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rev·e·la·tion \rē v'ē -lā 'shō n'n 1: an act of revealing 2: something revealed; esp: an enlightening or astonishing disclosure

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May 20, 1991



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0 NEW ENERGY AT PLEASURE ISLAND

By Neil Heller

Sound, lighting and videowalls rescued lower-than-expected attendance and revenue figures at this Disney World attraction.

SPACE, THE FINAL FRONTIER

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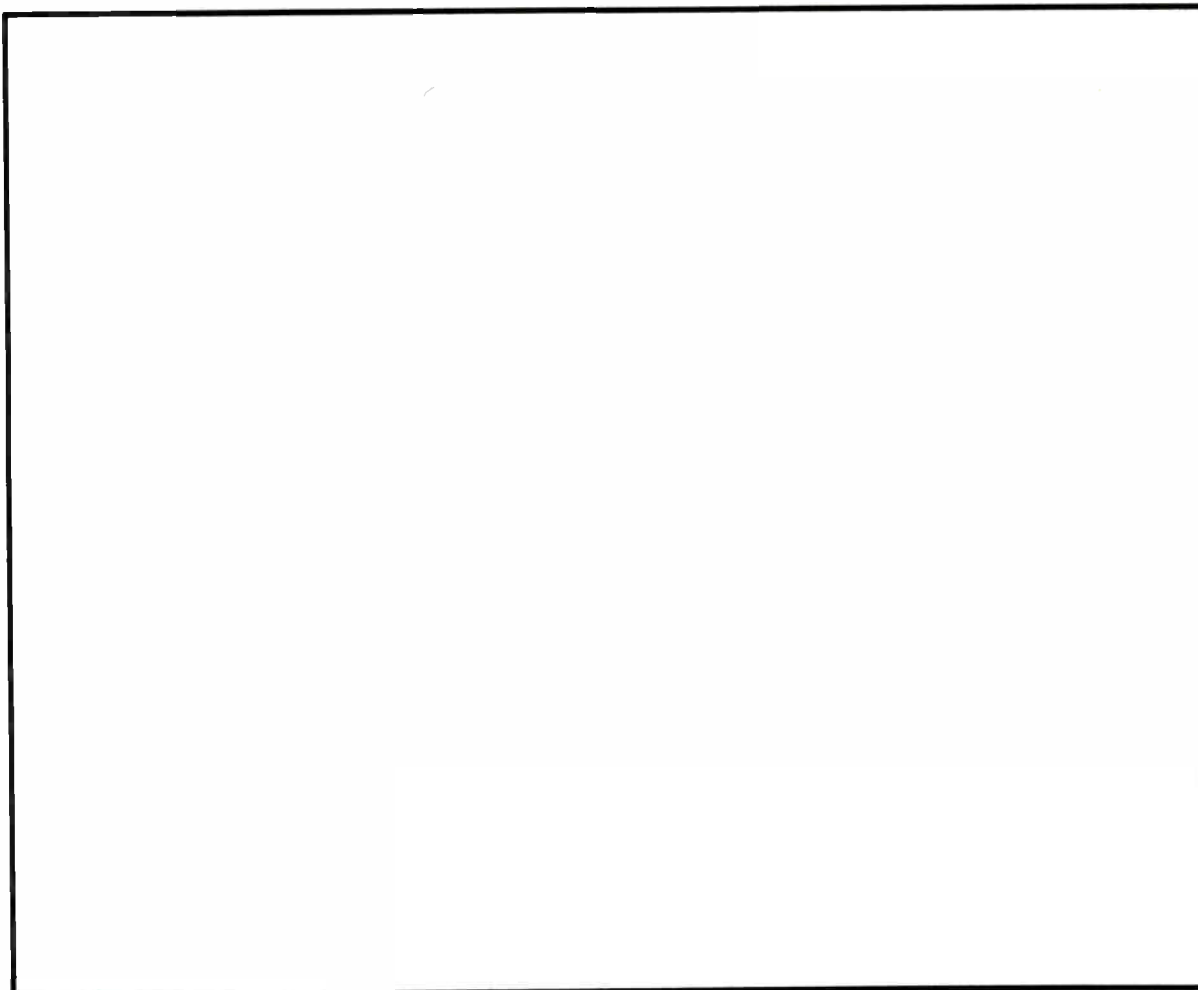
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PRODUCTS

