

SOUND & COMMUNICATIONS

Volume 38 Number 5

May 29, 1992

THE WINTER OLYMPICS, PART TWO

The Opening and Closing Ceremonies in Albertville were given short shrift by American television. But the 170-speaker sound system worked perfectly. Sound designer Cliff Henricksen reproduces his log of the sound preparations. **30**



THE SCHOOL MARKET

Renovations, Multimedia installations governmental requirements, and new techniques are all playing their part in changing the school sound and communications market. But through it all, quality is still being sacrificed for low-bid in too many cases some contractors. **40**

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• Sound Quality, Part 3

Part 3 of a series focuses on sound quality localization testing and the acceptance of a product standard. **58**

• Fiber Backbone

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• Background Music, Foreground Video — and Royalties

Music licensing — how much does it impinge in the background music business? Plenty. Sound and Communications contractors need to know the basic rules of the music copyright laws, and who has to pay when. **22**

THE ADA IS HERE

The Americans with Disabilities Act demands compliance — and offers a marketing opportunity. Advocacy groups are filing complaints, enforcement is beginning and systems for the hearing impaired are being installed. **50**

UNIVERSITY CONTROL

Purdue University's Elliott Hall uses computer control that will eventually tie in all the audio systems throughout the university. Using a Crown IQ System, Macintosh equipment, and the telephone control can be achieved at several locations. **45**

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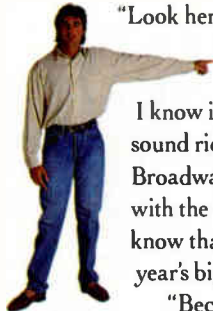
△ Specifically designed for low profile, surface mounted microphone applications. The ASM™1 consists of a wide range unidirectional condenser capsule, so mounted in its rugged housing that it becomes part of the acoustical boundary when placed on a flat reflective surface. △ The excellent performance, low profile, and rugged construction of the ASM 1 make it an ideal choice for many applications such as footlight areas for stage productions, on conference tables or TV news desks, on church altars, as a "plant" microphone on walls or ceilings of sets, and in any number of related situations. For instrumental music applications it may be mounted to the side of a grand piano lid, used in front of or inside kick drums, or in front of instrument amps.

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Ed
Sound Engineer

"Look here, I know the PM3000.

"I know it's at the top of the list of the best live sound-reinforcement consoles.

I know it's written into all those big concert tour sound riders. I know it's in the major theaters on Broadway. I know it's in the 5,000-seat churches with the 400-seat choirs. And I also happen to know that it's in all those T.V. trucks producing this year's biggest sporting events. And I know why.

"Because the PM3000 is flexible. Because it's logically put together. Because it performs. Because it's a pleasure to use. Because everyone likes working with it.

"But, here's the news.

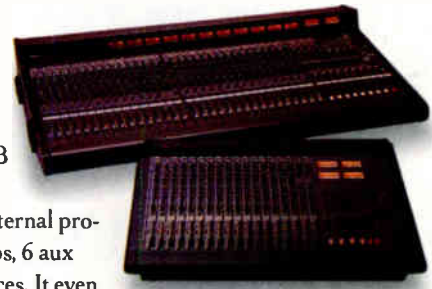
"There are two more PM series consoles. And they start at a mere \$5,500 MSRP. So obviously, they're for those situations where you want the best console available. But you don't have the space or the budget to get the 3000.

"The PM1800A was just updated. So it has an improved signal-to-noise ratio (6 dB better). And 0dB insert points for easy gain matching with external processors. It's got 8 groups, 6 aux sends and 4 mix matrices. It even has the same mute grouping feature you find on the 3000. But that's not the end of it.

"The PM1200 has the same roots. But in a more compact format. It's got 4 groups plus stereo, 4 aux buses, and 4 mute groups. You can get 16, 24, or 32 input channels and you still get two additional full-function stereo input channels.

"Obviously, they're both ripoffs of

YAMAHA®



"Obviously,
they're both
ripoffs of
the Yamaha
PM3000."

Ed and his opinions are a composite of several obviously brilliant and successful sound engineers. © 1991 Yamaha Corporation of America, Professional Audio Products, P.O. Box 6600, Buena Park, California 90622-6600. (714) 522-9011.

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LETTER FROM THE EDITOR

Safety, Security, Schools and Hotels

The derelict Bob's Big Boy in my home town now sports a "Hiring" sign underneath "Pizza Hut." The downside is that this will be the zillionth pizza place in a three-block stretch, so something's got to give. The upside is that Pizza Hut will presumably need a security system, an intercom, a phone system, and other accouterments of the modern day restaurant. And that means new business.

I choose to believe that the carting away of the Bob's Big Boy sign is indicative of an upturn in business. But there's another issue here. My first thought of business was related to a security system. And that's an unfortunate sign of the times. Even in a child's world. In talking to school districts and school suppliers for this issue of *Sound & Communications*, we found the point repeatedly made that new systems were mandated by security concerns. Interactive communication is needed between the administrative office and the classroom, to provide for the safety of both teachers and students.

The value of verbal communication came home to me personally this month since I have the distinction of now having stayed at two Anaheim hotels that have activated their life safety systems during my stay. While it was no fun being awakened by a voice in the ceiling telling me to get dressed *now* (at the Anaheim Hilton during Infocomm; remember?), the experience was far superior to the anemic fire buzzer at the Inn at the Park that worked in conjunction with

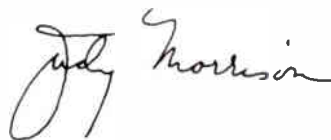
an absent front desk as a sad excuse for life safety (at this year's NSCA; were you there?). Seven flights of stairs later, surrounded by teenagers (remember the convention of kids that overlapped NSCA Expo?), a security guard provided information on the false alarm.

Those of you in the life safety business in southern California can do me a personal favor by selling the Inn at the Park a suitably modern system. That end-of-show event was no fun. (We'll leave thoughts on the grand finale riots for another venue. There's nothing good that can be said of them.)

But much of the rest of NSCA Expo '92 was fun. The Contractors Capers again drew a crowd; West Penn Wire threw its traditional party. Old friends were there. And new products were introduced. It's too soon after deadline to give you a complete and fair rundown, so we'll save our words for the next issue of *Sound & Communications*.

NSCA-TV News was on the air for the run of the show, and we hope you watched and learned from it. It was good seeing you in Anaheim.

Best regards,



Judith Morrison
Editor in Chief

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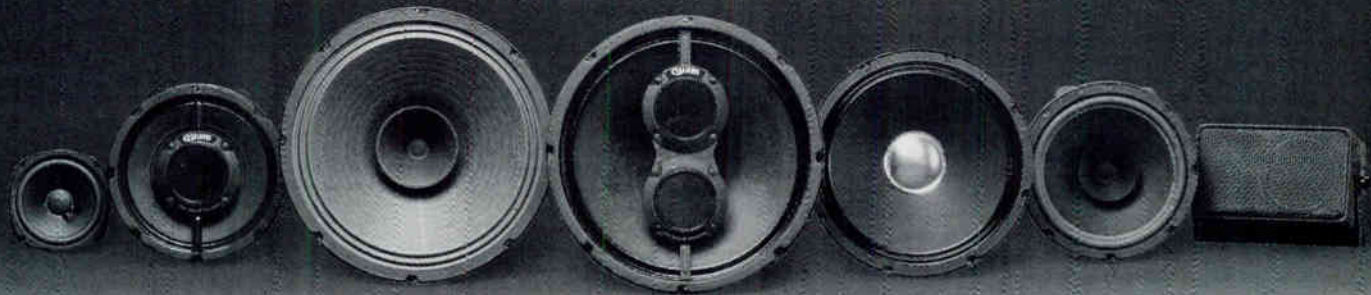
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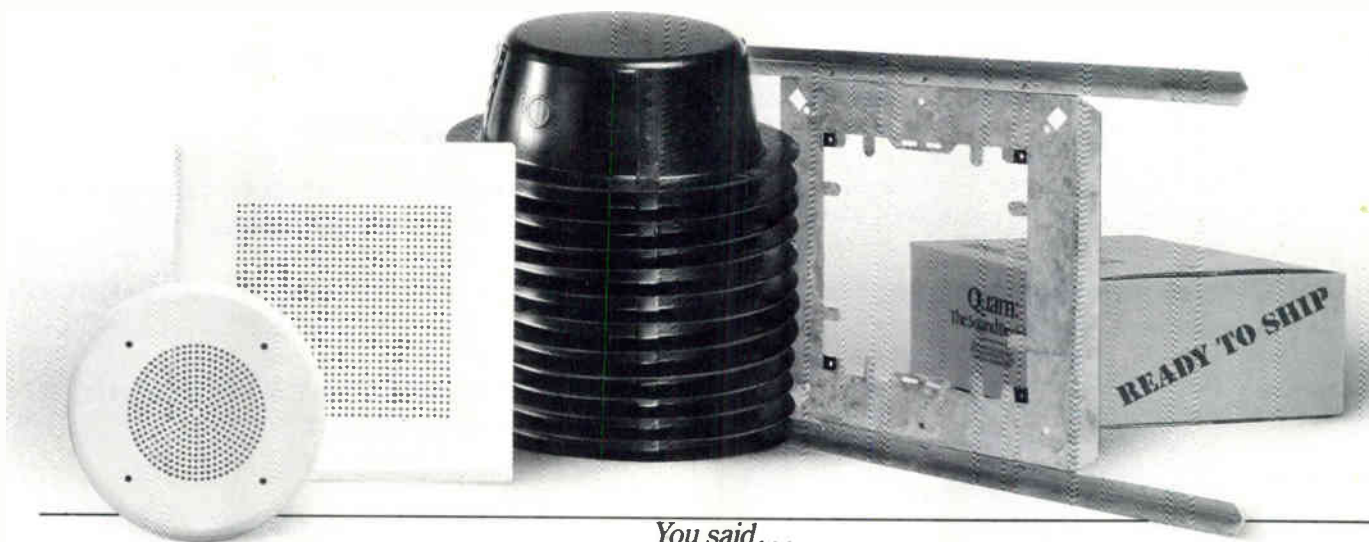
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"BACKBOXES TAKE UP TOO MUCH SPACE."

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World Radio History

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Introducing The Shure SM102. Now The Choice Is Black And White.

The new Shure Microflex™ SM102 makes the job of choosing a miniature condenser microphone an effortless one.

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and assure the intelligibility of every word.

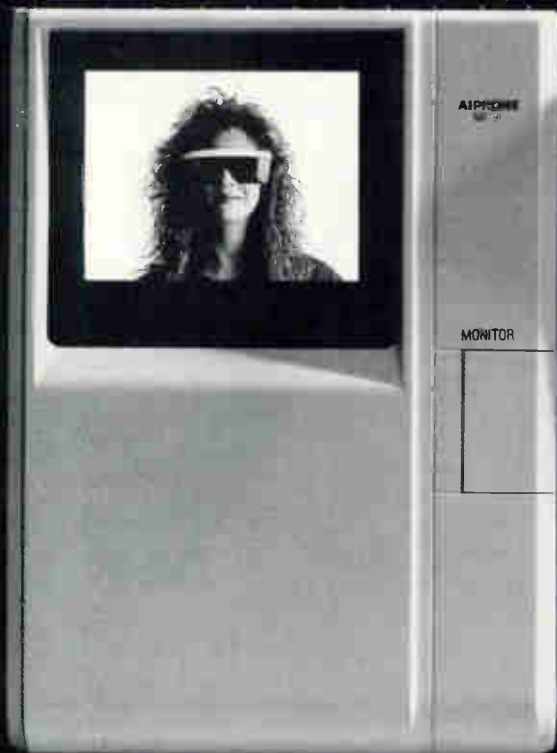
And with a choice of in-line or wall plate preamps, both with switchable gain, the SM102 gives you the unmatched flexibility to hang it any way, anywhere.

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NEWSLETTER

NUMARK ASSETS TO BE SOLD

Numark Electronics, having closed its doors in March after First Fidelity Bank refused to continue its credit line without personal guarantees, is in the process of being sold by the bank. The first bids, none of which were accepted, were for goodwill, the customer list, inventory, finished and unfinished goods, and some manufacturing equipment. At press time, second bids had been requested by the bank. At least four well known audio companies have been involved in the bidding.

THORBURN ASSOCIATES OPENS

Thorburn Associates has opened at 2728 Hillcrest Avenue, Hayward, California, with Steven J. Thorburn Principal Consultant. Thorburn was previously with Charles Salter Associates. The new firm provides consultation services in the following fields: "room acoustics and sound isolation, audiovisual and sound system design, mechanical noise and vibration control, environmental acoustics and traffic noise studies, construction administration, and expert witness testimony."

NILES TELEMMASTER PLANNED

Niles Audio plans to introduce, next fall, a residential master control system, called Telemaster, to be operated over the phone line. The system provides control over a multi-room audio video system in addition to movable items such as curtains and garage doors. Cost to the consumer is expected to be \$2,500 plus installation and \$100 for each room station. A master panel wires all sources; and the customer's phone acts as individual terminals. Niles has also introduced a weatherized volume controller which can be wall-mounted or "planted" in the lawn, and a series of outdoor protective covers to be installed over control jacks.

MUSEUM OF TELEVISION AND RADIO

The Museum of Television and Radio, which opened in New York City last fall, is planning an on-premises radio studio. Currently, a major portion of the space is devoted to two theaters, each designed for video projection viewing, live seminars and educational presentations. Shure has announced that the Shure FP410 automatic mixer is in use in these theaters, used in conjunction with Shure SM83 lavalier microphones. In the 200-seat theater, four FP410s are linked together to obtain 16 channels. In the 84-seat theater, eight channels are required.

STRATEGIC ALLIANCE FORMED

RPG Diffusor Systems and Hoffend & Sons have formed a "strategic alliance" to manufacture, market and distribute worldwide the D'Antonio Performance Signature Series using the Variable Acoustics Modular Performance Shell concept developed by Dr. Peter D'Antonio, CEO of RPG Diffusor.

Hoffend & Sons will design and manufacture the metal framework and rigging, and RPG Diffusor Systems will manufacture interchangeable acoustical modules. The D'Antonio Performance Signature Series will be sold jointly by the two companies through a network of reps.

Dr. D'Antonio said, "The addition of RPG Diffusor Systems to the recently announced strategic alliance between Hoffend & Sons and Waagner-Biro, Vienna, Austria, forms the world's largest manufacturer of . . . performance products for the staging and theater equipment industries."

KENTUCKIANA SCHEDULED

The twelfth biennial Kentuckiana Sound & Communications Seminar will be held at the Airport Hilton Inn, Indianapolis, October 19 and 20, 1992. More than 50 manufacturers and their representatives will exhibit in the 6,600 square foot ballroom. Indiana and Kentucky independent sales representatives sponsor this gathering every two years. Sponsors are: A/V Marketing Co., Bruce Dawson & Associates, Elmarcon, Inc., Green-Wissler Sales Co., Kingston Sales Corp., Midwest Representatives Inc., Monfort Electronics Marketing, Inc., Pat Norman Sales, Reptronics, Inc., Starin Marketing, Inc., and Sunrise Sales Co.

NEWSLETTER

ACOUSTICAL PROJECTS EXHIBIT PLANNED

The National Council of Acoustical Consultants is sponsoring a poster exhibit during Inter-Noise 92 July 20 — 22, 1992 at Toronto's Inn-on-the-Park Hotel. The exhibit includes posters contributed by noise control engineers, consultants, and researchers covering applications in a variety of building types, environmental, civil, industrial and transportation applications, and noise and vibration control and research studies. Posters will be held for subsequent display at NCAC's 30th anniversary celebration during the 123rd Acoustical Society of America's New Orleans meeting in October. Reservations for poster exhibit space are due at NCAC headquarters by May 30. Posters must be received by July 19.

AES IN VIENNA CALLED A SUCCESS

The 92nd Convention of the Audio Engineering Society in Vienna in March was the culmination of a joint planning enterprise that involved AES international headquarters, AES Europe office in Brussels, and the AES Convention Committee in Vienna. The efforts reportedly produced the desired result of an influx of new members and attendees from the former eastern bloc nations. Over 7,000 people attended the convention, with a 23 percent increase in attendees from the eastern bloc. Nearly 300 exhibitors participated.

NAMM SUMMER SESSION

The NAMM Summer Session, planned for June 20 — 21 in Atlantic City, will feature Dr. Marvin Cetron as keynote speaker. Cetron is founder and president of Forecasting International, and, according to NAMM, has been characterized as "one of the nation's foremost futurists." Other meetings include "Customer Service in the 1990s," "Local Market Expansion," and "Small Budget Advertising." The Summer Session also features manufacturer exhibits.

QSC IN FINNISH OPERA

QSC Audio Products have been selected to supply all of the amplification for the new National Opera House under construction in Helsinki. Helsinki based MS-Audiotron has been awarded the contracts to supply and install the three million dollar audio systems for the Opera House, which constitutes the largest single audio order in Finnish history. A total of 39 QSC amplifiers power both the main house system and the distributed system. The main house system is a five-channel Electro-Voice MT-4 system and the distributed system consists of 600 Atlas/Soundolier Strategy series speakers, 200 surface mounted OWI 702 speakers and 70 University Sound PA paging horns. The Atlas/Soundolier product will be placed in audience lounges and administrative staff facilities throughout the building.

CORNING OPENS NEW FACILITY

Corning Incorporated's Opto-Electronics Group will open a facility to develop the manufacturing process for opto-electronic components. The facility in upstate New York is expected to be in operation by August 1992.

SMPTE KEYNOTER

Patrick Watson, chairman of the board of the Canadian Broadcasting Corp., will deliver the keynote address at the 134th SMPTE Technical Conference and Equipment Exhibit in Toronto on November 10. The conference, "Images in Motion — The Second Century," will be held November 10 through 13 at the Metro Toronto Convention Centre. On November 9, the day before the conference opens, there will be two all-day tutorials, "Multimedia World" and "The Post Experience."

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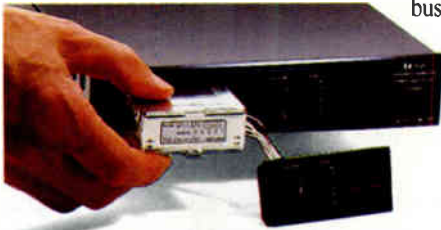
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{ A short story about inspiration and heavenly results. }

THE CHURCH WAS SMALL, MONEY WAS TIGHT, BUT PLANS WERE BIG. SO THEY BOUGHT A TOA.



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TOA's new wireless system, the modular miracle — add or change frequencies — up to four channels in one rack space.

That first system included a true diversity receiver, one that fit the new half-rack standard, and a featherweight lavalier. The Reverend noticed his new TOA mic gated silently on and off and delivered excellent field strength, up to 300', for more than 12 hours — all from a single AA battery.

It wasn't long before the church needed a second mic. Instantly, their devoted contractor

appeared, sleek new mic in one hand, receiver module in the other. And in five minutes he was finished. But the praise was just beginning.

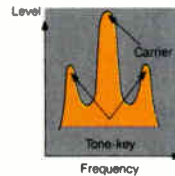
The next few years were busy ones for the congregation, the neighborhood and the TOA wireless. Along with a hotel next door and trucking company down the road came interference. Back came the TOA

contractor — salvation in hand. With more than twenty frequency modules — eight compatible in any area — exorcising interference was, literally, a snap.



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When the congregation moved to their new building, they left everything, except their TOA wireless, behind. And fortunately so, for no sooner had the choir



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settled into their pews when they raised their collective voices for two more mics. Miraculously, what was once just one receiver had multiplied and was now four in a single rack unit. A chorus was raised for the forward thinking contractor and the TOA wireless system.

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World Radio History

Small Historic Churches; Articles that Belong

SOUND AND HISTORIC CHURCHES

Received the current issue of *Sound & Communications* this morning and noting the articles on sound in churches has prompted me to set down and write you about church installations.

Our area is a county of small villages. It is an historic area, having been settled by the German Palatines in 1711. While the churches are not that old, there is one remaining that was built in 1734, no longer used as a place of worship, but as a museum. We have another church built in 1772 that is also a museum as it was used as a fort during the Revolutionary War.

However, still in operation is a church built in 1796, and others in our immediate community built in the 1800s. That is typical throughout our county. These churches are small, as there is no need for seating capacities in the neighborhood of 1,000 and over. These small churches need sound. In the course of several years I have installed sound in at least a dozen of these churches. They don't need delay systems, they don't need TV broadcast facilities etc., but they do need good sound.

I have wondered that you have never covered these small churches in your articles. Don't get me wrong, I am not criticizing you for information on the larger churches, as from these I personally have gained a great deal of information for sound systems in general.

These small churches that I refer to

present many problems for good sound installations. The churches are large "shells" with no rooms behind the pulpit, no rooms along the sides or the rear, save the entry way which is not very large in itself. In other words, there are no hidden spaces where speakers can be mounted and as such some sort of camouflage has to be used, or selection of speakers that mold into the interior designs. There is little distance from the pulpit and reading desk to the front rows of seats, making necessary the mounting of the speakers close to the pulpit with the chance of feedback. Then, unlike most modern churches, the choir and organ are located in the rear of the church in the balcony, another problem.

I have been in the "sound" business since 1925 and installed the first sound system on the Cobleskill and Altamont Fair Grounds in 1927. From that date in 1927 I had continued the rental of a sound system at the Cobleskill location until I sold the system to them in the fall of 1987. However, I still find myself operating the system at the fair time. This is an overall fairground system, not only "PA" but intercom as well, with over a dozen IC units, over 80 speakers, a permanent control room and several independent operating systems. Six handy talkies and two dispatch bases are also in use. These are on the 150 MHz bands.

Yes, I am still in business, working with schools, restaurants, mortuaries and churches. I have installed belfry systems in churches as well. The sound business has always been

something that I have never grown tired of handling even after all these years.

I have enjoyed receiving *Sound & Communications* over these many years and look forward to receiving it in the future.

Edward Scribner
Schoharie, New York

DOES THIS BELONG ?

Having just finished the December 27, 1991 issue of *Sound & Communications*, I came across an article that doesn't seem to belong in your magazine. The title was "Hotel Meetings of Many Images" by Jeff Ader.

While I did laugh at several of his anecdotes, I'm sure that by myself I could write a novel of war stories. If we combined all the situations encountered by those of us in the installation and entertainment fields, the size of the book would put the Encyclopedia Britannica to shame.

