.

Winter Consumer Electronics Show: Las Vegas, NV: (709) 299-9331. January 10-13

NEDA Test Measurements & Control Div. Conf.: Scottsdale, AZ: Contact: (312) 588-9114. January 12-15

ATE&I West (Auto. Test Equip. & Instr.): Anaheim, CA: Contact: (800) 223-7126. January 14-17.

NAMM (Nat'l Assoc. of Music Merchants): Anaheim, CA: Contact: (619) 438-8001. January 18-20

San Diego Electronics Show: San Diego, CA: Contact: (619) 284-9286. January 23-24.

BUSCON/West: Santa Clara, CA. (203) 852-0500. January 29-31.

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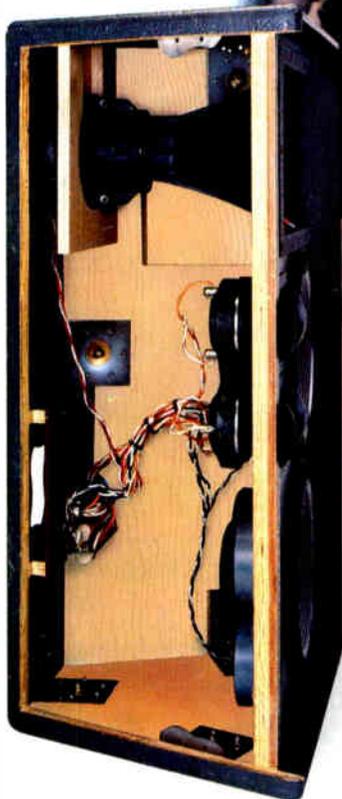
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