LITERATURE

PRODUCT CHECK SURVEY: CHURCHES

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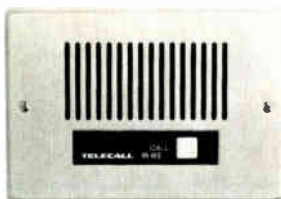
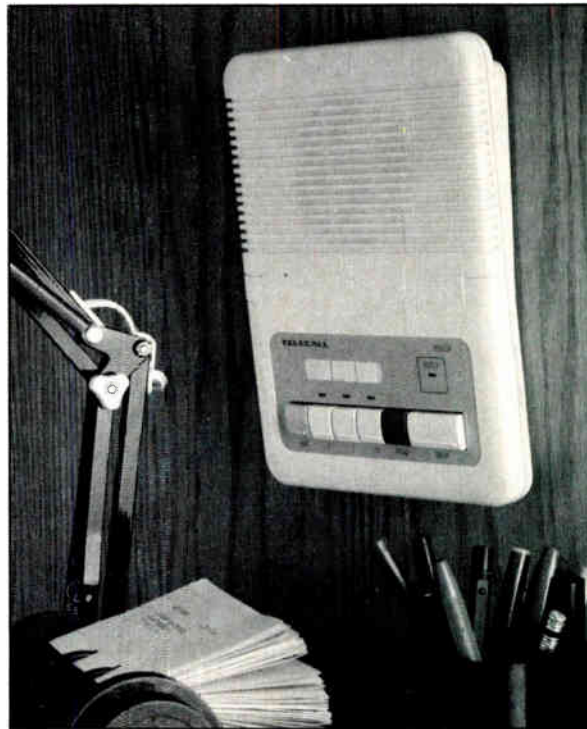
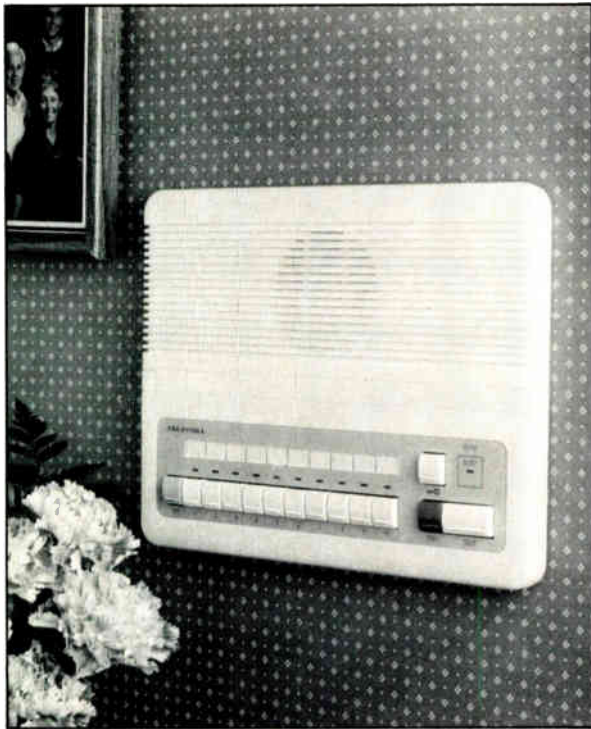
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NEWSLETTER

NEW ID BADGES FOR KUWAITIS

Hitachi hardware and a Datalink system are re-identifying Kuwaitis at the rate of 5,000 a day in a gym in Kuwaiti City. When the Iraqis invaded Kuwait, they commandeered the identification badges and system of the Kuwaiti government. When the Royal Family left, the Iraqis took possession of the main-frame computer that tracked identification papers. Now Datalink Information Systems of Herndon, Virginia is using a Hitachi Multimedia System to re-identify the entire population of Kuwait. A camcorder tapes 10 seconds of the subject which is then viewed through a monitor, printed on an electronic printer and laminated.

SUMMER CES NEWS

In conjunction with the Consumer Electronics Show being held in Chicago June 1 through 4, work rule changes within McCormick Place have been made for the first time in 30 years. Interconnection of equipment may now be made by full time employees of exhibitors; small booths may do their own decorations. The changes are an outgrowth of a March 1 meeting among representatives of the Electronic Industries Association, the Chicago Convention and Tourist Bureau and government officials including Illinois governor Jim Edgar. Other incentives offered include hotel and restaurant discounts. CES has dates reserved in Chicago for its summer show through the year 2000.