I look to your magazine for insight to the problems and solutions of the installation industry. While I like the way each article is personalized by the author, perhaps Jeff's article is a little too much.

Edward O'Connor
Rahway, New Jersey

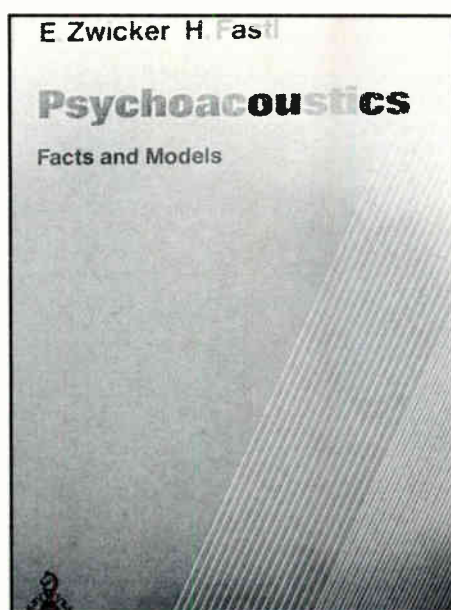
Editor's Note: We obviously disagree, since we printed Mr. Ader's article. It was headed "First Person" because, as you note, it *was* a war story. And we're glad that you laughed. That was its purpose. Thanks for the comments. We hope our other articles are more to your taste. ■

“PSYCHOACOUSTICS, FACTS AND MODELS”

By Steven J. Orfield

Sound quality, the practice of analyzing acoustical performance for its positive and negative effects on the listener, is coming of age. From audio system design to the design of concert halls and exotic automobiles, work is now in place to insure that sound quality, and its necessary change in emphasis from the source to the listener, will be one of the primary acoustic bases of acoustical design.

As binaural recording, DAT technology, advanced analyzers, digital acoustic editing workstations and advanced audio processing have combined to form advanced analysis tools for the acoustics field, another revolution has been fomenting. Over the past 25 years, staff members of the Institute of Telecommunications in Stuttgart have been working with models, many developed from their



earlier work, to begin to validate the formal mathematics of hearing perception, a large part of the basis for sound quality (a term not emphasized in this text).

Psychoacoustics, Facts and Models (by E. Zwicker and H. Fastl, published by Springer-Verlag, New York), is the result of the Institute's work to date in the field of psychoacoustic experimentation, and it is the first major text I am aware of which begins to develop a calculational model for a broad variety of these issues. (Others continue to be dealt with narratively.)

It is extremely rich in its discussion of such fundamental issues as masking, pitch, critical bands and just noticeable sound changes. The book moves into formal calculation with

the foundational concept of loudness and develops from this other calculational concepts such as sharpness, pleasantness, fluctuation strength, roughness and subjective duration. It further discusses rhythm, the nonlinear distortion of the ear, and binaural hearing issues; and provides examples of the applications of these concepts within noise abatement and audiology, hearing aid development, speech recognition, musical and room acoustics.

Since it is a foundational work, it will be among the tools now available for evaluation of sound quality. Many of these metrics may not provide specific benefit to particular analyses of certain types of acoustic signals; over the next few years, the value, utility and specific application of each of these calculations and concepts should become more evident as increasing numbers of acoustical practitioners begin to share their experiences in this field.

This text is of necessity an advanced work. Introductory texts in psychoacoustics would be useful before tackling this work. Having said that, this is one of the true foundational works in Psychoacoustics and should be in the collection of any reader with a serious interest in the subject and an interest in experimental analysis within the field. It is unfortunate that Professor Zwicker recently passed away just as his work was achieving a larger and larger audience. ■

Steven J. Orfield is President of Orfield Associates, Inc. in Minneapolis, Minnesota.

CONSULTANT'S SPOTLIGHT

NEIL MUNCY FINDING "ALL SORTS OF THINGS THAT NEED TO BE PROVED"

By Adrian Plant

A lot of you may already know Neil Muncy or have heard of his accomplishments in the pro audio field. Many of us haven't experienced the depth of change that Neil has, and I thought it would be interesting to drop in on Neil in Toronto and find out more about his audio career and his thoughts on the audio industry.

I imagine that talking with Les Paul about guitars would be something like talking with Neil Muncy about pro audio. His eyes sparkle with enthusiasm the moment we begin talking about his favorite subject.

More than required training or credentials, Neil has a passion for what he does, and that passion and dedication to his art was what I found most fascinating. An artist in audio... if you will.

Neil Muncy studied Electrical Engineering at the George Washington University and the Capitol Radio

Adrian Plant is with S.F. Marketing Inc. in Ontario, Canada.



Neil Muncy

Engineering Institute in Washington, D.C. He began his professional career in 1959 as a member of the technical staff of the Johns Hopkins University Applied Physics Laboratory, where he worked on radar and related communications research projects. In 1966, after pursuing further studies in Physics and Business Administration at the American University, he founded SSI, Inc., a company which pioneered in the application of operational amplifier technology in large custom-built multichannel recording consoles, realtime and high speed tape recording and

duplicating systems, and related equipment.

As an independent consultant since 1976, Neil Muncy Associates has specialized in the design of recording and broadcast facilities, the development of solutions to acoustical and technical problems, and the presentation of lectures and training seminars on audio-related topics for clients including The Audio Engineering Society, National Public Radio, and NBC New York. From 1966 to 1986 Muncy was a guest instructor at the Eastman School of Music in Rochester, NY, participating each summer in the Eastman Recording Institutes, one of the very first college-level courses in Recording Technology.

Neil has contributed to a number of U.S. and International patents, holds a TEF license from the California Research Institute Foundation, and was a major contributor to the development of the Reflection Free Zone (RFZ) control room design concept.

Recent projects include the complete redesign and renovation of the second-year Music Industry Arts recording facilities at Fanshawe College in London, Ontario, the development of the Reverberation & Sound Enhancement System (RSES) for the restoration of the Elgin Theatre in Toronto, and participation in the recent North American Introduction of Digital Radio Broadcasting in Toronto.

As with many creative artists, Neil's



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direction in life and passion for audio began at a very early age.

Sound & Communications: I'd like to know how you got into this. Were you one of those guys that built Heathkit stereos when you were a little kid?

Muncy: Oh yes. The first record player I had had one speed. Actually two speeds, 78 and off. We lived in Washington, DC and right across the street was a senior electronics engineer who worked at the National Bureau of Standards. He was sort of a sound nut, so he built a record player for this little eight-year-old kid across the street, and he put it together with screws that I wasn't supposed to be able to get out. [laughter] Well, it didn't last long. Anyway, I got hooked.

It was a very nice little box. I'm sorry I lost track of it. But anyway, I've had an interest in sound and recording in particular since I was in junior high school, I guess. I did a Science Fair project in stereo about 1956, maybe.

In high school, I had the first in-line two track Viking tape deck that had ever seen the light of day in Washington DC, and some pre-recorded tapes, a turntable that played the old Cook binaural records, which instead of having a 45/45, had two parallel mono grooves for right channel and left channel, and a pickup arm with two cartridges mounted on this little very crude mounting arrangement. The trick was to drop the arm and get the same groove for both styli. Amazing! So that was in the mid-fifties and of course we all know what's happened since then.

Sound & Communications: Technology is advancing so quickly now, it's a matter of trying to keep up with what's happened in just the last six months.

Muncy: It's a real problem, and it's going to get worse. There are so many things happening. Aside from having all of it happening, the problem is

what do you do with it and how do you keep all this technology from getting in the way of the music, which is often a big problem.

It's interesting to go back over recordings over the last 30 or 40 years and see how there's been this leap-frogging kind of thing going on. Every time there's some new technical development, for a while that's the buzzword and everything has to be recorded that way. You go back and listen to some of these things, and in retrospect they were a step backwards in terms of sonic quality. It was just marketing hype at the time.

Sound & Communications: I always think about the fact that Sgt. Pepper was recorded on two four-

I HAD THE FIRST IN-LINE TWO-TRACK VIKING TAPE DECK THAT HAD EVER SEEN THE LIGHT OF DAY IN WASHINGTON, DC.

tracks, and what an accomplishment that was.

Muncy: And the music on that record has gone platinum and gold and everything else, and now you hear it in the elevator. Success in the music business is partly defined by having the music played on Muzak. Every time the elevator goes up or down somebody's getting paid. [laughter]

Sound & Communications: Do you think the technology is getting in the way of music?

Muncy: Oh, it has on occasion . . . and it's nice to see with the new two-track digital formats we have that a lot of people are going back to live to two-track, because . . . I mean let's face it, recording an album one track at a time over a period of months does not exactly make fine musical interplay on the part of the

members in the band.

Sound & Communications: And you don't even get a chance to meet the drummer.

Muncy: My impression of a lot of that is that they are playing *at* each other instead of *with* each other, which is I suppose okay, but I don't particularly care for it. [laughter]

Sound & Communications: What was your first major job or project? From school where did it develop?

Muncy: When I was in college, I was working for Ed Greene in Washington, the same Ed Greene who now has the world's largest remote truck out on the West Coast. He had a studio, live to two work, mainly for broadcast and jingles, and a few albums here and there.

We did the first Bossa Nova album

with Charlie Byrd and Stan Getz, live with a total of eight mics because that's all the inputs the mixer had. If you wanted more reverb, you put the reverb mic further back in the house and that's the way it was done. And

IF YOU WANTED MORE REVERB, YOU PUT THE REVERB MIC FURTHER BACK.

it's been reissued on CD.

Through that association, I got to meet a whole lot of the people in New York and some in the L.A. recording world, and then also it evolved.

In school we started a company that was building custom recording

consoles. It's interesting to note that literally 20 years ago today there was no such thing as buying a console out of a catalogue, because there weren't even any catalogues back then. There were a few spec sheets, and if you wanted to order something it might be six months or a year before you got it, and then maybe three or four times the price.

Sound & Communications: So you worked very closely with the studios.

Muncy: Oh yes. We were changing the design in some cases after the paint had dried, to reflect what they thought they were going to need six months later, and of course that was back during the time when things went from three-track to four-track to eight-track to twelve-track to sixteen track, in the space of about five

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Orchestra in rehearsal at Toronto's Elgin Theatre.

years.

I remember studios in New York that had ordered eight-track machines, and by the time they actually got them, they had to have a sixteen to remain competitive.

If you're trying to build consoles that keep having to deal with more and more tracks, and if you don't know what the upper limit is and on top of that, if you are only building one of them, which is the way all these things worked it's rather interesting, to put it mildly.

Sound & Communications: When did that period end? When the custom console got to the sixteen-track?

Muncy: Well, the handwriting on the wall was back in the early '70s when MCI came out with the first... what was it, the 400 Series? And they came out with a sixteen-track machine, about the same time. That was Jeep Harned at MCI and Tom Hidley who at that point was doing studio installs out on the west coast.

I think those two people single handedly had more to do with getting multitrack to the point where it was a viable business proposition than just about anybody else during that time, because they came out with hardware that worked! It wasn't red hot, but it worked and it was reliable enough so that you could get things done.

And they sold a lot of them and of course everybody knows the success

story of both MCI and Tom Hidley. They are respectively internationally known for what they did. Of course Sony bought MCI and Hidley's still doing his thing.

But that was the turning point, and within about five years there were enough catalog console companies so that custom business just disappeared. Now it's to the point where if you need something special, really the only sensible thing to do is buy a stock console and make a modifica-

**HE SAID "I'VE BEEN
WAITING FOR TWENTY
YEARS TO TRY THAT!"
HE HAD COME UP
WITH AN ALGORITHM
BASED ON BOSTON
SYMPHONY HALL.**

tion here or there. Even that is getting to be less of a requirement now because most of the console companies that have survived are putting out products that are really pretty comprehensive compared to what there was even ten years ago.

Sound & Communications: So what turn did your career take at that point? Was that where you became more involved in consultation?

Muncy: In the mid-seventies, "track wars" were still on, and twenty-fours were starting to come in. I had spent

lots of time trying to make facilities work the way people thought they ought to, after they spent all that money.

Sound & Communications: This in acoustical design?

Muncy: Well, just overall. I mean, they weren't happy with the net result, and we would go in and look at the electrical part of the system, and we usually found all sorts of things that needed to be improved.

The problem was that after we'd improved all the electronic things to the point of diminishing returns, they still weren't happy and that's when we started getting convinced that there was something, maybe acoustic in approach, especially in the control rooms, that needed some fine tuning.

So we spent a lot of time working on that, out of which came some of the early seed work for what's known as the "Reflection Free Zone" control room approach. We had essentially prototyped that concept at Nimbus, here in Toronto right around 1980, before Nimbus went the way of a lot of other studios.

Sound & Communications: When was it that you crossed the border, so to speak?

Muncy: I've been up here full time since 1985.

Sound & Communications: But you were doing quite a bit of work in the States?

Muncy: I was commuting back and forth quite a lot for a while.

Sound & Communications: Why would you have selected to come up, rather than be in sort of the heartland of New York?

Muncy: Well, this is a heartland all by itself, and this is also a very nice place to live.

Sound & Communications: So your focus now is more in acoustics?

Muncy: Well, acoustics and electroacoustics systems.

Sound & Communications: The Elgin Theatre was new technology

that you were a part of, working with Lexicon on the software.

Muncy: The Elgin Theatre restoration project started, I guess, about seven years ago. The acoustician Robert Tanner surveyed and assessed what he thought they would end up with, and the conclusion was that the reverb time in there would be too short for anything other than speech, which is no surprise because it was built as a vaudeville theater specifically for speech. It was built and opened about ten years before even the first crude PA system was anything more than a glimmer in some inventor's eye.

And the acoustics were amazingly good, considering also that the science of acoustics was a lot less developed than it is now. So the proposition was made to see if there was some kind of electroacoustic system that could be installed which: did not in any way interfere with the appearance of the place; and was capable of realistically enhancing the reverb time.

A lot of other people had tried to do that with various hardware combinations over the years, and they've all been somewhat successful in certain areas, but none of them have really been to the point where even the critics have liked them.

When I got involved with the project, at that particular time, I think some of the technology we ended up using was just barely becoming available: the microphones, the Lexicon processors, the speakers. Anyway, it was an opportunity to take a fresh look at that kind of a project, and determine — in our opinion anyway — what some of the previous mistakes had been, and try not to remake them.

One of the first criteria was that we knew we needed a lot of loudspeakers, we had to come up with a way to conceal them so that unless you were staring right at them you wouldn't realize it was a speaker. And it worked out pretty well.

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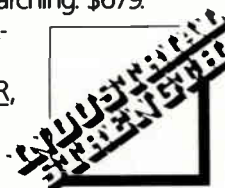
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We also needed a speaker that was as neutral sounding as possible, and after evaluating a lot of different brands we finally went to the National Research Council and Dr. Toole pointed us in the direction of Paradigm who makes this marvelous little 3SE Mini, which we ended up using. And it not only was a lot less expensive than all the others we evaluated, but in terms of technical performance and sonic quality, it just walked away.

So, once we had the speaker, we had to invent a mounting scheme, and we were able to do that and have the mounting hardware fabricated on site, pretty much.

Sound & Communications: How did you become involved in that project?

Muncy: Through a consulting contact.

Sound & Communications: Had you worked with Lexicon prior to that?

Muncy: Well, I knew the people and I knew Steve Barber in particular. He's a fellow "Washingtonian." When it became clear that we needed a software based system, which didn't take too long to realize, I also realized that Lexicon was just about the foremost authority in that area — reverberation — in terms of what their products were doing in recording studios. I had met David Griesinger and we had briefly discussed something like this, probably over a cup of coffee or something at an AES show at one point. Anyway, I called him up and described what I wanted to do, and he said "I've been waiting for twenty years to try that!" [laughter] some-

thing, you know, that would make a real place sound better, and require less of his time making recordings sound like real spaces.

He's an amazing man. Anyway, we went over and took a look at the place. He concluded that it was more than likely that we could pull it off in a very successful manner, although at that point nobody knew exactly how successful.

Over the course of the summer when the speakers were being installed, we concocted a scheme to get the speakers in, and get the wiring in, and the power amps, and get it to the point where we could bring in all the low level equipment on a rental basis or a borrow-it basis and find out exactly what we needed to do the job.

We got to the point where all the speakers were in, they were wired, we had power amps installed, and we literally rolled in two or three road cases full of Lexicons and things that we thought we might need and we plugged it all in. In the middle of piles of plaster and sand and a concrete mixer that we had to get them to turn off, and drywall and studs. I mean, everything you need. And we turned this thing on and it worked the first time we plugged it in, to the point where we were just flat outright amazed.

Sound & Communications: So David had basically done measurements, and come up with algorithms?

Muncy: He had come up with an algorithm based on Boston Symphony Hall and that was the first software that he brought up. He had a very good mind's eye view of what he wanted to end up with, which was fortunate because if we had gone with the standard software that the 480L comes with, I'm sure it would not have been satisfactory.

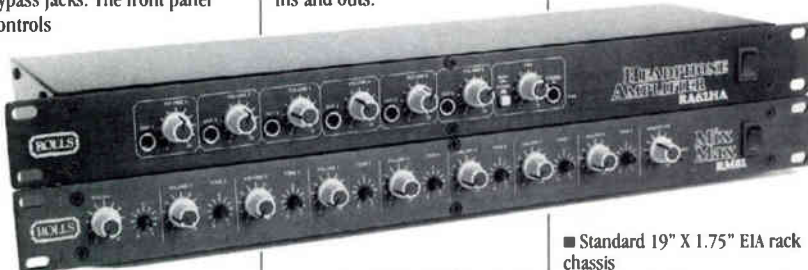
Anyway, the people who were producing the Wizard of Oz show happened to be at this demo, and were mightily impressed. So, one thing led

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include 6 VOLUME, and 1 PAN controls, MONO/STEREO and power switches. The RM81 is an 8 ch mike/line mixer with phantom power. The controls include 8 VOLUME, 8 TONE and MASTER VOLUME controls. The RM83 is a basic stereo mixer with all 1/4" ins and outs.

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to another and a few weeks after that we got the budget approval to finish it off.

Since then there have been about a dozen major software updates, but what we collectively have come up with now is a system which not only sounds very natural but can be made obnoxiously loud before it feeds back, and that's really the fundamental breakthrough. There's about a 20 dB improvement in gain before feedback with this system, with this software, compared to the same hardware without the software running. Anybody in the PA business is certainly aware that a 20 dB improvement in gain before feedback is . . .

Sound & Communications: Phenomenal.

Muncy: Whatever! It's totally amaz-

ing! [laughter] In our demo room at the NSCA we had a little stereo microphone, and we had an eight channel version of the Elgin system set up in the room and we were able to get on the backside of the microphone so we were talking into the null and hold

IT'S A REAL PROBLEM, AND IT'S GOING TO GET WORSE.

the microphone about a foot in front of us, and walk right up so that the microphone was literally inside the cone of the woofer, and the system was operating and there was no feedback.

The software now includes an algorithm which can detect the difference between speech and music. During speech the reverberation level is reduced and during sustained musical passages the reverb level is increased.

The system control is accomplished with a Lexicon MRC MIDI controller, and aside from making the operation of the system very simple, it also provides the opportunity for performers using MIDI equipment to directly tie into the system, so that they have real time control of the acoustics of the hall.

It takes a while for any new concept like this to take off, but the inquiries from some of the biggest names in the architectural acoustics world just keep coming in. ■

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May 1992 21

Background Music, Foreground Music — Who Pays the Royalty?

This month, Answerman turns over his acid-tongued pen to Answerwoman — Pam Michael, who (when she's not writing for *Sound & Communications*) lives a second life as an investigator for ASCAP. Pam's article was being finished as Bob Evans' note came over the fax. Here's his comment, and her expert response.

Dear Answerman,

May I suggest that somewhere in your continuing articles on CD commercial applications you mention ASCAP and BMI? I never cease to marvel at how many sound contractors, telephone people and DJs there are who know little or nothing about copyrights, mechanical fees and performance fees. You might mention that the installer could be sued by the customer for not fully informing him or her if the customer is sued by ASCAP or BMI.

Bob Evans
Cable Music Network
Wilkes-Barre, Pennsylvania

Dear Bob,

Anyone who has ever questioned the power of copyright law in the United States will surely understand why royalty (as in King George) and royalty (as in music licensing fee) are expressed by the same word. The almost invincible power granted to performance rights organizations like ASCAP and BMI by the United States Copyright Law has been solidified over the years by a series of Supreme Court decisions that reiterated and greatly expanded the organizations'

authority. Whether you're playing an aerobics tape in a health club, background music in a hotel lobby, or producing a live stage show in Las Vegas, the law says the songwriter is entitled to collect a royalty from you. With few exceptions (religious services being the most important), when

**BY THE FORTIES,
ASCAP HAD BECOME
A RATHER ELITIST
CLUB THAT
EXCLUDED MOST
COUNTRY, BLUES AND
LATIN ARTISTS.**

you play a song in public you must pay not only the piper, but the songwriter as well.

The idea behind the Copyright Law is simple — copyright is a property right. Copyright law protects works of authorship, published or unpublished, in any tangible medium of expression. Under the law, creators of books, plays, computer programs, movies, music and many other things secure exclusive rights to the performance, reproduction or display of their works. They, or their heirs, may license others to use their works. The United States Constitution recognized the need to protect such artistic commodities and granted Congress power to provide for copyrights. The very first Congress did just that, in 1790. The founding fathers appar-

ently believed the way to foster creativity was to make the successful works of creative minds profitable. And the founding fathers of ASCAP (American Society of Composers, Authors [lyricists] & Publishers) were astute enough to realize that the performance of a musical work is not the commodity to be valued — the copyright of the work is.

ASCAP was founded in 1914 by a group of composers, lyricists and publishers (Irving Berlin, John Philip Sousa and Victor Herbert among them) as a non-profit membership association whose goal was to license and collect royalties for their works. The New York-based organization is now the world's largest performing rights group, and wields enormous might in setting licensing fees paid by TV networks, radio stations, clubs, airlines, colleges, private clubs, dance schools, banks, lumber yards, shopping malls and jukebox distributors — just about everyone who plays music "anyplace where a substantial number of people outside a normal circle of family and social acquaintances is gathered."