An expanded workshop schedule at the summer show includes speakers such as Sam Donaldson, and a multimedia opening session.

COMMISSION ON LICENSING

A special commission has been formed in Rhode Island to study the desirability and feasibility of licensing individuals and corporations who install telecommunication networks and devices. Jeffrey S. Deckman, president of SyNet, Inc., the Cumberland, Rhode Island based telecommunications firm, has been appointed to the commission. Other members include representatives of the state congress, department of labor, fire marshall's office, Rhode Island Telecommunications Association, and a manufacturer of telecommunications equipment.

NAB SETS RECORD

The National Association of Broadcasters convention in April brought in a record attendance of over 50,000, with 700 exhibitors covering over 400,000 square feet at the Las Vegas Convention Center. This year's NAB show incorporated HDTV World, with 35,000 square feet of the latest in high definition television technology. Among the speakers at NAB were Ray Dolby, who spoke on the need for engineers to pay attention to consumer needs and desires; and Jerry Lewis who was inducted into the Broadcasting Hall of Fame.

NEW PARA PRESIDENT

Eli Harary, founder and president of Paris Audio/Video in Los Angeles, has been installed as the seventh president of the Professional Audio/Video Retailers Association (PARA). The election of new officers was held just prior to the organization's annual conference and management institute in March. Other officers include Fred Lokoff of Bryn Mawr Stereo, chairman; Buzz Jensen, Buzz Jensen's Sound Advice, vice president; James W. Pearce, Jr., Stereo Lab, secretary-treasurer.

PEAVEY IN MINNEAPOLIS

Upgrades to The Whiskey Junction Club in Minneapolis included a new system controlled by a Peavey Mark VIII 24-channel mixing console, four CS 800, two CS 1200, two CS 400, and two DECA 724 power amps; three 31-band and two stereo EQs; four AddVerbs; and two HDH processors. Sharp Music of Minneapolis, a Peavey dealer, provided the equipment. Craig MacKenzie of CAM Installations handled the system/design and installation. Other equipment includes Peavey equalization and effects rack as well as a processor-controlled stereo HDH speaker system. The club is known for its presentation of blues and vintage rock and roll acts. A customized 24-channel snake with a split goes upstairs to a Mark IV 24-channel console for recording the music on stage. Two live albums are in the works through the in-house system.

NEWSLETTER

A/D/S/ ADDITIONS

a/d/s/ has acquired investment capital provided by three private money management firms. The multi-million dollar deal will facilitate development and marketing of new a/d/s/ products and factory expansion. The agreement includes a minority equity position in a/d/s/; representatives of the investment companies have been appointing outside members of the board of directors.

New appointments at a/d/s/ include Chuck Kittelson, director of architectural audio; John Caldwell promoted to director for automotive audio; and Larry Bennett director for home audio. Webb Collings is the new Director of Marketing.

BAXALL ENTERS U.S.

Baxall UK has entered the U.S. market. The manufacturer of closed circuit cameras, video switching and control equipment has set up a sales and marketing division in Baltimore. A B Security Products, Inc./Baxall USA is located at 71 West Timonium Road, Lutherville MD 21093.

PATENT ISSUED

Rane has been issued a patent for its Accelerated Slope equalization design, which was introduced in the FMI 14 studio grade microphone preamplifier last year. The Accelerated Slope circuitry will appear in future designs of both Flex Series and commercial 19 inch products.

ANNIVERSARY CELEBRATED

WAH Systems Corporation, the Sacramento based Audiovisual Room Integration firm, celebrates its twentieth anniversary in business in May 1991. The company was started in 1971 as a regional concert and event sound and lighting company. In 1982, the company changed its name from WAH Sound to WAH Systems to reflect the evolution into an AV presentation auditorium integration company.

EXPANSION IN SEATTLE

Symetrix, Inc. has expanded its manufacturing, warehousing and shipping facilities in Seattle by over 60 percent. According to president Dane Butcher, the additional space and production capacity will increase the finished goods inventory. A portion of the new space will be used for the production line of the DPR 44 Digital Audio Recording/Editing Stations planned for delivery in the fourth quarter of 1991.

In other news, Jon Bosaw has been named national sales manager. He was previously with Valley International and Valley Audio. And Symetrix has announced that 33 Symetrix 572 SPL Computers and one 571 SPL Computer have been installed at the Seattle Kingdome, currently undergoing a renovation of its sound reinforcement system.