Performing rights societies are voluntary organizations. Song writers are not compelled to join, but anyone not affiliated with a performing rights organization would have a difficult time monitoring where his or her music is being played, licensing music users, collecting fees. Indeed, when ASCAP was the only game in town (from 1914 to 1941), composers who did not "qualify" for membership were



An ASCAP copyright delegation in Washington, D.C. in 1924. Back row: Con Conrad, Charles K. Harris, Otto Harbach, Harry B. Smith, Irving Caesar, Max Dreyfus, Joseph Meyer. Middle Row: E. Claude Mills, Nathan Burkan, Harry von Tilzer (partly hidden), Irving Berlin, Victor Herbert, Gene Buck, Jerome Kern, John Philip Sousa, Augusts Thomas, Raymond Hubbell. In front: Silvio Hein.

on their own, essentially frozen out of the marketplace, unable to collect performance royalties and dependent on sheet music sales alone. By the forties, ASCAP had become a

rather elitist club that excluded most country, blues and Latin artists. Radio was king in those days, and playing the hits meant paying ASCAP. Fees were increasing

steadily, along with the dissatisfaction of broadcasters. In 1941, in a move that was to change the course of American popular music, radio stations decided to boycott all ASCAP tunes. For ten months, Americans heard nothing but public-domain material on radio; an experience likened by a listener of the day as "a Stephen Foster marathon."

Bankrolled by CBS and others, a new performing rights organization of music users (rather than music creators, as in the case of ASCAP) was formed — BMI, Broadcast Music Incorporated. The organization was cash rich, but had few licensed properties. BMI agents scoured the country for ASCAP rejects. Many rhythm and blues artists and mambo kings were courted and signed; BMI embraced small-time country music publishers and created a Nashville empire that exists to this day. Branching out to support fledgling record labels like Chess, Atlantic and Sun, BMI established a catalog that eventually rivaled that of its competitor. Today ASCAP, BMI and a few other

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smaller performing rights organizations act as clearinghouses for tens of thousands of artists who deserve royalties for their work and the businesses that profit from their music. These licensing groups include: AMR (American Mechanical Rights Agency), CSB (Copyright Service Bureau), MCM (Mietus Copyright Management) and SEASAC (Society of European Stage Authors and Composers). The largest of these smaller groups, SEASAC, is a family-owned organization that licenses mostly gospel and religious music. Artists may join only one organization, but publishers usually have dual affiliation, generally with both ASCAP and BMI.

Performing rights organizations have been involved in almost constant litigation since their inception. They've fought each other, the U.S.

Justice Department, The Gap, CBS, and many others. In almost every case, their right to set and collect fees has been upheld, although rapid technological expansion has made it difficult for the law to keep pace with advances. Cable TV, in particular, presented new challenges to copyright interpretation. In a landmark ruling in 1991, The Disney Channel was ordered to pay BMI \$1.98 million to settle a dispute of many years over "split licensing," the practice of charging both the original producer of a program and the cable operator who broadcasts it for use of any copyrighted music.


Copyright law requires a license for mechanical performance, as well as for a live performance of a work. Mechanical performance includes broadcast or background music using

CD, tape, records, radio, DAT, karaoke. In the last few years, audio/visual — large screen or multiple sets — has come into play as well.


Song writers (of both words and music) make money from their work in several ways: sale of sheet music and song books, licensing their material for advertising or films, and most significantly, from performance (broadcast or live) and mechanicals (sale of recordings of their music). Mechanicals are paid at a rate set by Congress, called the statutory rate. It was set in 1988 at 5 cents per record, split between the publisher and songwriter. Some song writers earn over a million dollars a year, but most receive far less. Royalty revenues are distributed to individual song writers according to complicated and mysterious formulae based on surveys of licensees, broadcasters' logs, spot checking of various trade charts, and a few other factors; the larger the audience, the bigger the license fee.

Broadcast airplay is given a lot of weight in deciding how royalties should be allocated. A major hit can earn \$100,000, or more; "Yesterday," by John Lennon and Paul McCartney, was recorded 1,186 times between 1965-1973. Royalties for monster hits can add up fast. They are divided 50/50 between the publisher and songwriter. This monitoring system favors mainstream, commercial music and creates a built-in caste system of sorts. Indeed, at one time ASCAP paid 60 percent of its royalties to 8 percent of its members. Singer/songwriter/activist Holly Near, who has sold many, many records and received heavy play on college and alternative radio stations, "never got one nickel of royalties," as a music industry insider put it. (I could not verify this assertion with the artist or organization, but the fact remains that the system is heavily weighted in favor of mainstream artists.) Both the industry and the courts are aware

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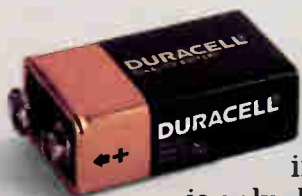
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◇Did we forget to mention we're giving away a free Duracell Alkaline battery with the purchase of a Concert Series II System? Offer expires October 1, 1992. Duracell is a registered trademark of Duracell Inc.

World Radio History

of discrepancies, but despite periodic sweeping changes in the revenue distribution system, it is not perfect. It is, however, the law.

End users (club owners, concert producers, etc.) are responsible for paying the licensing fees, usually in an annual, blanket fee that gives them the right to play all the copyrighted material they want. A surprising number of them do not understand their obligations, options, or rights; many believe it is up to musicians or record companies to pay the royalties. Performing rights societies seem to contribute to the confusion with complicated forms and formulae, a tendency to charge what the market will bear despite all their charts and tables, and what might best be described as "attitude." BMI's rate structure is generally considered easier to figure out than ASCAP's, but both rely on such variables as the number of speakers, square footage, attendance, admission price. A separate license is required for live performance and background music.

New venues usually are identified by a network of field investigators and researchers. It may take awhile, but the "new kids on the block" will be found out. Often, ads in local papers will alert the investigator to a new possible licensee. Once it is determined that music is being played at a given location, a bill is sent for licensing fees. It will be dated from the first day of contact, and not from the first day of operation. Damages for an infringement after being notified of licensing requirements run from \$500-\$20,000 for each song. Licenses are not transferable or assignable, and are limited to a particular licensee and premises. If the user thinks the fee is unreasonable, he or she may negotiate for a reduction directly with ASCAP or BMI, or, as a last resort, apply to U.S. District Court for redress.

While it is the sound contractor's client and not the sound contractor

THE LARGER THE AUDIENCE, THE BIGGER THE LICENSE FEE.

who is liable for paying licensing fees, it is prudent (and good business) to apprise clients about the financial implications of a given installation. It is very difficult to get a precise estimate from ASCAP or BMI in advance of operation, but using their licensing contracts and your own experience (and this article!) as a guide, you should be able to come up with a ballpark figure.

The following is a summary of current ASCAP rate structures. BMI and SEASAC are similar, but different. For your own files, request literature from all three.

Retail Stores: Audio only —

BY THE FORTIES, ASCAP HAD BECOME A RATHER ELITIST CLUB THAT EXCLUDED MOST COUNTRY, BLUES AND LATIN ARTISTS.

\$124.50/yr. for up to three speakers; \$25 for each additional speaker, up to a maximum of \$1,049.50. Audio/Visual — \$187/yr. for up to three speakers; \$37.50 for each additional speaker, up to a maximum of \$1,574.50.

Chains having ten or more locations under common ownership: Audio only — \$124.50/yr. for up to three speakers for each of the first 200 locations; 201-400 locations, \$112 each; over 400 locations, \$92 each. Audio/Visual — \$187/yr. for each of the first 200 locations; 201-400 locations, \$168 each; over 400 locations, \$138 each.

Restaurants, Tavern, Night-

clubs: Base rate ranges from \$162 — \$3,121/yr. Variables include mechanical music only or both live and mechanical, number of nights per week in operation, seating capacity, dance floor area, number of speakers, audio visual equipment.

Hotels and Motels: Live music only — Base rate ranges from \$120 — \$23,500/yr. Variables include annual expenditure for all entertainment on the premises.

Mechanical music only — Base rate ranges from \$190-\$1,494/yr. Variables include number of rooms in hotel, dance floor, cover or minimum. For A/V, add 50 percent of the above.

Live and mechanical music — Live music base rates as above, plus \$111 — \$1,494 for mechanical music, with variables.

Shopping Malls: (Applies to common areas of mall only. Individual stores must negotiate separate contracts.) Mechanical-audio only — \$132.50/yr. for the first three speakers; \$26.50 each additional speaker, up to \$1,113.

Mechanical-A/V — \$199/yr. for the first three speakers; \$40 for each additional speaker, up to \$1,679. If mechanical music is performed by both audio-only and a/v means, the latter fee applies.

Live music performances — say a choir at Christmas time in the atrium — are billed for each day when such performances are presented. This daily fee is based on the total square footage of all shopping center or mall areas, and ranges from \$24.50/day to \$40.50/day.

Conventions, Expositions, Industrial and Trade Shows, Meetings: (Fee depends on the number of people who attend and whether the music is mechanical or live.) Mechanical — 4.5 cents/attendee/day. Live music — \$25-\$500/day, based on the number of attendees; maximum fee — \$4000/day. Payment is due 30 days after the event, if the presenters do four or fewer shows a year; otherwise

quarterly filings are necessary.

Jukeboxes: Jukebox installers are required to notify ASCAP of any installation. The vendor is responsible for paying the license fee.

Users of background music services like Muzak or AEI do not deal directly with ASCAP or BMI. The service pays all licensing fees. Muzak is the world's largest supplier of business music and is also one of the biggest sound contractors in the world; 100 million people a day listen to a variety of pre-programmed Muzak music packages.

The 60-year old privately-held company does all its own installations, both new and retrofit, and utilizes satellite transmission, as well as on-premise tape machines and FM-radio side bands (SCA). Muzak fees are

negotiable: "whatever the market will bear," according to a Muzak representative. Fees generally range from \$35 — \$500/month.

So the next time you notice the tiny "ASCAP" or "BMI" in parenthesis beneath a song title on a disk label or cassette, remember that the power and clout represented by the designation is anything but tiny or parenthetical. These organizations are steadfastly dedicated to protecting the rights of song writers and publishers, have the full force of U.S. law behind them, and almost never lose in court. Copyright law is one of the most volatile and complicated areas of the U.S. legal system. New technologies and applications are forcing change and reevaluation almost every year. Keep up to date on current

interpretations and rulings. Protect yourself and your clients by making it your business to stay informed.

— Pamela Michael ■

ASCAP: One Lincoln Plaza, New York, NY 10023, (212) 621-6000.

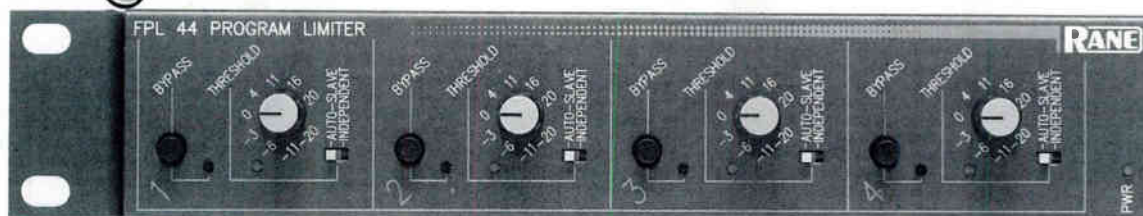
Harry Fox Agency (handles mechanical and synchronization rights for ASCAP material): 205 42nd Street, New York, NY 10002, (212) 370-5330.

BMI: 320 W. 57th Street, New York, NY 10019, (212) 586-2000.

SEASAC: 10 Columbus Circle, New York, NY 10019, (212) 586-3450.

Pamela Michael is a freelance writer who lives in Berkeley, California. For the past three years, she has been a part-time investigator for ASCAP.

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The 1992 Winter Olympics, Part 2

Installation of the Sound System for the Olympic Overture/Fermeture Ceremonies in Albertville

BY CLIFFORD A. HENRICKSEN, MIKE KLASCO, and PAMELA MICHAEL

If there was anything more excruciatingly frustrating for American television viewers of the Albertville Winter Olympics than the choppy short-shrift given by CBS to the breathtaking visual spectacle of the Opening and Closing Ceremonies, it was the tantalizingly brief snatches of the fantastic music and sound effects. For the 36,000 people lucky enough to be sitting in the Alpine stadium itself, the richness, fidelity and power of the 170-speaker sound system were, by all accounts, awesome.

Designed by US Sound, the all-digital system delivered impeccable sound for everything from full crunch electric guitars and synthesizers to full orchestral works to folk melodies played by battalions of concertinas. The system also scored high in speech intelligibility (in both French and English), especially critical for an international audience in a so large an arena (200 meters in diameter).

Never before had so many athletes (2,200) from so many countries (64) participated in so many events (55). Scattered among a dozen remote villages, the Olympic facilities included 10 competition sites and eight athletic villages spread out over 640 square miles of the Savoy region of the French



The Opening and Closing Ceremonies are serious business as is demonstrated by (from left to right) Pascal Orteg, Philippe DeCoufle, Alain Francais, Cliff Henricksen, John Lemon, an unidentified participant, Dominique Phelizon, Composer Martin, Dominique Barlot, and Serge Fernandez.

Alps. Gone are the days of the homey, intimate apres-ski kind of Olympic experience for the athletes and volun-

teers. Old timers recalled the 1948 Games in St. Moritz where all the athletes had breakfast together in the same hotel. Here, they communicated mainly online, linked only by computer in their far-flung accommodations.

Bose Corporation was chosen as the official audio supplier to the 1992 Winter Olympics. They subcontracted the sound reinforcement job for the Opening and Closing Ceremonies to U.S. Sound of Maple Shade, New Jersey.

US Sound was founded in 1983 by John Lemon and entrepreneur Gym Wilson. In collaboration with Cliff Henricksen, they developed a very innovative sound system designed to achieve high intelligibility in large, live spaces. The concept was based on complete dissatisfaction with the vocal intelligibility of all existing "PA" systems at the time, both on the road and in arenas. Design sketches from Cliff yielded a prototype system which was built and subsequently refined for use as a more practicable road system. The results were spectacular. Based on a live-performance demonstration, Grammy-winning group "The Judds" decided to contract US Sound as their touring sound contractor. On the road, their system was praised for its excel-

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lent and unusual sound quality.

Encouraged, John and Cliff continued to work together at an increasing pace, going on to develop light weight and self-cooling components. At this point, the company decided to get out of the touring business, develop a new refined system and get into manufacturing and sales.

US Sound's touring experience, along with the fact that both Lemon and Henricksen are musicians, gives the company an edge in developing new and unique sound systems and sound services technology. They have devised engineering methods using proprietary electronic, acoustic and mechanical building blocks, along with CAD-based systems assembly, design and setup technology. Completed subassemblies of loudspeaker-driven waveguides are integrated to behave and sound like a single-source loudspeaker. The loudspeaker building blocks are high-directivity devices that essentially allow the listener to hear only one complete sound source. U.S. Sound calls this approach "Coherent Zone Engineering." This systems approach has also resulted in the mechanical design of enclosures and components that are self-cooling, simple to service and extremely lightweight — 1/2 to 1/3 the weight of a normal system.

Many Sound & Communications readers may know of Cliff Henricksen. He's held many research and engineering management positions in the sound manufacturing industry and has contributed to the invention of the modern constant-directivity horizontal-diffraction horn, the very large format compression driver and "Manifold Technology." Other work has been on the development of a complete heat transfer technology for loudspeakers and the invention and design of the modern radial phase plug for high-frequency compression drivers.

During our trip to the Olympics, while Cliff was wildly gesturing about his speakers, we made off with his daily log and have reproduced it on the

following pages. After the fact, Cliff described the spectacular circus-like pageants in Albertville as "the best show I've ever seen." Under the direction of brilliant Artistic Director Phillipe Decoufle, a Parisian choreographer and conceptual artist who was given carte blanche by the French government and the Olympic Committee (headed by 1968 triple-gold medalist Jean-Claude Killy), the daring and thoroughly entertaining productions featured such memorable "cubofutur-

Bose Corporation, the official audio supplier, subcontracted the sound reinforcement job for the Opening and Closing Ceremonies.

istic" images as a bungee cord ballet with hundreds of human mobiles dangling 168 feet in the air, 36,000 people standing and sitting in unison doing "The Wave," huge cornucopia (cleverly situated over invisible tunnel openings connected to a maze of underground staging rooms) that spewed and later swallowed legions of wildly costumed characters — people wearing 20-foot dunce hats held aloft by helium balloons, living bubbles, Vikings, trees and snowflakes.

US Sound worked closely with Dominique Marthay of Bose France and French sound artist Alain Francais of the company De Preference, who ran the entire show from a Macintosh PowerBook laptop. Cliff described the digital control room, which had a Yamaha 8-channel mixer and a slew of disc-based Akai digital recorders, as "total Captain Video." Francais used the three separate loudspeaker systems designed and installed by US

Sound to the max, constantly experimenting and reconfiguring. The systems utilized 115 Bose 1800 amps, most of them in bridge — a lot of fire-power — as well as AKG CK401 wireless mics on headsets, US Sound large bass arrays, and their "Coherent Zone" mid-high system. The three systems designed by US Sound were:

One. The central system, primarily for music, which covered the seating area with full fidelity and gave the infield mostly midrange and bass, enough to hear what was going on, and minimizing reverberation.

Two. A voice system consisting of 11 US Sound CZ44s, clusters of four mid-high speaker boxes, flown on Kevlar cables just about directly over the plastic molded seating as a distributed ring system, with bass supplement under the seats — a battery of double 18-inch bass speakers.

(The above systems would have been impossible, due to weight limitations of the structure, except for the lightweight composite construction of the speaker's enclosures.)

Three. A 6-channel special effects system consisting of a pair each of a small array of two large mid-high speakers on poles high up in the air around the outside perimeter of the stadium.

Francais put the special effects system to remarkable use, employing many different output busses on the mixer to do all kinds of stereo wizardry high over everyone's heads — 3-D birds, laser sounds yodeling, church bells. In the closing production, lit by one of the largest fireworks displays ever, wireless mics were strapped to the ice skaters' blades and the whooshing signal was added to the mix. And thanks to Bose and US Sound, what a mix it was!

Excerpts from Cliff Henricksen's Log

Preparations for this project included a hands-on session with a similar system to the one we proposed for the Olympics, our installation at the Omni

Coliseum in Atlanta, Georgia. Alain Francais and Dominique Marthay flew in to Atlanta for a few days and both were very happy with the experience and the capability of the system. We worked via mail, fax, phone and several visits, a difficult process at best, independent of any language differences. Through Alain, we have also worked with the people at Telema, the main engineering and aesthetics coordinator in Albertville for all the activities and construction centered around the ceremonies arena.

January 1, 1992. Happy New Year. We say goodbye to everyone at home and pack for the flight on the next day. This includes three very heavy boxes filled with American- thread screws, eye bolts, 1-inch lifting eyes for the trusses and all the rigging straps and 3/8 -inch quick-links for hanging the

system. We all wonder how the customs officials in France will take to all this.

January 2, Thursday. My wife Bonnie drops me off at John's in the late afternoon and wishes us good luck. I am happy our daughters are still home from college, to keep her company. I tell her the installation will probably be a big fiasco, and we laugh.

January 3, Friday. We arrive at Orly Airport in a daze, breeze through customs with all our system hardware in very heavy boxes wrapped with silver duct tape(!) and check out the fast train to Albertville. The next one available arrives too late, so we rent a bright red Renault 5 from Budget so we will not be late for the unpacking of the container, which has been in France since 21 December.

We drive for 5½ hours at 160 km/h

(100 mi/h) and are regularly passed by others in similar little cars doing a far greater speed. I wonder how long these little motors can possibly last over here. While driving at 160, John notices odd flashes of light on the way. We find out later that he has been "flashed" by roadside cameras, which allegedly will deliver speeding tickets to him with this the photographic proof. Brave new world. Finally in Albertville, we enjoy the views of the Alps and drive directly to the Telema offices in search of Alain Francais. He is there, right in the thick of things, and informs us immediately that we have a "big problem," a phrase that seems to translate directly in French, much like "no problem" — seems to be an internationally understood Americanism. The Big Problem is that, for all our rushing to get here, the container with all the speakers in



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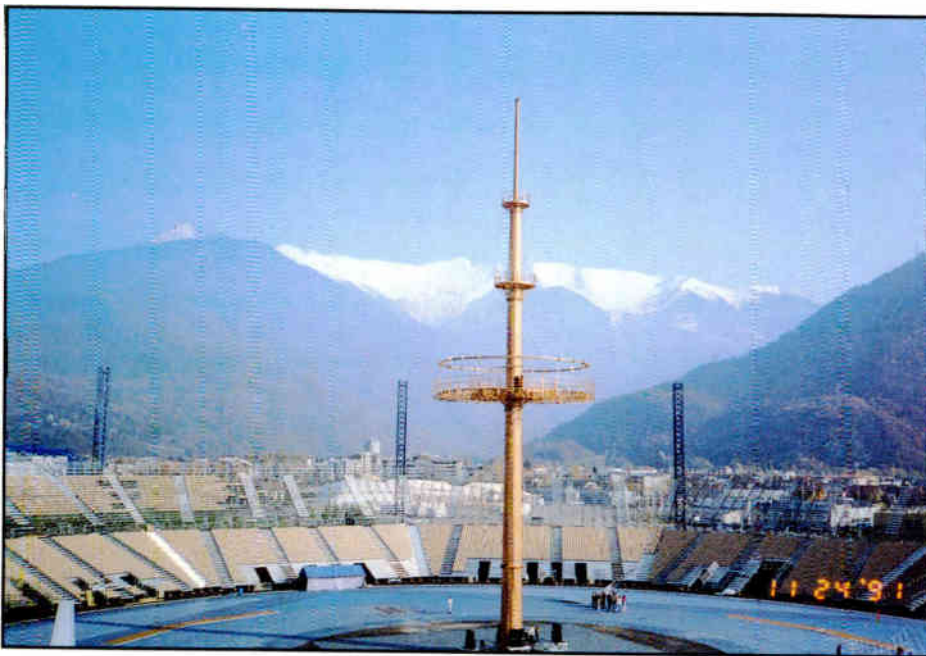
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Before installation.

it is still in Le Havre, due to a dock workers' strike. We are assured that the strike is "no problem" and that it will be over soon, like by the end of the day. But we were told that the container was here the 21st of December, cleared customs and would be waiting in Albertville, so we should rush over on the 3rd, not the 7th like we planned, so we can have the system up early. Well, we're here. No going back now.

Alain, Joe, John and I go to the arena for a look and meet Nigel Gibbons, the owner of Sori Rigging, the company hired to put the various systems up. They are painting pipes, for support of the speaker systems on the perimeter poles, to match the blue of the towers. It all looks black to me.

January 4, Saturday. We go to the arena again and check out the progress. Riggers are preparing things and the electrical installers are making wire runs and wiring harness subassemblies. We think the French-made Le Grand junction boxes for speaker systems are very slick. Nice weatherproof boxes with clever waterproof bellows glands for the wires. The power amps are all piled up in 12-high stacks for the main and voice systems, 115 amplifiers in all. It looks impressive, but it also looks like there is still a whole lot of work to be done.

January 5, Sunday. We go over to the arena again, just to see how everyone is doing. Riggers and electrical installers are still busy. Control room

welded and rigged their own points anyway, for their own truss; side-to-side points as opposed to the front-to-back points needed for the trusses we brought with us. What if you want to trim the truss with motors? Side-to-side? This is a big problem, and the riggers seem very intent on using their own equipment, a standard triangular tubular lighting bar. We agree to try this, now that the points are up and welded. This basically makes all our straps and system of rigging useless and we will have to use ratchet straps and do a bit of a tap dance to get it all



After installation during the Closing Ceremonies rehearsal.

gear, including a standard 40-channel PM3000 console comes in, and they can't get it into the control room. We suggest several approaches and the guys finally take the wall off the back of the room.

At Telema, we are told the strike is over and that the container is to be shipped on Monday, tomorrow.

January 6, Monday. In a conversation with Nigel, John points out that their rigging system, a standard lighting truss section, will not work for our speaker system. The riggers then

up.

All the pipes are welded into place on the outer perimeter towers for the speakers and look good. At least this will work okay.

We are told that the container is en route for delivery early ("first thing") tomorrow. At last.

January 7, Tuesday. The container arrives at 11:30. It's really our container, the same one we loaded in New Jersey, the same one, hopefully, with all the speakers in it. We get a huge crew of guys to help us and it is un-

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loaded by 2:00, during la repetition (or rehearsal). All the stuff is piled up in the entrance cutout area in the arena. We are now aware that la repetition will happen every day from 1:00 to 5-6:00 and no work can be done in the arena at these (prime) times. (Oh, by the way . . .) The workers all say "oh la-la" as we open the container and the mountain of trash paper and old cardboard used for final packing falls out in France. They accuse us of starting an American landfill in Albertville, but we assure them it will go back with the container, as it eventually does. Everything looks like it survived the journey in great shape. The boxes keep coming and coming and we unload a huge volume of stuff onto the tarmac.

We have lunch and then assemble a number of speaker arrays for the tower,

just to see what problems we will have. These all line up great and go together perfectly, giving me a sigh of relief for our new rigging system. One of the dual mid/high speakers is put up on the nearest tower with the aid of the LEV bucket-arm vehicles, and it looks perfect.

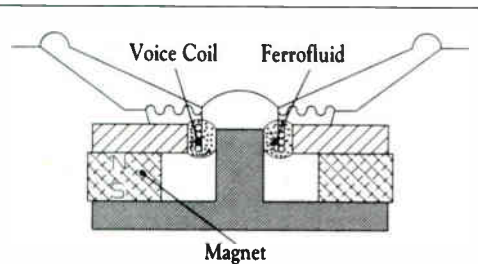
January 9, Thursday. We arrive at 9:00 in the morning and the inspection ceremony has already begun. Everyone comes out and stares, says "hmmm," pacing with their hands behind their backs, and Alain darts around, negotiating some more. The system has to go up soon so the truss-arms for the bungee-cord dancers can go up and rehearsals can progress. There are few options now, as we cannot put the speakers above the lighting platform nor on its perimeter, as they will interfere with rigging steel and

other objects on the tower. It is obvious to us that the tower (large gold-plated chandelier-like central mast) was never designed with provisions for a sound system, from both a visual as well as a structural point of view. It is also obvious, judging from the concern over the loading of various parts of the tower, that a standard sound system would be well over the weight load limit for the tower. Our system is the only one in the world that could fly on the tower without overstressing it! The committee reluctantly approves this configuration for the sound system, and that is that. Like a woman in labor, it is time to push.

Later, various of "les grandes fromages" ask us if we think the speakers are beautiful. I respond yes, with a smile, but a scowl response tells John and me that we are skating on thin ice here. Don't insult the visionaries. (Non, monsieur, it is tres ugly, but la son will be tres belle). From here on out, diplomacy is the best mode of operation. They all basically say it better sound great, for all the visual damage it is doing. When all the arrays are up, we secretly rejoice in the commanding visual presence our system has. Joe Vancho points out that we will be able to buy post cards with the system on it!

The stadium at night is a strange environment, and it has an almost alien-world quality to it. It is lit up by powerful work lights on the towers, which seem to have the blue-white spectrum of standard fluorescents. It is a very stark, lonely and unnatural environment. We are basically alone there, we three Americans and an installation crew of about four or five men, depending. Serge busies himself in the control room, hooking up all the stuff the way Alain wants it. Down in the amplifier cave, it is relatively cozy and jolly, similar to a living room with a fireplace in comparison to the strange and stark world topside. Incandescent lighting, gas heaters, and the 115 900-watt power amps, I'm sure, play a big

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part in this.

January 11, Saturday. We finish hanging all the arrays and the installation crew goes about wiring the arrays, before la repetition starts. It gets done.

Andy Smaga of Bose France shows up and we give him a tour. He is clearly impressed with the magnitude of what is going on. To us it is just our work. John tells him of all the problems we are having.

More work into the late evening, in heavy rain, and all but the last cluster is trimmed and wired. (It rained all three days of our installation.) I make sure all the nylon rigging is protected from chafing and being cut by the cabinets with cardboard and gaffers tape detailing. The French call gaffer's tape "le gaffer."

January 12, Sunday. I go in alone to

trim and finish hanging the last cluster. By the end of the morning, the last array is wired and up in place.

I return to the hotel and John, Joe and I leave for a nearby ski area, Valmorel, to spend the afternoon skiing. We meet Guy Rozier, brother of NFL's Mike Rozier and coordinator for the US Olympic team, from Camden New Jersey, of all places. He joins us and we all go up on the lift together. It goes way up. Joe disappears off on his own, having great difficulty snow plowing and generally keeping himself upright. As we ski off, we feel bad that we have left him to the wolves, skiing the Alps as a beginner. No ropes by the crevasses and generally wide-open skiing. We hope he will survive.

We return to the arena in the evening and supervise the riggers putting up another array. I suggest a scheme, but



Load out of the cluster.

Nigel's assistant, a Frenchman named Christophe, suggests a far simpler method involving no kickback. It looks like a good idea, so we try it and it works great. I do my usual visual arraying tests and we arrive at a geom-

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Night time shot of cluster.

etry that works fine; for all the other arrays it is mindless busy work. They also kick back the upper bass, which to this point has been hanging kicked slightly forward so that rain has had a chance to run into the grilles. A huge downpour of water falls out of one of them, but I know the water has merely filled the back portion of the box and is no threat to the woofers.

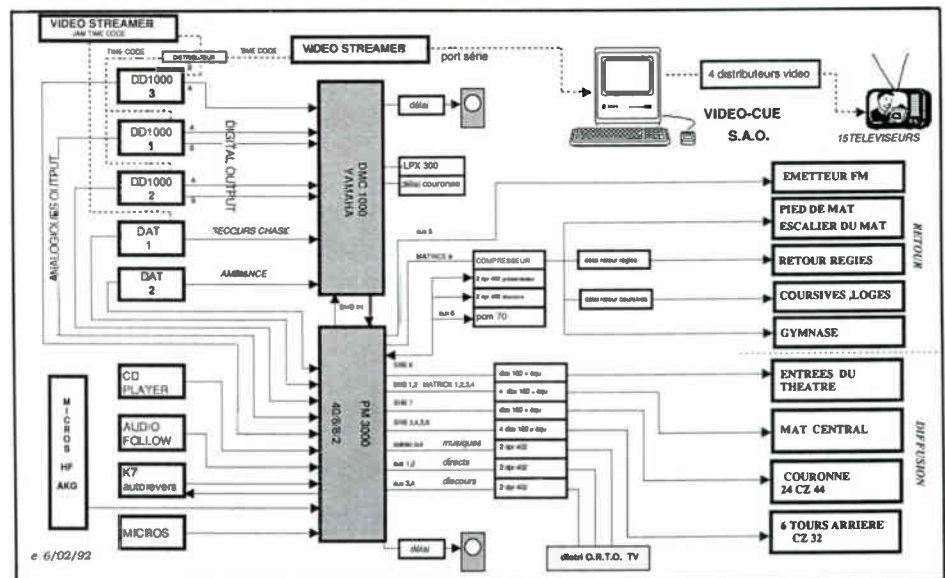
January 13, Monday. Today we were supposed to go home, but we're not even close. I call home with the news and we all brace ourselves and try to be big boys and girls.

We get up early and go to the arena and make sure things are okay. The riggers put up more of the arrays and they go up without a hitch. The rigging scheme works like a charm, and is certainly better than our original plan of two points for support and one point for kickback.

January 14, Tuesday. The main cluster speaks. It is going to be a real fine system, and sounds much louder than it does indoors. Coverage, even with the vertical overlap, is excellent, and we get that in-your-face sound even at 250 feet! There is a lot of ground-loop buzzing that the installers are trying to fix. A whole new earth scheme eventually calms this down. Alain seems to

hearsal ends with the trying of all the lights and the sound system simultaneously, so that everyone can see if the power surge is okay. If the lights in the village dim, we're in trouble. Serge plays the system so loud that the bass amps clip and I measure 110 dB at mid level in the seats; about 80m from the cluster. I yell at Serge and he assures me this is only a test and that they will not play the system this loud.

Alain leaves for Paris and the installers head out for an eve of drunken misconduct, to clear their attitudes as they say. It has been a long taxing project and I personally am numb and homesick beyond words. We change the tickets and I make the mistake of telling the attendant I was on standby.



Opening and Closing Ceremonies system.

like it, as he says it is what he hears in the studio. He loves the transient character of the bass, but misses a "soft" quality. I take this to mean deep bass "puff." However, there is no doubt about it. The system speaks with authority.

January 15, Wednesday. System up and running. We leave the amps on overnight with pink noise on. Let 'em cook!

January 18, Saturday. We return to the amp room to find everything percolating along in good shape. The re-

John and Joe play dumb and get seats, in Business Class to boot. Tired and fried, I get depressed with the thought of being stuck here another day, aching to be with Bonnie and the little ducks.

I finally get on the flight, in Business Class also, and we have a pleasant flight home. I finally get to sleep in the evening after being awake 45 hours or so and being on the French clock for 2 1/2 weeks. ■

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The School Market

Now and in the Future

BY MARIA M. CONFORTI

Reading, writing, and ROM are on the books for all learning levels, from primary schools to universities. Add to this assistive listening devices, CCTV, and multimedia systems, and it could spell out plenty of assignments for contractors and consultants.

The upgrading of old sound systems is providing a lot of work, Sam Borgia reports. He is a head of pro audio/video at Warren Radio, Inc. of Erie, Pennsylvania, which has a broad school-client base. "As far as this area's concerned, [the schools] are in desperate need, and they're really having a hard time finding the money to make the necessary changes, because the equipment is finally showing its age . . . It's a total replacement," Borgia says. "We're gutting the system, and re-installing new equipment, for the most part." In some instances, some additions and repairs suffice.

"The cost of renovating a school versus building a new school is cost-prohibitive on renovating, but they continue to do it, for a lot of reasons" including the perceived historic value of an institution's establishment on land already owned, says Suzanne Graham, market manager for Ranger products at Rauland-Borg. "To try to



Installation at Butler County High School in Morgantown, Kentucky included a Rauland-Borg Telecenter IV Plus. Rick Williams from Comstar Systems in Bowling Green, Kentucky is shown.

modernize [sites] is very expensive. In the midwest, the trend seems to be to renovate as opposed to building new." Graham observes that controversy brews — even before classrooms are considered — over infrastructure choices.

"There seems to be a trend toward

centralized distribution systems," notes Ric Bayly, senior consultant audio/video for Acentech of Cambridge, Massachusetts. Typically, Acentech installs at universities and colleges. The work usually includes a bank of program material sources like VCRs, laser disk players, satellite tuners, and occasionally slide-to-video converters. From there, images or data are distributed to classrooms, meeting rooms and auditoria. Spiffy, for sure, but there is at least one very down-to-earth advantage of centralized systems, Bayly points out: "A lot of this means that you're not wheeling around portable equipment all the time."

While centralized media control can decrease personnel and maintenance costs, scheduling of equipment use and playback can get very complicated, due to the systems' various factors. One wonders if the politics inherent in school teaching and administrative staff could also further complicate the initially streamlined scenario presented by media distribution.

"Schools are very technology-conscious," says Graham. "They are looking for ways to help teachers keep the attention of the children, and get them more involved in education. How do you do that? The answer today, most

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The control room at the University of North Carolina with its centralized scheme of program sources as installed by Acentech.

educators feel, is 'hands-on.' Don't just preach to the children, get them involved with doing. So with any type of technology where they can do a hands-on search for information, educators feel the students have a better chance of retaining that knowledge that they gain. When you look at the sources that are available — CD-ROM format, laser disk format, VCRs, anything to do with computer — any type of visual format like that becomes very attractive to educators who try to weave that in and work with their curriculum.

"Most school superintendents and technology people understand the cost," Graham continues, "What they're trying to do now is organize it in some form of a technology plan so it can become cost-effective over a number of years. Obviously, they can't go out and buy everything that they want immediately. Then, they say 'How can we work through this so we have enough money each year to budget, yet we don't obsolete ourselves immediately.' The fear is that you buy all this fancy equipment, and then in another year, it's obsolete. Where is their assurance that everything they buy will be used well into the next century?"

Computer and graphic projection with either rear-projection or front-projection screens are in demand with Bob Adams' school clients. Adams, president/owner of the Los Altos, California-based EISI, states that the learning institutions his company mainly works on are colleges and universities. Their systems "might also include nicer sound systems, or wireless remote control systems for sound, lighting, screens, and projection equipment," he adds.

"Community colleges seem to want

to put either projectors or monitors up in the ceilings for larger types of classrooms for either video, data, or sometimes graphics projections," Adams says. He adds: "Graphics projection is a little rarer on the college or university level. They want the latest type of technology, which is the brightest color on the screen and the sharpest contrast ratio."

Also, CCTV monitoring in hallways for some urban areas is becoming more commonplace, while PA into each room for announcements is becoming the norm rather than the exception, opines Ron Taylor, manager of marketing services/advertising at Telex Communications. Furthermore, he adds that "[b]ecause of ADA [legislation], auditory trainers will not just be used in the classroom [designated] for the hearing impaired," Taylor says. "My guess is that personal listening systems will become the norm in classrooms and, most definitely, in auditoriums. Schools are quite familiar with FM devices that allow access to what the teacher is saying for the hearing impaired, but they've been kind of portable systems that have been going around to those special ed classes."

"It's a tough sell," says Borgia. "They know what they want and they know that they need it, but at the same time, unless you go in there with a variety of advantages and perks, they're more than likely not even going to bother doing the system. They'll limp through in their present condition. So it gets to be an interesting time trying to sort it out with them. We can prove very easily that what we're going to put in is going to work better."

"Dealing with the pricing of these things, getting beaten up pretty good

by bids," is a frequent problem when working with schools, according to one source who did not want to go on record. "Sometimes I think they will sacrifice quality for the price, and that's not fun when you're trying to deal from a quality standpoint."

Because equipment standards are so similar, the job usually goes to the lowest bid, Borgia further explains. "It's a buyer's market . . . the buyer has the best say-so right now, without a doubt . . . They're really being picky as to what they want to do and what they want to spend."

"With the ADA legislation, you have legislation that is legally demanding that some contractor put some things into a public institution," Taylor says. "Then you have budget cut-backs that are pressing in the other direction. In this case, you have two forces at odds with each other. It may mean that those things covered by legislation are going to come first on the list of things remaining that can be done in terms of budget. If budget cuts happen, legislative imperatives are going to take priority, and it's going to cut even further into what's left to be done. So it may mean that luxury items like multimedia systems that enhance education rather than do basic things are going to have to take the back seat."

Still, things are not tough all over. "I see [midwest] schools saying, 'Let's spend the money up front, right now, for the infrastructure. What kind of a local area network [LAN] are we going to have and what kind of cable does that take?'" reports Graham. "Those are the questions that are immediate and [some] contractors aren't real sure what the answers are. They're scrambling, I think, to learn more."

"There are a lot of contractors now who are trying to become more proficient in fiberoptic cables, in IBM-type cables, just for when the customer says, 'What way do you want to go?' At least they'll have an informed opinion."

Competition is fierce, so load your gun with whatever you can. "The thing



Installation at Buena High School in Sierra Vista, Arizona by Chambers Electronic Communications. Included in the install were Rauland Borg's Telecenter IV Plus and a Blonder Tongue RF distribution system. The photo shows the terminal boards behind the racks.

that allows us to coordinate a better, higher-quality installation is that we have our own installation/contracting crew that puts in these types of systems, rather than subcontracting it out to someone we know just a little," says Adams.

"Consider your supplier in terms of back-up," Taylor advises. [A contractor] is so dependent on reliability and the backup to his product, that he really can't afford to have a long link between himself and the engineering expertise that developed the product that he's putting in.

"Callbacks are sometimes more expensive than the job itself," Taylor continues and in this day of budget cuts and slimmer margins, perhaps [contractors] have to be even more conscious of reliability."

As more and more high-tech A/V systems are being spec'ed in schools by A/V consultants, contractors who previously had to deal only in division 16 electrical contractor-type specs are now having to deal in the world of the integrated media systems that are the backbone of Division 17.

"Sound contractors right now are at a crossroads," Graham says. "With these more sophisticated systems, the division 16 electrical engineer is having less and less say, and division 17 is taking on a new character for what we would call the high-technology-type systems. Therefore, if you're building

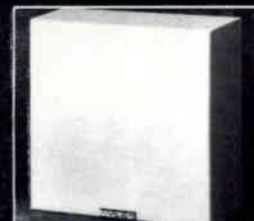
a new school, there could be consultants that would only work under division 17.

"The sound contractor is in the middle. He has to be able to talk intelligently about division 17-type systems," continues Graham. "He has to be able to bond [the systems], and he has to be able to organize the whole division. Yet in 16, he has to keep everybody happy, because that's where his bread and butter has come from for so many years. So right now he's walking a fine line, because we see a lot of activity in division 17, which totally rules out the electrical contractor and the engineer.

"We don't know how soon this is going to become more popular — I think by and large the majority of the jobs are coming through 16 — but we are preparing ourselves for 17, because once all of our systems start interfacing, all of a sudden you've got this huge system, and division 16 contractors are no longer valid. We see a lot of technology consultants starting to emerge, and they deal in division 17, not division 16. The electrical engineers are being pushed aside, and they don't like it." Graham concludes: "Schools that have millions of dollars to spend are going to look at specialists [and] consultants versus the electrical engineer who's always done their high-voltage equipment."

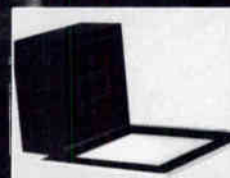
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Total Control

Purdue University Systems Uses IQ, Appletalk — and the Telephone

BY KEITH CLARK

In designing a new audio system for the Elliott Hall of Music at Purdue University, Andrews Audio Consultants of New York had several goals in mind.

"We wanted the system to be state of the art and as flexible as possible. Most importantly, we wanted to install a system that anyone in the world would be comfortable using," says David Andrews. "This new system accomplishes all of these goals."

Elliott Hall, a 6,000-plus seat venue located on Purdue's West Lafayette, Indiana campus, hosts a variety of music and theatrical productions as well as conferences and convocations. Its audio system was outdated when Andrews and the hall's technical staff began design and installation of the new system in 1989. Work is still continuing on the system.

The most unique aspect of the installation is the way that Andrews decided to employ Crown IQ System 2000 computer control hardware and software. "We did something a little

different with the IQ System, something that no one else has ever done, as far as I'm aware," Andrews notes.

Andrews designed an Appletalk network, using IQ System software version 1.4 designed for use with Macintosh. This network provides control over the system from six dif-

When the hall is used for graduation ceremonies, video screens are suspended to each side of the stage, blocking the left/right clusters.

ferent locations throughout the hall. Andrews created the network after discussions with Jay Paul, head of audio services for the Trump Plaza in Atlantic City.

Paul utilizes an IQ System at the showroom of the Trump Plaza, along with more than 10 Crown Macro-Tech amplifiers equipped with Crown's PIP IQ modules. "Jay sug-

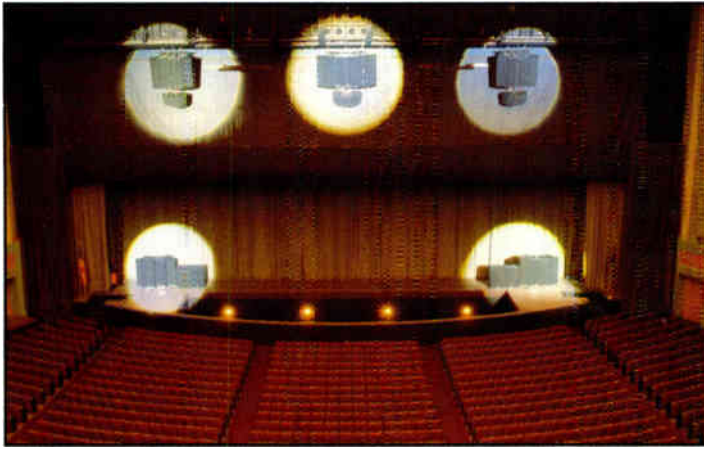
gested that we attempt to turn the IQ system controller into a PhoneNET node, and to run the entire system on Appletalk," Andrews says.

Andrews employed Shiva Netserial, a networking, modem-type of device that takes RS-424 out of the IQ Interface. "The IQ Interface plugs into the Shiva Netserial, which then plugs into the Macintosh through the PhoneNET," he explains. "The result is that anywhere we bring the computer with a PhoneNET node, we can access the audio system. Basically, we're controlling the system through the use of phone lines."