ACQUISITION COMPLETED

Lyrec of Denmark has acquired 100 percent of the Italian company Robotecnica from AEG, Germany. Robotecnica is a manufacturer of audio cassette loaders. The Audio Systems Division of AEG in the U.S.A. has been acquired by Media Technologies, a company jointly owned by Mr. Rainer K. Zpfy and Lyrec. The new company is responsible for marketing and distribution of the line of Lyrec and Robotecnica products and remains located in Ronkonkoma NY.

LIGHT AND SOUND SHOW IN SEPTEMBER


The 1991 Plasa Light & Sound Show will take place September 8 through 11 in Olympia 2, London. Last year's show had a visitor attendance that was up by 30 percent to 7,192, with 15 percent coming to the show from overseas. Sponsored by the Professional Lighting & Sound Association, the 1991 exhibition is the thirteenth in the series.

NEW HDTV PRODUCTS IN JAPAN

JVC (Victor Company of Japan, Ltd.) is expanding its Japanese market line-up of professional use equipment for high definition television with the introduction of a 36-inch HDTV receiver equipped with a Muse decoder and broadcast satellite tuner, a 47 inch HDTV projector, and a 32 inch HDTV monitor beginning in late July.



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Our L1 Body-Pack Transmitter has features like a separate audio mute switch and a universal 4-pin "Tiny QG" connector that accepts a variety of microphone and other inputs. And L Series lavalier systems come with the 839W, a reliable Shure condenser lavalier microphone designed for clear, natural vocal pickup. The L2 Handheld Transmitters, available with interchangeable