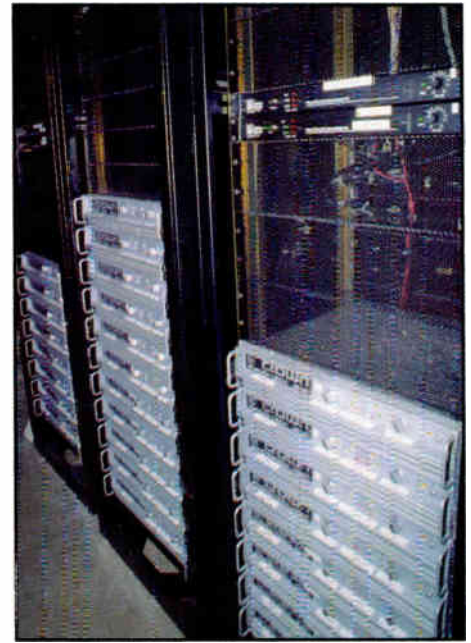
As a result, control can be achieved at any of the three amplifier rack locations, the front-of-house mix position, the monitor mix position, and an audio control room in the back of the hall. "This situation offers a load of flexibility, and we were also spared the trouble of having to run 424 cable all over the place to accomplish the same thing," Andrews says.

Keith Lockette, audio engineer for the hall, also has plans to eventually tie in audio systems throughout the Purdue campus via IQ systems and Appletalk. "It will be extremely con-

Keith Clark is Vice President, Public relations for Jesse Walsh Communications.



Front of House view of proscenium clusters and ground stacks.



Left, center and right cluster amp racks.

venient to control and monitor several audio systems, all via the computer in my office. It's going to save a lot of time and headaches," he says.

The Elliott system was also designed to offer portability. As part of this concept, speaker clusters were suspended using touring-style chain hoists. Unlike most tours, however, the motors for the hoists are anchored

to a grid near the ceiling. Numbered XLR and EP-4 connectors offer easy, convenient connection and simplified troubleshooting.

With the hoists, clusters can be individually raised or lowered with the push of a button. "One significant reason for the portability is that we wanted to make sure that everything can be easily serviced," Andrews ex-

plains.

The speaker clusters are Meyer Soundlabs MSL-3s and UPA-1As, flown left/center/right. "We used the existing speaker locations. The Elliott staff was very happy with the performance and flexibility provided by the left/center/right speaker configuration," he notes.

In addition, there is also a portable system that can be used as "groundstacks" for heavy-duty music shows, and also for events requiring a system elsewhere on campus. The portable system includes Meyer MSL-3s and portable racks containing Crown Macro-Tech 1200s.

Lockette says that at times he runs vocal signals through the center cluster and ensemble parts through left/right clusters, with the room's dimensions providing good imaging. The three clusters also provide a variety of configurations without compromising audio quality.

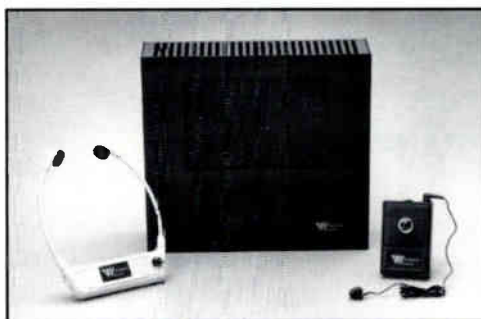
For example, Lockette points out that many acts need to suspend a video screen above the stage, blocking the center cluster. However, the left/right clusters combined with the groundstacks easily provide the required SPLs. When the hall is used for graduation ceremonies, video screens are suspended to each side of the stage, blocking the left/right clusters, making the center cluster

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Crown Macro-Tech 1200 amplifiers are used to power the entire main and monitor systems, with their IQ-P.I.P. modules programmed to provide two different gain settings. "For theater applications, the gain is set low to make the system as quiet as possible. The higher gain is for rock shows, where the high sound pressure levels required causes the system to produce an audible hiss that isn't desirable for theatrical events," says Andrews.

The house console is a Gamble EX-56, while a custom, portable Gamble 32-channel console is also available. The two consoles can be linked to provide up to 88 inputs.

Reaction to the system by visiting

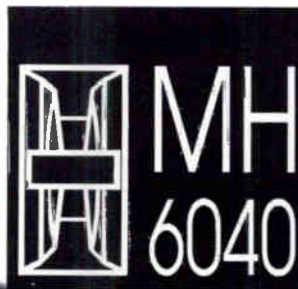
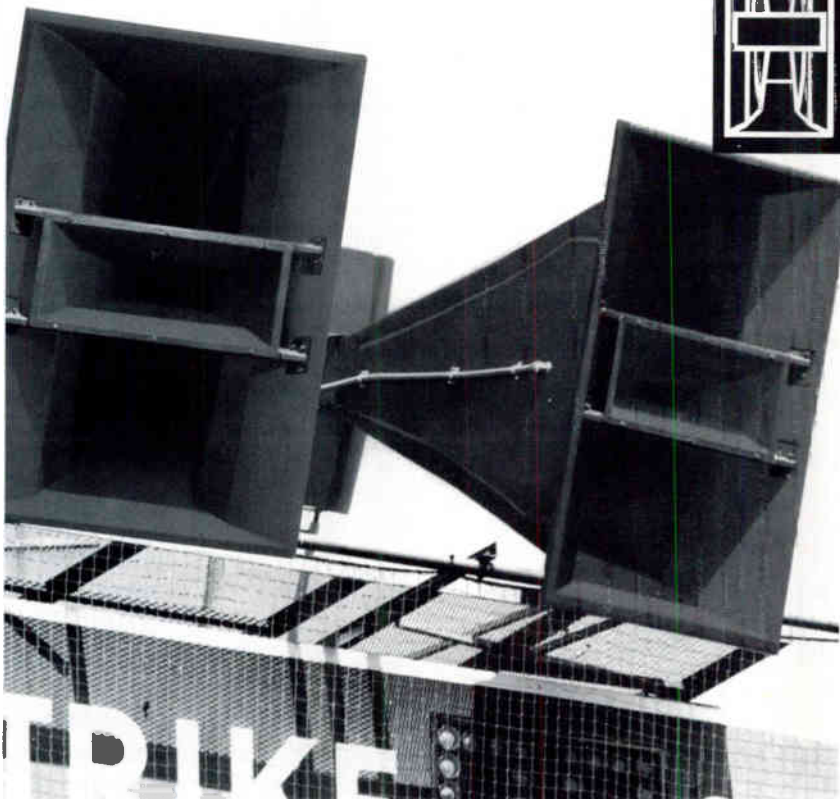


Keith Lockette pictured with front of house consoles and effects.

groups has been extremely positive, according to Andrews and Lockette. Reba McIntyre and her band used the house system for a recent show,

leaving their own system on the truck. "All they brought in was their own console and monitor system," Andrews notes. ■

MH6040 shown with optional co-axially mounted HP640 high-frequency horn with N/DYM®1/2MT manifolded compression driver system.



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Schools and Communication

Fiber Backbone System Integrates Campuses

BY CASEY BOSMAN

At Grand Valley State University (GVSU), technology is improving the communications between our student body and faculty members. Thanks to fiberoptic technology it is possible to integrate our various schools and locations. This is a major accomplishment because of the sheer size — in terms of acreage — of the University. Our graduate and professional campus is located in downtown Grand Rapids. Our undergraduate campus — itself with a north and south campus — covers more than 800 acres, in Allendale, 12 miles west of Grand Rapids.

A 565 megabit (Mb/s) single-mode fiberoptic backbone links these campuses together via a number of token ring and Ethernet networks and an RS-232 asynchronous data system. And, those networks power more than 20 CAD/CAM work stations, eight computer labs and several hundred microcomputers with mainframe access for students.

In addition, 95 percent of the fac-

ulty offices are equipped with microcomputers — all networked with the mainframe — and have on-line access to our computerized library system. Other capabilities include mainframe access to financial and registration records as well as in-bound and out-bound modem pools.

The long-term goal for a five-year project begun in 1991 is to connect buildings on the university's campus to our fiberoptic backbone network. Currently, all users are not yet able to access all the various resources — such as the CD-ROM services that are offered by the library.

The project's first phase, completed in October, 1991 included laying a 96-fiber cable (manufactured by AT&T Network Cable Systems) from the north campus to the south campus, and then linking the south campus hub to the library with a 12-fiber cable. On the north campus, the 96-fiber cable will connect to a group of network servers. However, instead of placing servers all over campus, we intend to use the university's mainframe location as the site for the network servers. For management purposes and in terms of service and programming, it is logical to place the network servers in a place that is

staffed around the clock.

Ultimately, we will connect every building on campus with fiber. As of April, 1992, seven academic buildings on the main campus — each with 12-fiber cable — have been connected to the fiber backbone system. From the south campus hub, fiber will be run to five additional buildings.

With the new fiber backbone system, the network's speed will increase from 19.2 Kb/s to an initial 10 Mb/s, although the fiberoptic cable is capable of transmitting 100 Mb/s and meets FDDI specifications. In terms of distances, the fiber backbone's 96-fiber cable will run 1,100 feet. Other runs will vary from 500 to 2,500 feet. The cable is a 62.5 multimode fiber along with ST connectors, and AT&T terminating shelves.

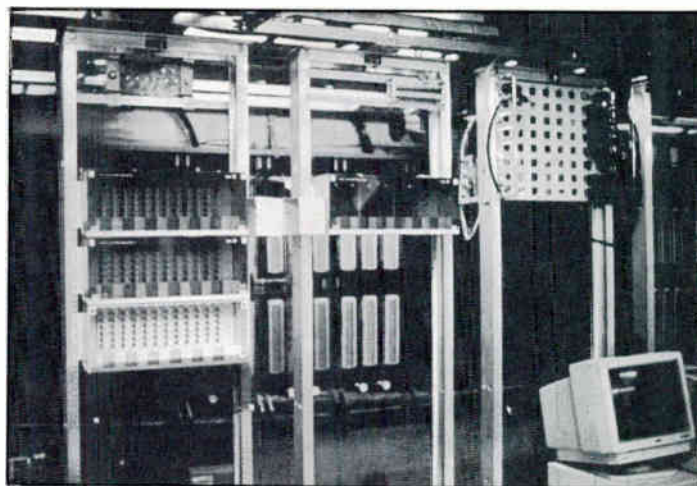
This year, the fiber backbone system is allowing users access to Internet, a network that ties together major U.S. universities with messaging, databases, and bulletin boards. During the project's second phase, all classrooms will be wired into the network. And, ultimately, interactive video will become available.

GSVU is not alone in recognizing the importance interactive video-conferencing. This capability is be-

Casey Bosman is Manager, Telecommunications, Grand Valley State University, Grand Rapids, Michigan.



Grand Valley students in the university's Manitou Hall Computer Lab.



The fiberoptic backbone: junction panels in Grand Valley's computer center on the Allendale campus.

coming a competitive advantage in attracting students. This ability will enable us to make our own campus more compact by facilitating the interaction between students and faculty at different locations on campus, as well as by allowing students in rural areas to have dial-in access to the university without lengthy commutes.

The addition of video transmission,

over the fiberoptic system, will greatly enhance the academic programs which are now audio-interactive. Many of these academic programs are downlinked and broadcast to remote classrooms, through the fiberoptic system. Other programs, originating in the university's teleconference center, are uplinked to GVSU's interconnected satellite dish for broadcast to these sites.

As an institution committed to teaching excellence, GVSU has always offered a personalized instructional approach and relatively small classes. Our new fiber backbone system and all its capabilities will provide new meaning to faculty and student interaction and wider access to educational resources. ■

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The ADA and You

How to Attain Hearing Accessibility Under the Americans with Disabilities Act

BY KATHY ANDERSON

"The Americans with Disabilities Act gives civil rights protections to individuals with disabilities similar to those provided to individuals on the basis of race, sex, national origin, and religion. It guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services, and telecommunications. Fair, swift, and effective enforcement of this landmark civil justice legislation is a high priority of the Department of Justice."

Attorney General
United States of America
1991

January 26, 1992 was the date when the historic Americans with Disabilities Act (ADA) of 1990 became effective for virtually all public assembly facilities in the United States. The public assembly facility industry, which hosts millions of Americans at its events each year, is highly visible and hence likely to be one of the industries where federal enforcement action of the ADA will be the greatest.

There are three titles to this law. Title I (which becomes effective July

26, 1992), deals with employment and requires that employers "reasonably accommodate" disabled individuals throughout the employment application process and in all facets of the actual employment relationship. The employer's obligation to reasonably accommodate disabled individuals is one of the ADA's vaguest mandates. "Reasonable accommodations which includes obligations to modify and/or change the application process or work environment, must be undertaken unless it would result in "undue hardship" to the employer. "Undue hardship" is defined as "significant difficulty or expense."

Title II basically applies to publicly owned facilities. Governmental facilities are essentially required to retrofit their buildings unless it would create an undue financial hardship.

Title III applies to privately owned "public accommodations" (i.e., private entities that own, operate, lease, or lease to places of public accommodation). Places of public accommodation include theaters, auditoriums, museums, stadiums, parks, hotels, convention centers and libraries. The ADA requires all public facilities to remove existing architectural and communication barriers if it is "readily achievable" to do so. This

includes entrances, bathrooms, pathways, and telecommunications.

Title III also requires all public accommodations to furnish "auxiliary aids" to ensure effective communication with individuals with hearing, vision, and speech impairments. Fixed seating assembly areas that accommodate 50 or more people, or have audio amplification systems, must have an assistive listening devices (ALD). Auxiliary aids that would result in an undue burden (i.e., "significant difficulty or expense") or in a fundamental alteration in the nature of the goods or services are not required by the regulation. However, a public accommodation must still furnish another auxiliary aid that does not result in undue burden or financial hardship. According to Section 4.1.3 19(b) of the Federal Register, "The minimum number of receivers to be provided shall be equal to 4 percent of the total number of seats, but in no case less than two."

Private parties may bring lawsuits to obtain court orders to stop discrimination. No monetary damages will be available in such suits. However, a reasonable attorney's fee may be awarded. Individuals may also file complaints with the Attorney General who is authorized to bring law-

*Kathy Anderson is Commercial FM
Coordinator for Phonic Ear of
Petaluma, California.*



The Phonic Ear Easy Listener system.

ity be conducted as a first step towards compliance to see exactly what the facility will need to do.

For instance, with a Phonic Ear Easy Listener wireless narrowband FM Hearing Assistance System, the patron can sit in any seat and be able to hear every word of the performance

(Continued on page 63)

suits in cases of general public importance or where a "pattern or practice" of discrimination is alleged. In suits brought by the Attorney General, monetary damages and civil penalties may be awarded. Civil penalties may not exceed \$50,000 for a first violation or \$100,000 for any subsequent violation.

Numerous complaints have already been filed, but the cases were closed because corrective actions were taken. Many public accommodations want to ignore the law because they do not understand the needs of the disabled and do not want the expense to comply with this law. The fact is that this law is here, and it's here to stay. And yes, there are many disability organizations knocking on doors and filing complaints that certain facilities are not in compliance. Public facilities should look at this law as an opportunity to increase their business by marketing to a new group of people (the disabled) to patronize their facility.

It is estimated that over 24,000,000 Americans have some level of hearing loss and only 4,000,000 wear hearing aids. These 24,000,000 Americans suffer from hearing difficulty in public facilities because of distance, reverberation and background noises. Most of these individuals would rather stay home than deal with the frustration of not hearing the performance.

Compliance with the ADA for the hearing impaired need not be difficult. In fact, it is the easiest and least expensive area that facilities will need to address. It has been recommended that an evaluation of the entire facil-

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WHEN TO THINK PACKAGED SOUND IN SELLING SOUND SYSTEMS

By Norman Ackerman

Even though portable sound systems have been around for years, they have generally not been viewed as part of the contractor's mix. And while they will never replace the heavy-duty work which forms the larger part of your business, they can easily become another profit center.

As a product, the portable sound system remains an important solution to the needs of many organizations, including hotels/motels, restaurants, resorts, churches, schools, offices and plants. So-called "packaged sound" also can be a useful addition in a major new project, can be the best solution in many aftermarket situations, and can help you develop a lucrative rental business. By keeping alert to applications for equipment like "sound lecterns" or "portable PAs" you may be able to uncover incremental profit opportunities, and help maintain or establish relationships with clients between or before big projects.

Norman Ackerman is Chairman, CEO for Perma Power Electronics, Inc. of Chicago, Illinois.

Recommending portable sound systems or packaged sound is good business because it's based on giving the customer the most practical solution to what he or she needs. And you make a profitable sale, which could otherwise go to the nearby office equipment or audio-visual dealer.

Today's sophisticated portable systems can be used all the way from small groups up to situations where the audience is over 2,000 people. Although the specifics for a given application vary with each group's needs, the primary need is almost always voice reinforcement. Battery operation facilitates outdoor use, and there are system configurations that are particularly appropriate for crowd control, parades or athletic events.

PACKAGED SOUND MARKETING

Packaged sound systems all share one characteristic: they are a speaker's aid, a voice reinforcement system, as opposed to a music system, whether background or foreground.

Packaged sound is needed frequently at meetings and training sessions held at hotels, motels and restaurants. In fact, these operations often broker the portable sound system as a service to corporate guests. Besides these events, sound reinforcement also is needed at parades, picnics, rallies, political events and carnivals.

What most packaged sound applications have in common is that the need for the sound system is occasional and the setting varied. That's why the primary requirement for packaged sound is that it be extremely easy to use — so easy that anyone can use it instantly (very different from using parametric equalizers or programmable digital delays).

When you specify and start recommending packaged sound equipment, you are usually dealing directly with the talker. The equipment is designed to help the talker, and you should be able to discuss these five areas directly with those end users.

LOUDNESS OR COVERAGE

Coverage is a better word than *loudness*, because the goal is for the entire audience to hear what is being said equally well, and not too loudly. Watts and decibels don't translate to this customer; group size does. You ask the customer: How many people do you need to cover? In how big a room? You ask yourself: Will the amplifier power as many loudspeakers as this size group requires? Does the package allow for varied placement to cover different groups properly? Uniformity of sound, as well as sound that's ample and evenly distributed for a large range of audience sizes, is important. The system shouldn't be too loud in one area nor too soft in another.

NATURALNESS

Even when the budget is minimal,

you don't have to make the user or the audience uncomfortable by voice reproduction that sounds amplified. A system that is optimized for voice frequencies, without adjustments being necessary, puts the talker and the listener at ease. Circuits that equalize the voice characteristics for standard room conditions will preserve the talker's voice quality without the need for bass, treble or similar controls.

EASY USE

Talkers should be comfortable instantly with the system, so they can concentrate on what they are saying. Therefore, the fewer controls the better: a foolproof ON/OFF switch and a volume control are enough! Controlling both with one knob, however, can be confusing. Consider the case of adjusting volume and turning the unit off. The ergonomics of easy microphone adjustment, removal and reinsertion in the holder also are important.

PORTABILITY

Talkers, meetings planners, etc. rarely pre-test or have the time for pre-meeting setup. Besides, plans are often changed in mid-meeting. That's why many prefer to carry their own talker's aid. It should be flexible, movable, quickly set up and down, easy to move inside or outside or from front to side of room. Battery operation to avoid line cords and plug-ins is a consideration. In some locations, a union electrician may be required to plug in the system, where a battery system would be exempt. But an alternate power supply should be provided for diehard AC advocates. The system's battery life should be a one-year minimum, and readily available battery sizes are a must — D cells or 9-volt being the most accessible. In other words, the packaged sound system should be complete, with nothing else to buy; all parts and connectors must

be supplied.

FREE OF DISTRACTIONS — AURAL AND VISUAL


Systems should work immediately at the needed volume without howls. The equipment should look professional, without calling attention to itself. Discreet and practical cabinetry

that blends with the decor reflects best on the user and his supplier.

ECONOMICAL

Finally, end users seek a value equal to the cost. That means a fair price up front (whether for sale or rental) and the convenience of maintenance-free performance. Even one service call

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“blows” the advantage the packaged system is supposed to return!

So, from the end user’s point of view, the packaged sound system will also have to be:

- a complete unit, with all components furnished;
- readily movable from place to place;
- able to operate well wherever used;
- simple for the user to set up.

These, not incidentally, are the major benefits to note when selling packaged sound.

WHERE PACKAGED SOUND EQUIPMENT FITS WITH YOUR BUSINESS

Since not everyone needs a permanent setup when they first contact you, selling or renting a packaged sound system is a way to establish a relationship with a customer who may need a permanent, wired-in system in the future.

For packaged sound, as with your permanent installations, start with the physical setup where the voice amplification will be needed. Here’s a brief rundown of the types of packaged sound equipment in use today, as well as additional parameters to consider when you’re writing business for packaged sound.

A platform, auditorium stage, pulpit. These situations usually call for a complete floor lectern, which provides the talker with the necessary sense of shelter and support and a reading table for notes, as well as housing for sound system components. Lecterns are supplied either as complete columns or modular units.

Speaker’s Table, or dais. When the talker will be behind a sheltering support table, as in a banquet or panel discussion situation, a table-top system is a good choice for your client.

Stationary Audience, roving speaker. When the talker will roam the platform, or doesn’t need a

lectern’s shelter and support, and the audience is stationary, “furniture” is superfluous, and a briefcase-type unit will serve the purpose. You can always add a Sound Column to cover extra-large audiences.

High In-Use Portability. In situations that involve tours, crowd con-



A modular lectern reading table from Perma Power.

trol, demonstrations or athletic events where the speaker and/or the audience are on the move, the sound must be extremely portable. A quality hailer may be the choice for announcement-type events, while a lightweight briefcase system may be the answer for plant tours and more extensive talking.

Considering the great variety of applications for portable sound, you might assume that many rental firms already carry sound equipment. In fact, this is true, but very few carry more than one basic model. For example, in the Chicago area, most general rental companies carry only one model of portable sound system such as the Perma Power Roving Rostrum or Sound Attache. For customers who want a more formal or powerful sound system, such as a modular lectern, the rental house does not fulfill the need.

More important, most renters will first call a sound contractor, and few contractors have recognized the potential of portable voice reinforcement systems and therefore cannot fulfill the need either. Most contractors who rent are renting temporary, AC systems which are used for both music and voice reinforcement. They do not rent portable, battery powered systems that comprise the bulk of the demand for sound rentals.

Rental rates typically are set at about 10 percent of retail equipment cost per day, although rates can range from 5 percent to 15 percent depending upon local competition. For a weekly rental rate, firms typically charge the equivalent of four days. That is, if you would rent a packaged sound system for \$50 per day, the rental fee for a week would be \$200, and a month’s rental could cost anywhere from 50 percent to 100 percent of the retail cost of the unit.

In practice, however, anyone who needs a system for a whole month should buy it; and here is where you can begin to grow your packaged sound business, particularly by applying rental cost against purchase.

Generally, you should aim to regain the original cost of the equipment within one year, although depending upon the rental fees you charge it could be as long as two years. This rule of thumb may be difficult to apply if you have no idea of how many times a year the equipment may be used. But if you purchase the equipment solely for rental, there may be an additional benefit. Ask your tax accountant whether the cost of the equipment is depreciable. You may get a tax benefit on the purchase of the equipment as well as income from the rental!

If you look at the potential versus the equipment cost, and then add typical rental rates, you can easily determine if rental is worth a test. Factor in the possible benefit of depreciation, and even if success if mar-



Sound Cruiser mobile P.A. from Perma Power.

ginal, it could well be worth the risk on the "rent-a-system, make-a-friend, keep-a-customer" theory.

Regardless, using the criterion of infrequent usage, it is correct to assume that the rates can be relatively high (depending, of course, upon competition). When you rent equipment to someone for more frequent use, the rate generally has to be set low enough to make continued rental more attractive than outright purchase.

There is another benefit to setting rental rates on the high side and applying rental fees to purchase. Keeping in mind that the main reason you are in the rental business is to foster sales, higher rental fees that let you credit at least part of the customer's cost toward purchase of the unit also lets you lay the groundwork for the sale of a wired-in system.

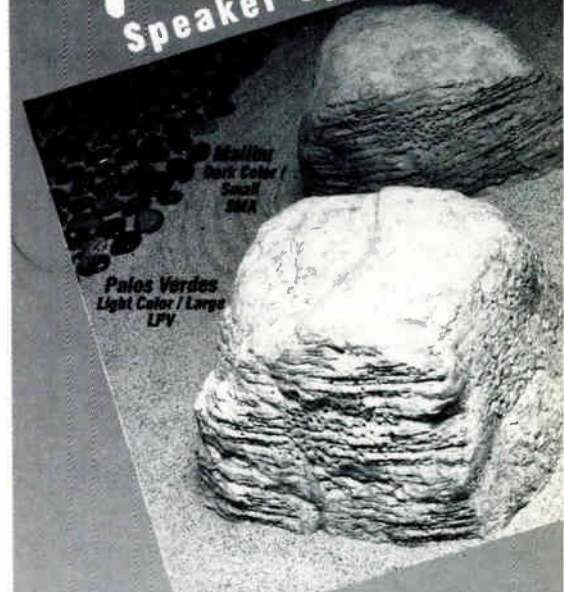
For example, say you have a school customer that has the need for sound reinforcement, but not the budget. Rental becomes the only alternative, and an easier one to implement if there is the prospect of recouping some or all of the rental fees in the form of a discount on the purchase of the unit. It is easier to budget \$400

for the cost of a sound lectern, knowing that another \$400 in previously paid rental fees is being credited to the purchase, than it is to budget \$800 for a straight out purchase. You may even have multiple unit sales, as the school may find that they can use two or three systems, not just one.

In addition, by making it more attractive to rent, you'll find that you'll have more repeat rentals. Going back to school, the administration may learn that they have used the packaged systems so much that they now can justify the dollars for a (more expensive) wired-in system. That's a sales job that only using a sound system can do, and a sale that you would not get if you had not "made friends" with the school, by offering them the low-cost alternative.

So remember to look beyond immediate profit when deciding whether or not to get into the rental business. Of course, you should do whatever you can to make it profitable in and of itself, but do not forget the residual benefits of happy customers who will return to you when they are ready to buy. ■

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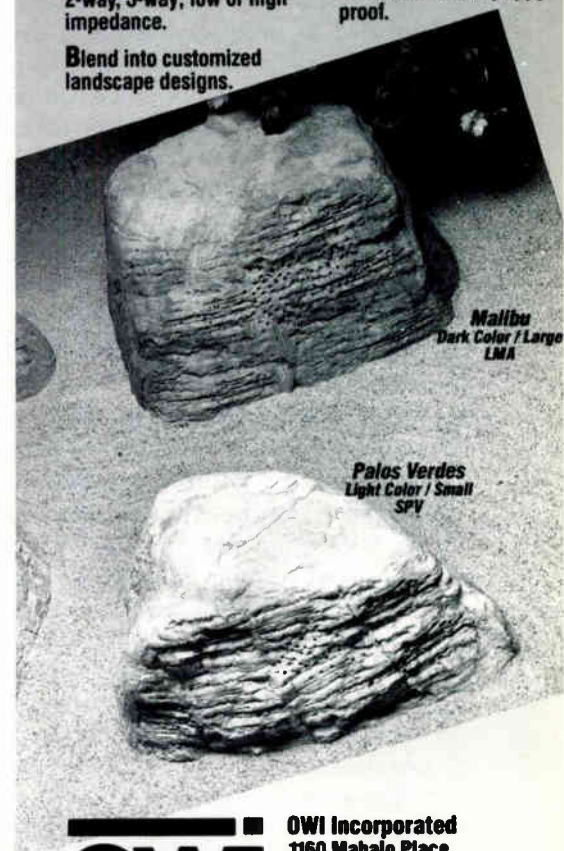
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SOUND QUALITY, PART THREE: SOUND QUALITY LOCALIZATION TESTING

By Steven J. Orfield

In Part II of this series, the concept of sound quality subjective testing, binaural recording and jury process were discussed.

The concept underlying Part II was that technical acoustics is not the primary issue in sound quality work; rather, the use of sound quality as applied to product design is interested in predicting purchasing and other response behavior from subjective jury testing of responses to product noise.

In Part III, we will discuss the concept of source localization, starting with the acceptance of a sound quality product standard. While our past articles have concentrated on the development of sound quality standards, this article considers what happens once a preliminary or final sound quality standard is accepted and existing or new products are analyzed for their performance under that standard. The specific examples of testing and analysis systems included in this article are based on those supported by the Sound Quality Working Group, noted in previous articles. They are shown as significant illustrations of the process of sound quality measurement.

The standard may be based on frequency response, time-based response and even on product vibra-

tion. It may be characterized as a change in sound quality of an existing product or as a totally synthesized sound quality standard based on either an existing or a new product. This standard will take into account the question of significance (will response of the consumer actually change in beneficial ways via environmental factors, such as

THE SECOND ENVIRONMENT PROVIDES THE NOISE FLOOR AND SIGNAL DISTORTION AGAINST WHICH THE SIGNIFICANCE OF THE MEASUREMENT IS LATER JUDGED.

signal-to-noise ratio and other counterveiling stimuli?).

In the process of accepting the sound quality standard in place, the research and marketing departments may have made some assumptions regarding these issues:

- The consumer value, in dollars, of the standard.
- The research and manufacturing cost of the potential changes.

It is important to remember that as the product analysis and diagnostic testing and design proceeds, the program may be found to have violated

these limits and may then need to be reassessed.

Typical questions arising at this testing phase of a sound quality project are these:

- What is the current spectral description of this product?
- What is the current temporal description of this product?
- When comparing these with SQ goals, is this problem attenuation-based (noise reduction) or more complex (*i.e., altering a changing signal, etc.*)?
- Is the product "SQ" objective narrow (narrow band analysis) or wider ($\frac{1}{3}$ octave or greater)?
- What kinds of analysis capabilities are available and are they sufficient?
- Is the in-house staff aware of and conversant with the sound quality process?

Often, these questions very quickly move the manufacturer to make a series of decisions regarding testing systems, additional training of staff and the use of outside testing laboratories.

Since a sound quality analysis system typical of those described in these articles may cost \$200,000 or more, the manufacturer may decide to outsource some or all elements of the formal sound quality program, most commonly binaural recording and editing, jury testing and complex system testing (intensity and modal analysis). Additionally, many manufacturers come to the conclusion that involving their own staff with an



Sound Quality Working Group.

outside sound quality laboratory is often the quickest, least expensive and most dependable source of training available.

With this brief introduction, this article is focused at providing an introduction to the physical testing of the product to determine what components are causing SQ problems and what changes are needed to bring them into compliance with the standards in place.

THE PRELIMINARY MEASUREMENT INVESTIGATION

As the new sound quality standard is considered, one of the first steps is to determine organizational measurement and calculational capabilities. In terms of testing capabilities, the typical inventory of test systems includes:

- Precision sound level meters
- Precision microphones
- Real time analyzers
- Narrow band analyzers
- Accelerometers
- Impact hammers
- Dual channel analyzers (FFT and discrete filter)
- Intensity software
- Modal software
- Finite element analysis software
- Operational deflection shapes software
- Wavelet transform software
- Specific sound quality analysis software

In terms of test spaces, the in-

house lab generally has a hemi-anechoic (absorptive walls and ceiling plane) or near hemi-anechoic room; some are equipped with full anechoic chambers (absorptive floor as well). In terms of testing capabilities, the firm should have a working knowledge of sound intensity testing, modal analysis (to analyze structurally based sound generation) and computer modeling techniques. If the client is looking for a basic set of information on these issues, some sources include the membership and committees of the Acoustic Society of America (ASA), the International Standards Organization (ISO), the American National Standards Institute (ANSI), the Audio Engineering Society (AES), the Society of Automotive Engineers (SAE), the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), the American Psychological Association (APA) and the American Speech and Hearing Association (ASHA).

THE EXPERIMENTAL PROCESS

The process of evaluation of the product in question suggests consideration of two kinds of testing environments; the first is the anechoic or "dead" room, and the second is the typical use environment of the product (or its simulation). The first environment provides results with the best signal-to-noise ratios and lowest distortion, and the second environment provides the noise floor

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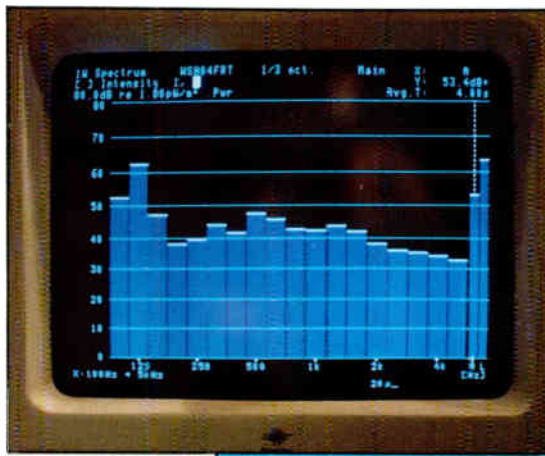
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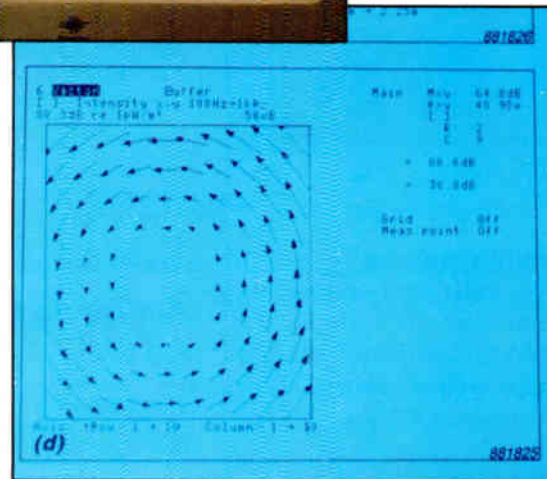
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Bruel & Kjaer 2133 Intensity Analyzer display.



Intensity displayed as a Vector Map.

and signal distortion against which the significance of the measurement is later judged. Prior to beginning the testing process, the technicians involved should very carefully review the sound quality standards data.

Additionally, and very importantly, they should review, by listening, the progression of tapes recorded in the process of developing the sound quality standard. This eye on subjective performance is very important as the process moves along, as recognition of appropriate sound characteristics by the ear is a substantial aid to the measurement analysis of the sounds in question. (Psychoacoustic analysis is often very complex and does not easily correlate with the mass of data which can be gathered.) As audio researchers know all too well, the current profusion of testing equipment uses the term "analyzer" quite loosely. The large quantities of data developed during the testing process goes through no intelligent analysis within the basic test system; the analysis is up to the user.

MEASURING THE DEVICE

The first measurements made of



Modal Testing with Impact Hammer.

the device are generally measurements of the spectral output, and these are typically made on an FFT or a Real Time Analyzer.

The FFT or constant bandwidth analyzer provides a linear measurement of the sound spectrum, generally from 20 Hz to 20 kHz. The constant percentage bandwidth analyzer or constant energy bandwidth analyzer (also called the real time analyzer due to its instantaneous measurement of all frequencies) provides information in the same frequency range, but it is provided in octaves or fractional octaves ($1/1$, $1/3$, $1/12$, $1/24$, etc.) Its data display is logarithmic.

The first of these analyzers is most typically used in vibration studies (due to its capability to measure pure tones, etc.) although many of these systems can synthesize octave-based data for display. The second analyzer is generally the more popular system for acoustical measurement, as it better represents the ear's perception of sound in its octave-based, logarithmic display. Often, a recorder, such as a DAT recorder, is used with or in lieu of the analyzer. This allows collecting data in an unanalyzed form for later alternative analyses.

The spectral data gathered will next be compared with spectral information in the new standard to

determine what level of enhancement or reduction is needed. Via this process, it may be discovered, for example, that there is an excess level at 2500 Hz, and that this excess is 12 dB. With this in mind, the question arises as to the source of this discrete frequency component, and this is an ideal problem for intensity analysis.

INTENSITY MEASUREMENT

Intensity measurement is not new (see *Sound & Communications*, June 1989, July 1989, September 1989); it has been applied to product analysis for about 10 years by some practitioners. Intensity analyzers are dual channel analyzers with directionally

sensitive, and generally dual, microphone probes. In addition to normal acoustic measurements, they are capable of measuring and plotting the directional flow of sound power. The display on the screen is typically in two colors in order to indicate positive and negative intensity (sound coming from in front of or behind the probe).

In addition to the ability to display the positive and negative intensity of each frequency, there is a very powerful capability provided in the more advanced analysis systems and software. This is the capability to display data of grided measurements as number maps, contour maps, 3-D maps or vector maps. It is this capability to provide scientific visualization of the sound flow which is so crucial in the analysis process.

In order to gather this type of "gridded" data, a physical grid of string is generally set up and placed sequentially on each side of the product under test. The spacing of this grid, its distance from the product, the choice of microphones and spacers (cylinders establishing the distance between microphones on the intensity probe), the time constant of the measurement and the bandwidth limit of the measurement (octave, $\frac{1}{3}$ octave, etc.) is based on experimental data gathered from measurement manuals and trials with the products to establish the necessary measurement resolution.

Once these data are gathered, generally by manual or automatic input to the analyzer, they are transferred to a calculational program in order to produce the visualization maps. Next, these maps are often overlaid on the specific engineering drawings of the product in order to see where the sources of noise are originating from. Measurements can be made across a broad frequency spectrum, and displays can then be generated as broadband displays or as displays of the frequency region of interest in

bandwidths as narrow as $\frac{1}{12}$ octave.

Once these preliminary measurements are taken and plotted on the product drawings, a logical analysis must be applied in order to determine their meaning. If, for example, components for silencing are easily identified via this mapping, then the analysis may be sufficient prior to working with these components. Alternatively, the mapping may require trial and error in terms of selecting frequency regions and resolution which provide meaningful conceptual pictures of component operational problems.

VIBRATIONAL MEASUREMENT AND OTHER TOOLS

Once the analysis of source localization has been completed, individual components may be analyzed via the same intensity procedures, and are mapped in great detail. In the analysis process, it is often discovered that an individual structural component is providing the offending acoustic signal due to its inherent structural properties or modes. In this case, finite element analysis (FEA) may be employed. FEA is a method of computer modelling the structural behavior of the device or component in question mathematically, in order that a theoretical view of specific modal problems may be developed. Following upon FEA or in lieu of this testing, individual components may be analyzed via modal analysis (MA). Modal analysis is used as a method of exciting the component under test, either via the use of an impact hammer or via the use of a structural shaker.

Modal testing is accomplished via the use of an excitation device, an FFT analyzer of the requisite number of channels, and charge amplifiers powering measurement accelerometers. As with acoustical intensity testing, the results are often taken on a DAT recorder for later alternative analysis. During this test-

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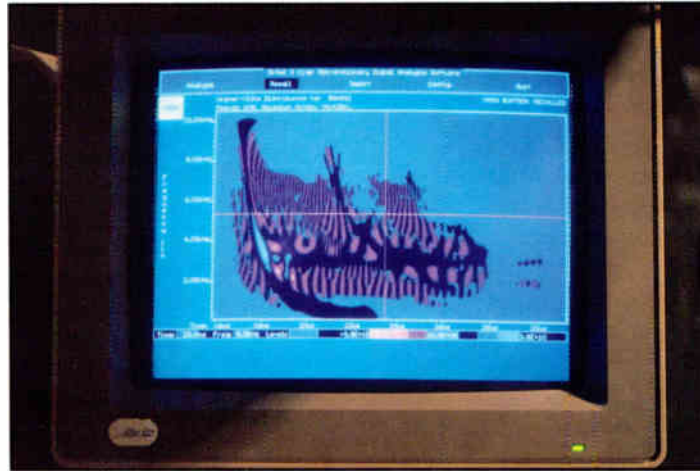
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Wavelet transform display.

ing, accelerometers (vibration transducers) are placed at various positions on the component under test in order to construct a vibrational mode shape visualization of the component. In addition, the structure is also driven at various positions.

After the testing has been completed, modal analysis software is employed to build a model from the data (or to correct the analytical model) in order to understand the vibrational characterization of the product. Findings from this work often suggest changes in structural materials, structural damping and reinforcing, etc.

Additional methods of analysis include use of the Wavelet Transform, a method of topographical visualization of level, frequency and time, and Operational Deflection Shape Analysis (ODS), a method of visualizing the operating modes of a structure under active operation (without stimulation from a hammer or a shaker).

SUMMARY

With this general background in diagnostic testing, the process of sound quality broadens out into its full continuum. This last phase requires substantial knowledge of the testing process along with substantial investment in testing instrumen-

tation and capabilities. It is also the phase that ties together the entire process of sound quality analysis. While there are many methods of conventional and binaural recording, it is important that the data developed in the recording process be compatible with that developed in the diagnostic process. Thus, it is not sufficient to talk about sound quality as only the recording and jury process. This is why our original binaural recording system development used both a recording torso and a measurement torso and analyzer. (See *Sound & Communications*, September 1990, October 1990.)

In the sound quality process, we have now come full circle from the audio field (recording/editing) through the field of perceptual psychology (jury assembly and testing), through complex acoustics and vibration, and by implication, back to audio and psychology (final listening verification). This journey would be tenuous at best if it were not for the fact that we use as a basis for validity the human listener and the predictability and repeatability of his response.

Next, we will consider a number of examples of sound quality projects in order to more significantly demonstrate the application of this practice to the real world. ■

THE ADA AND YOU

(Continued from page 51)

or the speaker. A base station transmitter plugs directly into the existing sound or PA system of the facility through a line input jack, using standard XLR cables. The base station transmits the sound to wireless FM receivers that work on frequencies allocated by the FCC for the hearing impaired. The patron simply picks up a receiver at the box office by turning in a drivers license or credit card, puts on a "Walkman style" headset (or any other listening option), turns the unit on, adjusts the volume, and is able to sit anywhere in the facility and enjoy the entire performance without any "line of sight" restrictions.

Title III also requires all public accommodations to furnish "auxiliary aids" to ensure effective communication.

Fenway Park, home of the Boston Red Sox, installed the Phonic Ear Hearing Assistance System with a large area antenna which covers their entire facility. This allows the sports fan to go to the concession stand and still be in tune with the game.

There are many applications for this system, just as there are many different shapes and sizes of facilities. Using the 150 FSR (Frequency Selective Receiver), a multiplex movie theater, such as AMC Theatres, will meet the needs of the patron when they have several programs showing at the same time. With a single switch, they can select up to six channels in one receiver — each one corresponding to a different program in the facility. Since there are 32 separate narrowband frequencies to choose

from, one channel does not interfere with another.

The real success to the Americans with Disabilities Act is *usage*. Therefore, Phonic Ear has a complete "Facility Marketing Support" program to assist the facility in letting the community know their facility is "hearing accessible." For example, when Fox Theatre in Atlanta installed their Phonic Ear system, we contacted the

local schools, disability organizations, and local audiologist asking them to patronize the facility. This is an excellent way to recover the costs of compliance. Increasing the customer base increases ticket sales!

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Church Microphone Selection

Recommendations for Finding the Right Mic

BY TIM VEAR

(The following is excerpted from chapter eight of "Microphone Selection and Application for Church Sound Systems" by Tim Vear, a 40-page book available from Shure.)

In order to select a microphone for a specific application, it is first necessary to know the important characteristics of the sound source(s) and of the sound system. Once these are defined, a look at the five areas of microphone specifications (the operating principle of the microphone, the frequency response, the directionality, the electrical output characteristics and the physical design) will lead to an appropriate match. Finally, correct placement and proper use will insure best performance. In this article we will present recommendations for some of the most common church sound applications. The sound system in the following examples is assumed to be of high quality, with balanced low-impedance microphone inputs and available phantom power.

ALTAR

The desired sound source for an altar application is a speaking (or sometimes signing) voice; and undesired sound may include direct sound

(such as choir, organ, or loudspeakers) and ambient noise sources (such as building noise or the congregation itself).

A boundary microphone is the physical design best suited to this application. Its use will minimize interference effects due to reflections from the altar surface and will also result in increased microphone reach. A condenser type is the most effective for this configuration, due to its high performance and small size.

The frequency response should be optimized for the vocal range and will benefit from a slight presence rise. A unidirectional (typically cardioid) pattern will give the broadest coverage and good rejection of feedback and noise. A condenser microphone will provide the highest sensitivity. Finally, the microphone should have a balanced low impedance output.

The microphone should be placed flat on the altar at a distance of 2 to 3 feet from, and aimed towards, the normal position of the person speaking. It should be located or aimed away from other objects and from any local noise such as page turning. Unless there is more than one distinct position to be covered, and unless these positions do not violate the 3-to-1 rule, use only one altar micro-

phone.