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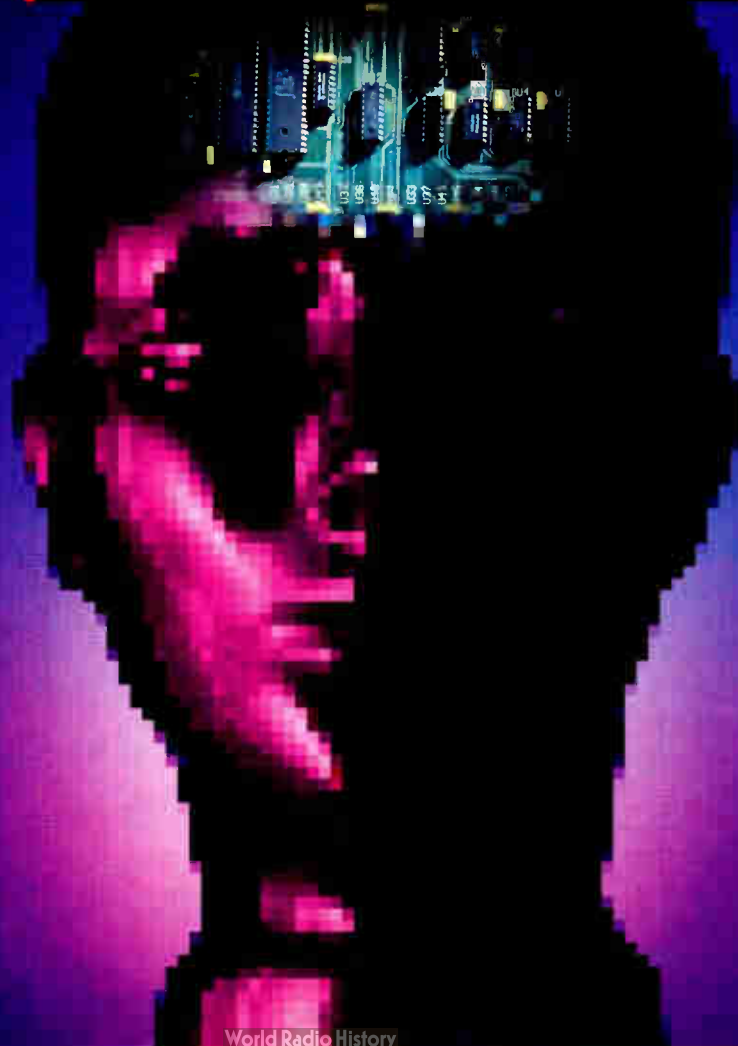
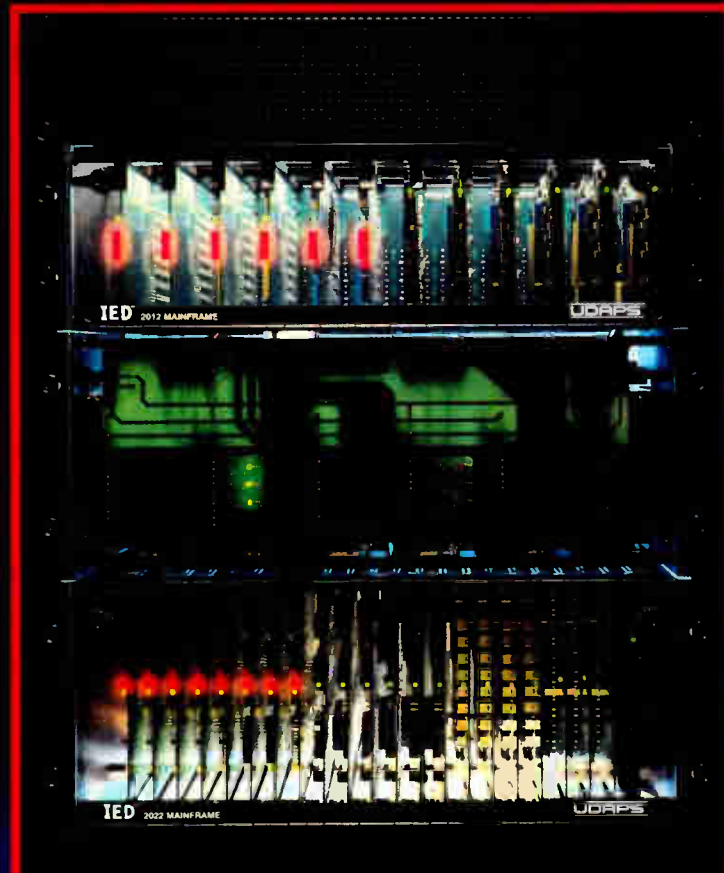
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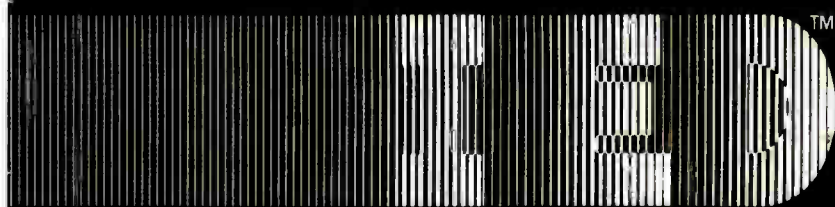
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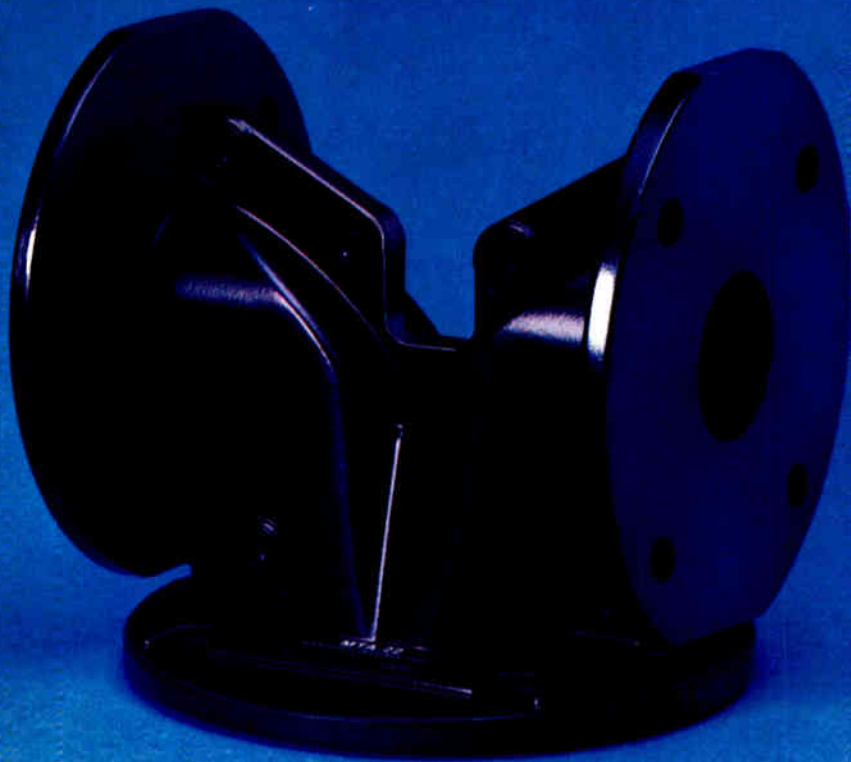
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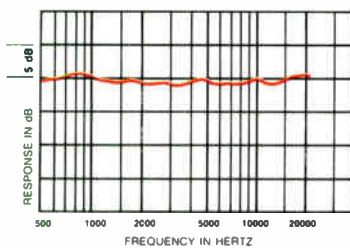
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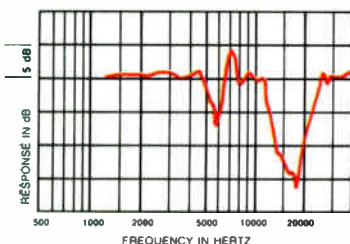
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Model DH1A/2MT