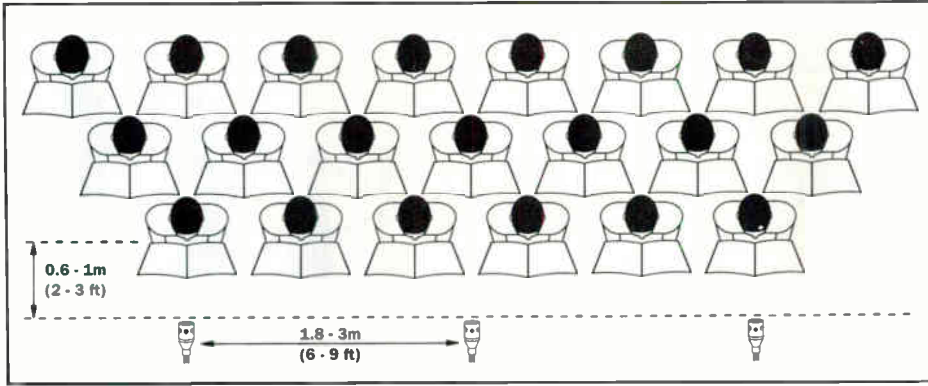
The microphone should be connected and powered (if a condenser) in the proper fashion. If the altar itself is a source of noise or vibration, isolate the microphone from it with a thin foam pad. A low-frequency filter may be a desirable or even necessary feature. A pop filter is not normally required. Do not cover the microphone with heavy altar linens.

CHOIR

The desired sound source is a group of singing voices. Undesired sound sources may include the organ or other musical instruments, loudspeakers, and various ambient sound.

A condenser is the type of microphone most often used for choir applications. They are generally more capable of flat, wide-range response. The most appropriate directional type is a unidirectional, usually a cardioid. A supercardioid or a hypercardioid microphone may be used for slightly greater reach or for more ambient sound rejection. Balanced low-impedance output is used exclusively, and the sensitivity of a condenser microphone is desirable because of the greater distance between the sound source and the microphone.

The physical design of a microphone



Choir microphone positions - top view.

for choir pickup should lend itself to some form of overhead mounting. It may be supported by its own cable or by some other fixture, such as a stereo microphone mount. Finally, it may be a full-size microphone or a miniature type for unobtrusive placement.

Application of choir microphones falls into the category known as "area" coverage. Rather than one microphone per sound source, the object is

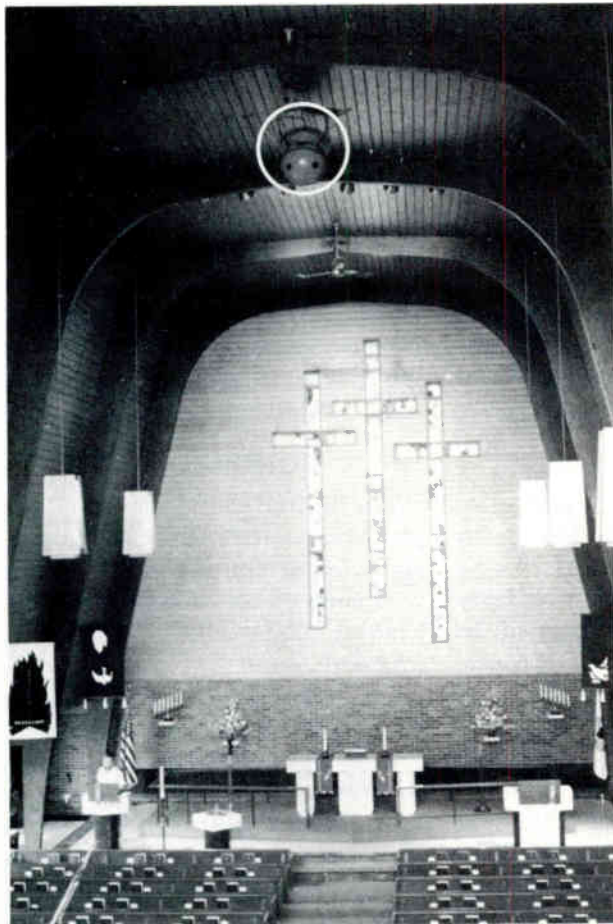
to pick up multiple sound sources (or a "large" sound source) with one (or more) microphone(s). Obviously, this introduces the possibility of interference effects unless certain basic principles (such as the "3-to-1 rule") are followed, as discussed below.

For one microphone picking up a typical choir, the suggested placement is a few feet in front of, and a few feet above, the heads of the first row.

It should be centered in front of the choir and aimed at the last row. In this conjugation, a cardioid microphone can "cover" up to 15-20 voices, arranged in a rectangular or wedge-shaped section.

For larger or unusually shaped choirs, it may be necessary to use more than one microphone. Since the pickup angle of a microphone is a function of its directionality (approximately 130 degrees for a cardioid), broader coverage requires more distant placement. As choir size increases, it will eventually violate the cardinal rule: place the microphone as close as practical to the sound source.

In order to determine the placement of multiple microphones for choir pickup, remember the following rules: observe the 3-to-1 rule; avoid



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56 Sound & Communications

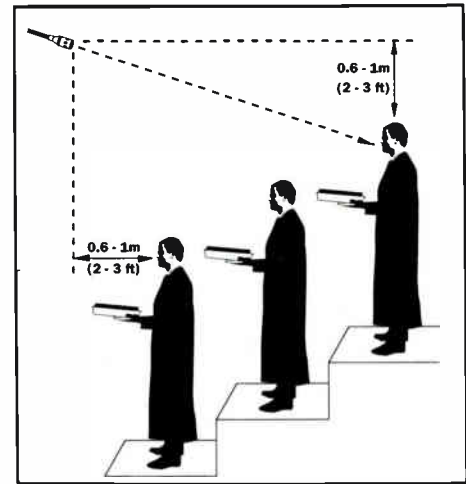
picking up the same sound source with more than one microphone; and finally, use the minimum number of microphones.

For multiple microphone, the objective is to divide the choir into sections that can each be covered by a single microphone. If the choir has any existing physical divisions (aisles or boxes), use these to define basic sections. If the choir is grouped according to vocal range (soprano, alto, tenor, bass), these may serve as sections.

If the choir is a single, large entity, and it becomes necessary to choose sections based solely on the coverage of the individual microphones, use the following spacing: one microphone for each lateral section of approximately 6 to 9 feet. If the choir is unusually deep (more than 6 or 8 rows), it may be divided into two vertical sections of several rows each, with aiming angles adjusted according. In any case, it is better to use too few microphones than too many.

Once overhead microphones are positioned, and the cables have been allowed to stretch out, they should be secured, if necessary, to prevent turning or other movement by air currents or temperature changes. Find thread or fishing line will accomplish this with minimum visual impact. Use only highest-quality cables and connectors, particularly if miniature types are specified.

The use of choir microphones is governed, to some extent, by the intended destination of the sound. In general, high-level sound reinforcement of a choir within the main body of the church is not recommended. In fact, it is not possible in most cases, unless the choir itself is isolated from the main body of the church. Use of area pickup microphones in the same acoustic space as area coverage loudspeakers results in severe limitation on gain-before-feedback. The best that can be done in this circumstance is low-level reinforcement in the im-



Choir microphone positions - side view.

mediate area, and, possibly, medium-level reinforcement to distant areas, such as under balconies or in foyers. Destinations such as isolated listening areas, recording equipment, or broadcast audiences can receive higher levels because feedback is not a factor in these locations.

Many older churches are very reverberant spaces, with provide natural, acoustic reinforcement for the choir, though sometimes at the expense of speech intelligibility. Some modern architecture has been designed to provide a less reverberant space, both for greater speech intelligibility and to accommodate modern forms of music. This results in a greater reliance on electronic reinforcement. However, it is still not practical (and probably not aesthetically advisable) to make a choir of 20 sound like a choir of 200. The sound system (and the microphones) can provide some useful enhancement, but a large acoustically "dead" church simply requires a large "live" choir.

CONGREGATION

The desired sound source for a congregation microphone is a group of speaking or singing voices. Undesired sources are usually the sound system loudspeakers and various ambient sounds.

Condensers are the choice for highest quality sound at a distance. A flat, vocal-range frequency response is usually desirable, with a unidirectional polar pattern to minimize pickup of unwanted sound. The electrical output should be balanced low impedance, and the physical design

should accommodate overhead mounting, by cable or other fixture. The microphone may be either full-size or miniature, depending on visual requirements.

Since this application of microphones is another example of area coverage, the placement should be in front or, above, and aimed toward the faces of the congregation. Though similar in concept to the choir example, fewer and more distant microphones may be used to pick up the overall "ambience" of the congregation.

A particular method that is sometimes suggested for overhead placement is a ceiling-mounting microphone, usually a boundary micro-

Though similar in concept to the choir example, fewer and more distant microphones may be used to pick up the overall "ambience" of the congregation.

phone. This position should be used with caution, for two reasons: first, it often places the microphone too far from the desired sound source, especially in the case of a high ceiling. Second, the ceiling, in buildings of modern construction, is often an extremely noisy location, due to air handling noise, lighting fixtures, and building vibration. Remember that a microphone does not "reach out" and "capture" sound: it can only respond to the sound in its immediate vicinity. If this "local" sound field is louder than the "distant" sound from below, there is no hope of picking up a usable sound with a ceiling-mounting microphone.

Congregation area microphones are used exclusively for recording, broadcast, and other isolated destination. It is never intended to be mixed into the sound system for local reinforcement. If it is desired to reinforce an individual member of the congrega-

tion, it can only be done successfully with an individual microphone in the congregation: a stand-mounted type that the member can approach or a handheld type (wired or wireless) that can be passed to the member. ■



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R-431 Graphic Equalizer (top) R-830 Graphic Equalizer (bottom)

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Beranek Heads Research Group; Peavey Reappointed to Trade Group

Concert Hall Research

A group of acoustical scientists and consultants met in Cambridge, Massachusetts to map out a research program to obtain acoustical data for concert halls throughout the United States and Canada. Dr. Leo Beranek was elected "volunteer" Chairman of the Concert Hall Research Group, located at 327 F Boston Post Road, Sudbury, Massachusetts 01776. Sponsors reportedly include the National Research Council, Acoustical Society of America, Acentech, Artec Consultants, Leo L. Beranek, David Braslau Associates, Cavanaugh Tocci Associates, Commins-Ingemansson, M. David Egan, David Griesinger, Jerald R. Hyde, Jaffe Acoustics, Kirkegaard & Associates, Klepper Marshall King, McKay Conant Brook, Minoru Nagata & Associates, Paoletti Associates, Sonic Perceptions, and Takenaka Corporation. Tim Foulkes is secretary/treasurer of the group.

The aim of the group in obtaining the acoustical data is to concentrate halls built in the late 19th and early 20th century such as Boston Symphony Hall as well as more recent halls as the Orange County Performing Arts Center. According to the group although many of these halls have been previously studied, recent advances in digital based instrumentation permits extraordinary detail in comparable acoustical measurement methodology and the opportunity to obtain acoustical data not available before.

Peavey Reappointed

Hartley Peavey, CEO of Peavey Electronics Corporation, has been reappointed by Secretary of Commerce Barbara Franklin to a fourth term as a member of the Industry Sector Advisory Committee on Consumer Goods for Trade Policy Matters. Peavey has been a longstanding supporter of the export of American manufactured goods into world markets. He said, "I look forward to being able to serve again on this committee to advise the Commerce

Department/U.S. Government in regard to vital issues affecting U.S. penetration into world markets. Exports mean more business and more jobs for America."

Ramsa in China Club

The Chicago China Club sound system, designed by Dave Katzman, features systems for a live music room, a dance room and a small lounge. Equipment includes Ramsa amplifiers, speakers, subwoofers, mixing consoles and Panasonic DAT machines, turntables, CD and cassette players.



Bud Greene

Award to Bud Greene

Bud Greene, president of Dearborn Wire and Cable Inc. has been selected as a recipient of the Charles D. Scott Distinguished Career Award, given annually by the New England Wire & Cable Club to outstanding leaders in the wire and cable industry. The criteria for being chosen as recipient of the award includes a career of at least 25 years in the field, demonstration of "impressive professional and personal leadership, and other qualities."

Sam Ash New Store

Sam Ash Music Corporation has leased a 20,500 square-foot retail store in Cherry Hill, New Jersey, formerly occupied by defunct electronics retailer Crazy Eddie. According to Ash president Jerry Ash, the store is in excellent condition and "should not take long" to open, but no official date has been set.

EAW News

Among several new installations and sound designs, EAW has announced the installation of EAW speakers in The Supper Club in New York City, installed by Audio Unlimited of Long Island City, New York. According to Ernie Schaffer of Audio Unlimited, "Along with the 300 Series arrays, we used four of the new UB-42's for fill coverage in the rear areas of the venue. The system has a Soundcraft Delta-200 32-input console, Klark-Teknik and dbx signal processing, and Crown amplifiers. The Supper Club was formerly the Edison Theater. Audio Unlimited also installed EAW speakers in True Blue, a club in Manhattan. According to Schaffer, "This place had a need for full-bandwidth, high level sound in a limited space. "We installed a KF300 array and used the dual 15" SB250 subwoofer under the stage." The system is powered by Crown amplifiers, and features a Soundcraft console along with Lexicon and Yamaha signal processors.

In Albany, New York, The Eggs, a privately owned theater funded by the Rockefeller Foundation, has a new surround system from Audio 300 featuring EAW speakers along with MicroAudio programmable equalizers, and a 40 input DDA Arena mix console.

In other news, EAW has appointed several distributors: Studer Revox (Far East) is now EAW's distributor for China and Southeast Asia. Hermes International has been named exclusive distributor for Mexico. Mocom Communication Handelsges of Vienna distributes the company's products in Austria.

Meridian in Birmingham

Meridian Communications has announced that Technical Industries, audiovisual contractor for the newly built Birmingham-Jefferson Civic Center, has installed the Meridian Distramix matrix mixers for the 300 seat auditorium and the 200 seat classroom projects. The matrix mixers are used as mix-minuses to the

auditorium and classroom's speech reinforcement systems, and the left, right, and center playback systems. The other four outputs are designated to the video teleconference system, routing switcher, and the audio and video production control centers. The audiovisual systems were designed through a collaboration of Pelton Marsh Kinsella and Cape-Dixson Associates.



Talk-A-Phone KC-4906LD

Airport Radar System

Talk-A-Phone's K-C-4906LD intercom has been chosen as part of the Westinghouse airport radar modernization program for the FAA's 10 billion dollar, 20-year plan to modernize and revitalize the U.S. National Airspace System. The intercom system assists in the remote maintenance and monitoring functions, and in the 16 annual scheduled site visits. Westinghouse is under contract to supply 128 airport surveillance radars, 40 air route surveillance radars, and 137 "mode select" secondary surveillance radars. It is reportedly the largest such project being undertaken anywhere.

News from Sanming

Sanming Sound of Huntington Beach, California, has announced that it has supplied the Clark County School District in Las Vegas with 500 units of SC-30AT paging horns for new school construction. Sanming has also announced that its Multi-Tap 15 paging horn SK-150T has been granted a design patent in the U.S.



Georgia Resource Center

Georgia Information

The Georgia Resource Center, a cooperative effort among the Georgia Power Company, Georgia Department of Trade & Tourism, Georgia Research Alliance, and the Atlanta Committee for the Olympic Games, is gearing up for the 1996 Olympics to be held in Atlanta. A high-technology multimedia center, the GRC pools resources to provide companies with instant access to information about Georgia. Sharp Electronics has announced that the GRC is using Sharp's XG-2000 LCD projectors in its presentation facility. In the GRC new Atlanta facilities, the Sharp projectors display video images generated from IBM PS2 Model 55SX computers, allowing groups of up to 40 people to visually tour communities, sites and buildings.

British Installations of Altec

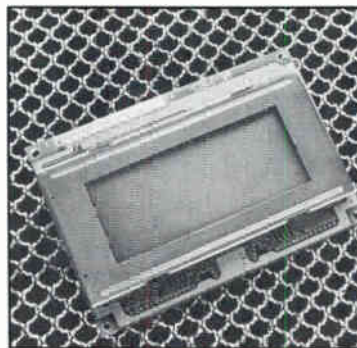
Altec Lansing has reported that the Royal Lancaster Hotel, Wembley Stadium, and the Royal Festival Hall, all in London, are using sound systems and equipment manufactured by Altec. The ballroom sound system in the Royal Lancaster includes more than 200 ceiling loudspeakers, eight Anniversary Series power amplifiers, and a separate system for fire evacuation using mixer/power amplifiers. Wembley Stadium installed a multi-purpose sound system including Altec ceiling loudspeakers, compression drivers, one-third-octave equalizers, single channel crossovers, and a series of Mantaray horns.

In the far east, Altec equipment has been installed at the Grand Hyatt Erawan Hotel in Bangkok, and in Korea at: the Korea World Trade Center and hotel complex; Korean

Broadcasting System studios; Hon Moo Hotel; Lotte Hotels; and at the Hot.

Klay Anderson Installs

Klay Anderson Audio, which opened its doors in Salt Lake City in October, has announced several installations. The newly redecorated and upgraded American Fork City Council chambers in American Fork, Utah, has been fitted with a new sound system featuring a Shure AMS automatic mixer and six Shure AMS gooseneck microphones, along with a Shure wireless handheld audience microphone. The Cathedral Church of St. Mark has been fitted with an Apogee system, replacing 15-year-old equipment. The cathedral was built in 1870.

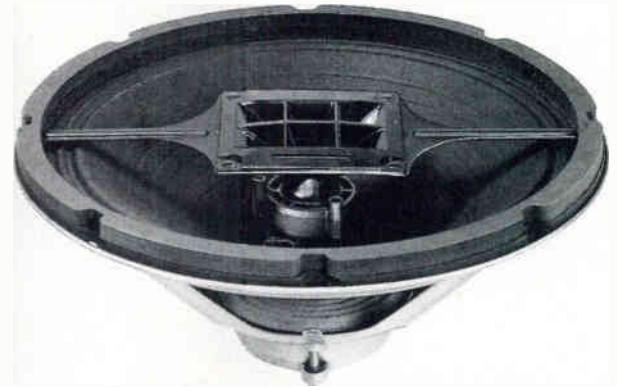


Rohm LCD module

Rohm Module

A new LCD module is available from Rohm Corporation, featuring low power consumption, a 20 degree viewing angle, and a set of key instruction functions. Up to four rows of 16 characters can each be displayed by the reflective TN-type device. Characters are 5 x 7 dot matrices which can be configured as 240 different characters or symbols. Price is \$17 each in 1,000-piece quantities.

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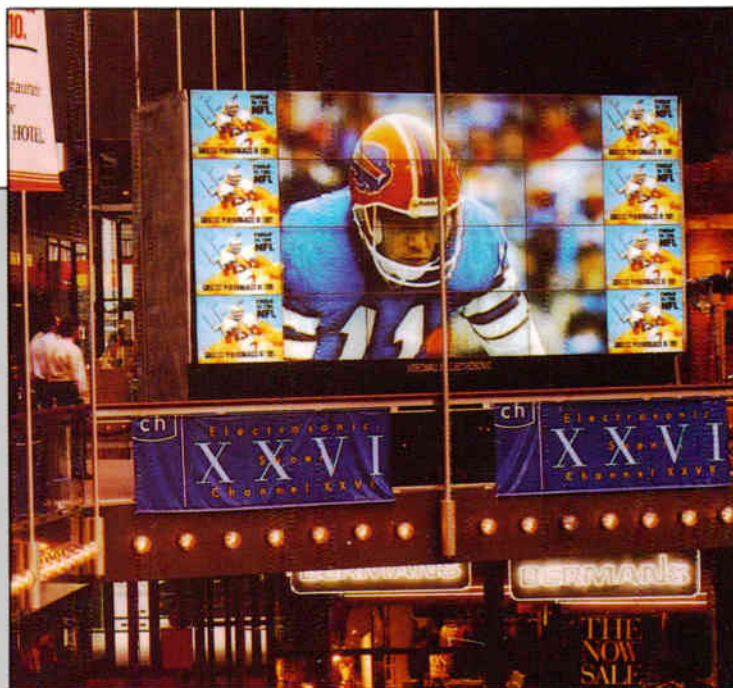
May 1992 69

CHANNEL TWENTY-SIX

Each year's Super Bowl is noted for all kinds of "biggest" and "best" feats in the promotion and staging of the game and accompanying activities. The January 26, 1992 Super Bowl in Minneapolis/St. Paul, Minnesota — Super Bowl XXVI — was no exception.

It began with getting the 26th Super Bowl to the Twin Cities in the first place. Several years ago, a task force of Twin Cities businesses was formed to attract the Super Bowl. As things progressed, it was noted that the typical Super Bowl attendee brought some impressive statistics to the game site: over 50 percent earn more than \$50,000; 27 percent own corporations; 25 percent are corporate officers, etc. Obviously, highly effective local advertising and promotion give the NFL and corporate sponsors the visibility they want. It was also a way to wring out the most financial benefit from the relatively short stay of each fan (typically, most Super Bowl attendees come from outside the host city) and help ensure a favorable impression — paving the way for future major events in the Twin Cities.

Dayton Hudson Corporation was one of the leaders of the task force, and recommended the use of media with which it was very familiar: the videowall. Dayton's flagship retail store in downtown Minneapolis has used a permanently installed 32



monitor Electrosonic videowall for years for continuous in-store and public service promotional messages. The effectiveness of the wall was well known and made perfect sense for the big event . . . but, given the scale of the Super Bowl, more was needed.

Thinking big, the task force, with the involvement of locally based Electrosonic Systems, Inc., developed the plan for "Electrosonic Super Channel XXVI." The plan resulted in the installation and linking of ten videowalls of various configurations. Each was located in a high traffic area of the Minneapolis Skyway pedestrian system (a mile long, second story level, all weather pedestrian complex linking downtown retail, hotel/restaurant and financial areas — adjacent to the stadium) plus

one in the World Trade Center in St. Paul. In addition, a videowall was installed in the game-week broadcast booth of WCCO TV, the host CBS station.

In all, over 140 screens were used. During Super Bowl Week, all the Skyway and Trade Center videowalls presented advertising and promotional messages, plus the NFL's 1992 season highlight film, Super Bowl updates, event schedules, interviews with players and coaches, and the game itself.

The challenge was formidable. In the space of one week, all videowalls were installed . . . each in a very valuable, high profile (busy) location. They operated continuously for the event week and, with the exception of the Dayton's videowall, were removed in a matter of hours after

the game was completed. "It was a monumental task on everyone's part," said Jon Salhus, Vice President of Video Display for Electrosonic.

Electrosonic provided the equipment, labor and programming for the videowalls. A variety of shapes were used, including pyramid, diamond, rectangle and tower. Special effects were achieved through the use of Electrosonic and Philips video display and processing equipment. Video signals were digitized and distributed to the display screens under the control of Electrosonic C-Through software. Effects included full screen magnifications, distribution of images or parts of images to one or more screens in pre-programmed sequences and the use of color washes for impact and visual separation between image effects.

Among the new products in use were Electrosonic's ProCube II video projection display (manufactured in Minneapolis) and Picbloc 3 videowall control system, and Philip's Super Projector video display.

Events surrounding the Super Bowl are bigger than life and get bigger each year. Keeping with that tradition, Electrosonic Super Channel XXVI was the biggest, most extensive network of videowall display systems ever constructed. The Picbloc 3, Procube II and Super Projector combinations make such an enterprise possible.

— Electrosonic Systems

REP NEWS

Renkus-Heinz Appoints

Silver Peak/PSI has been appointed exclusive Renkus-Heinz sales representative for the Rocky Mountain region, encompassing Colorado, Wyoming, Montana, New Mexico, Utah and most of Idaho. Silver Peak/PSI is located in Denver and maintains an office in Salt Lake City.

W.B. Pray Sales of Northboro, Massachusetts has assumed the responsibility for the sale of Renkus-Heinz products in all of New England.

Audiomotion Systems Appoints

Audiomotion Systems has appointed Group One in Farmingdale, New

York, as its U.S. sales representative for the Uptown moving fader console automation system. Group One president Jack Kelly, formerly president of Klark-Teknik Electronics, services east coast clients. Chris Fichera, formerly DDA product specialist with Klark-Teknik, has primary responsibility for the west coast.

Innovative Sales to Bag End

Innovative Sales & Marketing of Irvine, California, is representing Bag End in California, Nevada, Arizona and New Mexico. The rep firm celebrates its tenth anniversary in 1992.

John Vitale, sales manager of Bag End, said, "Innovative Sales, under the direction of John Eichenmuller, is a key player in the territory. Jerry TAplin in northern California and Charlie Turner in southern California are doing an outstanding job in opening up new dealers for us."

Bag End Names Castelluccio

Castelluccio and Associates, headquartered in Clifton, New Jersey, is representing Bag End in metropolitan New York City, Rockland and Westchester counties, and northern New Jersey. Gary Castelluccio said, "I first came in contact with Bag End

15 years ago as a guitar player. I'm very familiar with the speakers and have the utmost respect for them."

New Horizons Named

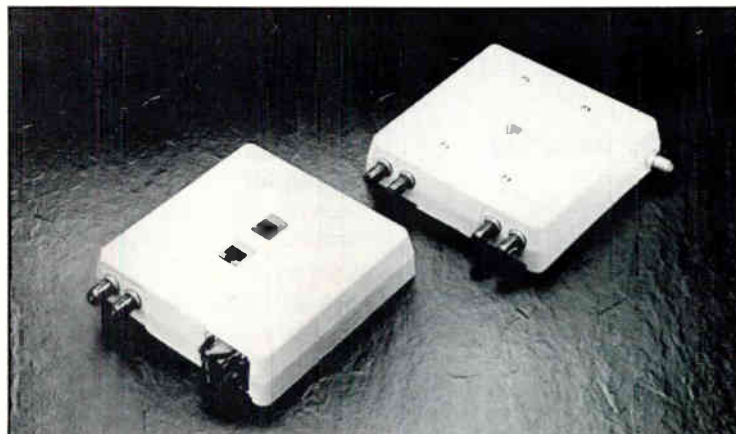
Parasound Products has named New Horizons its manufacturers' representative in Illinois and Wisconsin. The announcement was made by Chuck Kittelson, Parasound director of sales. New Horizons, headquartered in Lake Forest, Illinois, is headed by George Stamos, Bill Mowry and Rick Shulhaser. The firm also represents Beyer, Infinity, SkyPix, and Yamaha home and car audio systems.

ERA Members Certification

Nearly 70 members of the Electronics Representatives Association are now enrolled in the three-year curriculum of the Certified Professional Manufacturers' Representative course. The CPMR program is a project of the not-for-profit Manufacturers' Representatives Educational Research Foundation and is co-sponsored by the Indiana University Graduate School of Business. To be certified, representatives must successfully complete one-week course sessions, including 25-plus hours of classes and a final examination, each year for three years.

Finnish Opera Gets Audio

Finnish pro audio distributor MS-Audiotron has been awarded the contracts to supply and install all audio systems for the new National Opera House being built in Helsinki. This is reportedly the largest single order in Finnish audio history, and is worth \$3 million. The audio project was split into three contracts of which the first covers the main house sound system, distributed paging and background music, and recording studio acoustical treatment, monitoring and signal processing. The second contract covers audio mixing consoles including main house and studio. The third covers all digital and analog recorders and players.



Hubbell's Advanced Communication Outlet

Hubbell ACO with Multimedia Capabilities

Hubbell's Advanced Communication Outlet (ACO) provides the ability to combine fiber, twisted pair and coax terminations at one location. Fiber and coax connectors exit from the bottom of the unit, which includes a

fiber storage compartment using a molded core in the unit base as a coiling drum. The ACO, available with jacks and connectors, is available in "office white" or "telco ivory."



Left to right: Joseph Vayda, Pat Shevlin, David L. Brown, WEA; Daniel Malcorps, BASF.

Inventors Award Presented

BASF has named WEA Manufacturing the recipient of its 1992 "Inventor's Award" for WEA's development of DIGalog digital audiotape duplication. WEA is the manufacturing arm of the Warner Music Group. The award was presented by Daniel Malcorps, BASF Corporation Information Systems vice president, who said, "Using an ultra-modern digital RAM storage sound source, WEA haXs revolutionized the technology." He further stated that DIGalog has created a new chapter in high-speed tape duplication by its application of digital mastering.

WonderMega in Japan

JVC, in conjunction with Sega Enterprises, has developed a new product called WonderMega, a 'multi-amusement player' scheduled for the market this spring in Japan. The Model RG-M1 includes CD-Rom, CD Graphics, CD+Midi and "Mega-CD" and "Mega Drive" software. It offers games, karaoke, "auto-electronic musical performances," and of course music CD. Included are a control pad, AC adapter, signal cable, video cable and CED-Rom software. Features include 16-bit configuration and S-type video signal output.

CALENDAR

Upcoming Events

JUNE

ShowTech '92: Berlin, Germany. Contact: (030) 3038-0. June 2-4.

Test & Design Expo: Somerset, New Jersey. Contact: (617) 232-3976. June 2-4.

International Conference on Consumer Electronics (ICCE): Rosemont, Illinois. Contact: (716) 392-3862. June 2-5.

Supercom: Chicago, Illinois. Contact: (312) 352-8476. June 15-19.

Introduction to Sound Quality Analysis: Minneapolis, Minnesota. Contact (612) 721-2455. June 16-17.

Nepcon/East: Boston, Massachusetts. Contact: (708) 299-9311. June 16-18.

Semicon West: San Francisco, California. Contact: (415) 964-5111. June 16-18.

Showbiz Expo: Los Angeles, California. Contact: (213) 668-1811. June 20-22.

Image World: Chicago, Illinois. Contact: (914) 328-9157. June 22-26.

Test Engineering Conference: Atlanta, Georgia. Contact: (800) 223-7126. June 25-27.

JULY

Satellite Dealers Association: New Orleans, Louisiana. Contact: (317) 653/8262. July 8-11.

CD-I Publishers Conference: New York, New York. Contact: (914) 328-9157. July 22-24.

Night Club and Bar: New Orleans, Louisiana. Contact: (800) 247-3881. July 27-28.

AUGUST

Image World: Los Angeles, California. Contact: (800) 800-KIPI. August 10-14.

PEOPLE

Romeo at University

University Marketing Director

Steve G. Romeo has been named director of marketing of University Sound, Inc. Romeo had been at JBL since 1986, initially as market manager for engineered sound at JBL Professional, and later as director of marketing for professional products at JBL international. Before joining JBL Romeo had been market development manager of professional products at Bose Corp. from 1984-86.



Romeo

Ferrofluidics Names Bousquet

Ferrofluidics Corporation has named Carol Bousquet product specialist in the technology division. Bousquet is primarily responsible for developing new business in existing markets and industries.

Bousquet has experience in the stereo equipment industry, as well as marketing communications and customer service.

Suerth Joins Infinity

Infinity Systems has added Henry J. "Hank" Suerth as Executive Vice President and Chief Operating Officer. Suerth has over 25 years experience with consumer products.

Suerth is responsible for day-to-day operations of the company. plan-

ning company strategy and coordinating business development.

Promotions at A-T

Audio-Technica has announced the promotions of Jacquelynn Hebrock to director of product development for Audio-Technica's professional and consumer divisions and Kenneth Satz to the position of product manager.



Hebrock

Hebrock has been with Audio-Technica since 1986. Prior to that, she held positions with Tandy Corporation and Audio Dynamics Corporation in Connecticut.

Satz is acting as a liaison between marketing, engineering and manufacturing for professional and consumer products. He has held positions with Reliance Electric and Picker International.



Satz

Symetrix Adds

Symetrix has added a digital division that will be coordinated by engineers Christopher Hoskin, formerly of EV Tapco and John Fluke, and Allen Goldstein, formerly with Peavey and AMR. Both engineers bring a number of years of experience to the staff.

LITERATURE

Guides and CCTV

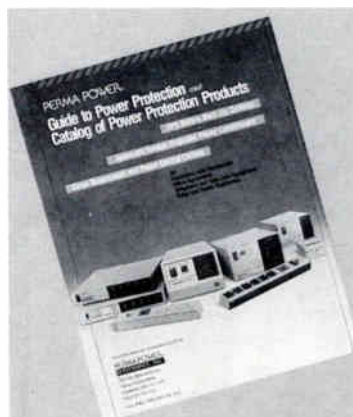


CCTV Equipment

A short-form edition of American Dynamics' catalog of closed-circuit video equipment has been released. The eight-page catalog covers the company's line of matrix switcher/control systems, sequential

switchers, quad multiplexers, splitters/inserters, motion detectors and other processing equipment and accessories.

Circle 21 on Reader Response Card



Power Protection

A catalog of power protection pro-

ducts, featuring a guide to power protection has been published by Perma Power Electronics, Inc.

The eight-page guide and catalog includes an explanation of power problems and descriptions of the three basic types of power protection, as well as the full line of Perma Power power protection products.

Circle 22 on Reader Response Card

Informative Guides

National Audio-Visual Supply has introduced Informative Guides. Designed for presentations and classroom meetings the guides consists of titles including: How to Prepare Effective Overhead Transparencies; LCD Panels: Vivid Presentations Using Your Overhead Projector and Personal Computer; and Create Powerful Presentations Using Flip Charts.

Circle 23 on Reader Response Card



Computer Protection

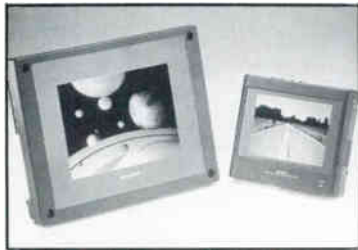
A catalog from Best Power Technology, Inc. gives readers an education in power problems and solution. The Spring 1992 Best catalog is a 40-page, color publication covering what computer users need to know to diagnose and correct power aberrations.

It also highlights new products in single-phase uninterruptible power systems from Best.

Circle 24 on Reader Response Card

PRODUCTS

Sharp Flat-Panels; Pioneer Pro CD



LCD Color Video

Sharp Electronics Corporation has introduced a flat-panel-inch and 5.6-inch color video monitor. Both of the TFT LCD monitors provide high-resolution images with a contrast ratio in excess of 60-to-1.

The 5.6-inch LCD video monitor, model 6M-40U, provides a resolution of greater than 300 TV lines and a pixel response time of 50 mSec. The 8.6-inch LCD video monitor, model 9M-60U, incorporates a double-

speed scanning system to provide a resolution in excess of 400 TV lines. Applications include teleconferencing, medical, education, transportation, research, entertainment, security and retail point-of-purchase.

Circle 1 on Reader Response Card

Pro CD Changer

Pioneer Communications of America has introduced the CAC-V3000 300 compact-disc auto-changer. The system features a double CD player design for switching between discs. Up to 32 CAC-V3000 CD autochangers can be daisy-chained together so as many as 9600 compact discs can be on line at one time. The unit can be computer-controlled through the RS-232C or RS-422A port.

Circle 2 on Reader Response Card

DCC

Carver Corporation has introduced the DTD-1880 digital compact cassette deck. The DTD-1880 uses a drawer-type cassette loading mechanism that incorporates the standard DCC auto-reverse tape drive system that allows music to be accessed from both sides of the tape. It can also play back analog cassette tapes.

Circle 3 on Reader Response Card

Table-Top Conferencing

Coherent Communications Systems Corporation has begun shipping its table-top audioconference system, the ConferenceMaster.

The system supports one to 20 participants in a room up to 30 feet in length and features Sculptured-Sound performance.

Circle 4 on Reader Response Card



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Multiple Video Windows

RGB Spectrum has released its Watchdog for display of multiple video windows on a high resolution monitor. Watchdog can be integrated into a surveillance system and is designed for security, process control, medical monitoring and financial trading desk applications.

Watchdog accepts eight direct video input signals plus inputs from a TV tuner for a display of up to nine monochrome video windows on a screen. The video windows can be positioned, overlapped and scaled from 1/64 to full screen under user control.

Circle 5 on Reader Response Card



Rare-Earth Neodymium

A miniature supercardioid dynamic mic incorporating TG-X technology via the use of rare earth neodymium magnets has been introduced by beyerdynamic. The M 424 is 1 1/2-inches long and 3/8-inch diameter. The model is also available in a pre-mounted gooseneck version as the SHM 424.

The 424 series is designed to provide intelligibility for a variety of mixing assignments including instrument miking in a sound reinforcement environment.

Circle 6 on Reader Response Card

Commercial Enclosures

Adamson Acoustic has announced the commercial release of the F

Series loudspeaker enclosures. F Series speakers have passive cross-overs built into them and are designed for use in small to mid-size clubs, theaters or places of worship.

The FR121 is a two-way box based on the MH121. Applications include front-of-house and side-fill monitoring. The FM121 is a floor monitor version of the FR121.

Circle 7 on Reader Response Card



Digital Movie Sound

ARC International Corporation's Ballantyne subsidiary has introduced its Strong DLS6 Digital LaserSound System. The DLS6 is a system using a 12-inch laser disc encoded with six discrete channels of digital sound, with up to eight channels for special applications.

Cinema Laser Technology, a division of Ballantyne, will encode the original soundtrack of a motion picture on a 12-inch laser disc. By optically reading a SMPTE time code track placed on the film — outside of the sprocket holes — the DLS6 synchronizes a movie's laserdisc audio with the projected film image.

Circle 8 on Reader Response Card

Shipping Consoles

DOD Electronics, the U.S. Distributor of the Allen & Heath line of mixing consoles has shipped the first GS-3 mixing consoles in the United States. The console is described as an "ultra-compact professional mixing console" and comes in 16 x 8 x 2 or 24 x 8 x 2 standard in-line formats.

Circle 9 on Reader Response Card



Compact Pro Speakers

Optim Audio, Inc. has announced the Wharfedale Programme 30D loudspeaker. The Programme 30D has been based on the design for the company's Diamond loudspeaker and is aimed for use at small clubs, restaurants, airports, malls, boardrooms, motion picture theaters, live theaters and home theaters.

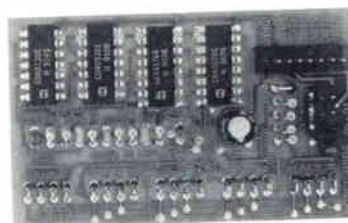
Circle 10 on Reader Response Card

Zone Monitoring

The Zone Reporter Module (ZRM) from Corby traces movement within a building. The ZRM can monitor a security device and report the activity of the zone to a Corby system 1-4-5 or 10 Access Control System.

Each module can be programmed with a code for zone identification. With the use of ZRMs, Corby access control systems can send a monitored control signal to an alarm control panel if a security zone is violated.

Circle 11 on Reader Response Card



Enclosure Design Software

Scientific Design Software has released BoxOpt, an enclosure simulation and optimization design program. BoxOpt is specifically designed to develop loudspeaker/enclosure systems.

BoxOpt uses circuit simulation and gradient optimization techniques to

analyze system designs. It also includes a non-lumped parameter "model" for its calculations.

It can design enclosure configurations including sealed, vented, passive radiator, all multi-chamber enclosures and isobaric versions of the previously mentioned enclosures, as well.

Circle 12 on Reader Response Card



Phase Adjustment

Burle Supply, Inc. has announced the S1384 phase adjustment tool to its line of Burle security products. The S1384 is designed as a setup tool used for vertical phase adjustment, eliminating picture rolling in multiple camera systems.

Circle 13 on Reader Response Card

CAD for Windows

Autodesk has announced AutoCAD Release 11 Extension for Windows that is designed to initiate the PC-CAD transition from DOS to Windows. The \$99 product complements AutoCAD Release 11 and enables designers and engineers to work with AutoCAD in the Windows operating environment.

Circle 14 on Reader Response Card



Surge Protection

Jasco Products has announced the 4 in 1 Surge Protection Set to its line of home and office accessories. The set, model 1815, includes: a six-outlet surge strip with a four-foot cord; a six-outlet in-wall surge protector; three-outlet in-wall surge protector; and single-outlet in-wall surge protector.

Circle 15 on Reader Response Card

Trapezoid Enclosures

The Grundorf Corporation has announced the GAD GT Series of professional trapezoid loudspeaker enclosures. The GAD GT Series uses: nine-ply birch construction and response-tailored, third-order crossovers.

The series is comprised of trapezoid enclosures ranging from the GT-1070 10-inch two-way design to the GT-1520, a 15-inch two-way design with a two-inch-throat high-end horn.

Circle 16 on Reader Response Card

Portable Cabinets

Bud Industries, Inc. has introduced a line of portable, "low-cost" cabinets. The Econocab has features including all-welded 18-gauge steel construction, stationary panel mounting rails offering a 14.5-inch clear inside depth and five panel heights.

Circle 17 on Reader Response Card



Hear with Your Skin

The Tactaid 7 by Audiological Engineering Corporation allows deaf people to understand sounds through the use of an electronic "box" that clips on a belt or slips into a pocket.

The cord leads to a strip of seven plastic boxes that vibrate in response to sounds. With the vibrators strapped to the chest or the nape of the neck, deaf people feel vibrations given off by the sounds around them.

Circle 18 on Reader Response Card

Titanium-Domed In-Wall

Parasound has introduced its C/ST (Custom Series/Titanium) in-wall speaker line. Three models in the series, the CS/T-280, CS/T-265 and CS/T-255, feature a titanium-domed tweeter incorporated with a polyimid surround and ferrofluid damping.

The top-of-the-line CS/T-280 employs an 8-inch woofer with a carbon fiber-reinforced polypropylene cone and imported butyl rubber surround with a 1-inch titanium tweeter. In-wall response is 36 Hz to 22 kHz.

Circle 19 on Reader Response Card

ADAT Harnessing

ProCo has introduced its ADAT harnessing cables for use with the Alesis ADAT 8-track tape machine. The four harness configurations include the ADAT-X 56-way multipin to male and female XLR connectors, and ADAT-BQ 56-way multipin to balanced (T/R/S) 1/4-inch phone plugs.

Circle 20 on Reader Response Card

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● Amplifiers	● CROWN	● TOA	● ALTEC LANSING
Automatic Mixing Systems	IRP	TOA	SHURE
Combining Systems	FSR	IRP	SHURE
Machine Control/Remote Control Systems	AMX	CRESTRON	IRP

* indicates tie

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PRODUCTS

	FIRST PLACE	SECOND PLACE	THIRD PLACE
Loudspeakers	JBL	ATLAS/SOUNDOLIER	ALTEC LANSING
Back Boxes	ATLAS/SOUNDOLIER	LOWELL	ALTEC LANSING
● Amplifiers	● TOA	● CROWN	● BOGEN
Automatic Mixing Systems	SHURE	ALTEC LANSING	TOA, IRP*
Combining Systems	FSR	IRP, SHURE	COMMUNICATIONS COMPANY
Machine Control/Remote Control Systems	AMX	CRESTRON	IRP

* indicates tie

SURVEY METHODOLOGY

1. The sampling pool for the survey consists of sound and communications contractors from Sound & Communications' subscription list. Only contractors within the United States and Canada are called.
2. In a telephone survey, contractors/installers selected at random are asked to identify what brand they used for various products in installations completed in the past six months and those in progress. A different type of installation is highlighted each month.
3. On completion of the survey, results are tabulated and the product brands are ranked on a scale from one to three, with number one having the most votes. Separate rankings are made for installations occurring in the past six months and for those in progress.
4. An asterisk (*) denotes a tie for that ranking.

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THESE CONSOLES SO MANY FEATURES COULDN'T FIT THEM ALL ON THIS PAGE



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We wanted to list *all* of the features on SOLO consoles but we ran out of space. If you want to find out more about every



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World Radio History

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After more than twenty years, UREI Compressor/Limiters remain the of choice of audio professionals, having earned a reputation for excellence as hard working tools of the trade. It is difficult to find a recording or broadcast studio that does not own at least one UREI Compressor/Limiter. And engineers in the Sound Reinforcement and Installed Sound industries have long considered our products as vital links of any high quality audio equipment chain. With experience as our teacher, and modern technology as our guide, we are proud to offer three LA Series Compressor/Limiters, beginning with the LA-22.



The LA-22, a dual channel unit, contains three Gain Reduction circuits, can be used as a Dynamic Expander, and is equipped with a Full Parametric Filter on each channel. Its unmatched versatility sets it apart as a truly unique multi-function tool. Designed with innovative "spectral agility," the user has the option to reduce or expand gain across the total audio bandwidth or at a chosen center frequency with variable "Q" of 1/6 octave to 2-1/2 octaves. With proper settings in the expansion mode, you can use the LA-22 to "lift" vocals in a live or studio mix or increase intelligibility in paging systems or radio broadcasts. Conversely, in the gain reduction mode, the compression can be frequency focused to control levels to prevent feedback, for De-essing, De-popping or to creatively "fatten" the sonic character of particular instruments and vocals. The parametric filter circuit, completely accessible via the rear panel barrier strip, can be accessed and routed to the Side Chain, thus making the LA-22 a frequency dependent gain reduction or expander system.



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