MTA-22 Summation Response



Y-Adapter Summation Response

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The Manifold Technology concept was first introduced by Electro-Voice in the MT-4 four-way concert sound system where manifolding was applied in each of the four frequency ranges. The MT-4 has garnered considerable success in touring applications, worldwide. The recently introduced MT-2 compact concert system and the MTS-1 high-performance stage system feature Manifold Technology throughout. Now, with the driver packages featuring the MTA-22 Manifold Technology adapter, you can apply the same performance and physical size advantages of Manifold Technology to any of the our HP series constant-directivity horns.

For additional information, contact an Electro-Voice sound contractor or John Murray, Electro-Voice market development manager for professional sound reinforcement at 616/695-6831.



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LETTER FROM THE EDITOR

Cincinnati Attractions; Theme Parks Go Global

By the time you read this we'll be wending our way to Cincinnati for the National Sound and Communications Association Expo '91. And since this is our "theme park" special issue of Sound & Communications, we thought it fitting to bring you an article about a major tourist attraction in Cincinnati — so major, in fact, that NSCA is sponsoring a tour of the facility. The renovated Union Rail Station in Cincinnati houses two museums and an Omnimax theater. And Mary Gruszka writes in this issue on the sound and the visual systems for that venue. It's a complicated attraction made better by competent installation and design. Read the article; and visit the station while you're in Cincinnati.

It may be that Mickey Mouse says it all. Walt Disney World in Orlando is now celebrating its twenty-fifth year. And during those twenty-five years the sound contracting industry has become integral to the amusement business. The New York Times estimates that \$5 billion worth of projects are underway for themed entertainment worldwide. That's not small potatoes. And from the smallest museum in the smallest town, the medium is multimedia as sound takes its place beside the visual enhancements for pure escapism and education. Many of the firms we talk to have been making specialties of amusement attractions. The specialty can be challenging in that the more unusual the effects, the more the public uses the attraction. This after all isn't the old time background music.

The sound system for Typhoon Lagoon Water Park at Disney World, for instance, required five sources of background music, along with timed control of a boat whistle and ships' bells to sound on the half hour, a mic station capable of zoned paging and initiation of preprogrammed messages; and separate level control between paging and background music.

Typhoon Lagoon uses an IED 590 computer. Start and stop times for five CD players, boat whistles, ships bells and preprogrammed safety messages are entered or changed by software. Sixteen different

paging zone maps and one preprogrammed message map can be entered to allow selective paging to 40 different areas of the park.

That's only one part of the amusement business. As we said, though, Mickey Mouse says it all. And with EuroDisney scheduled to open next year just outside Paris, we thought we'd investigate what's happening there. Malcolm Howard talked to the powers that be at EuroDisney, and his report on this major work in progress appears in this issue.

Planetariums would be black holes without sound systems, and the Hayden Planetarium in New York recently upgraded its sound. This issue of Sound & Communications features a report on that system.

This issue also features a first — a new department called "Product Check." Product Check is a survey of sound contractors to ascertain what products they are using in particular venues. This month features church installations. In months to come we will be surveying various segments of the business, asking a randomly selected group of contractors what equipment they have used in recently completed jobs and in jobs in progress.

As for products in use — the technology continually changes. And that's proper and fitting. This month, the month of the NSCA convention, we're especially cognizant of new products. As at past NSCA conventions, Testa Communications and the staff of Sound & Communications will produce NSCA-TV News, a television news program about the NSCA Expo. You can view it in your hotel room in Cincinnati, or on the exhibit floor. We'll be checking out the latest greatest equipment for you and presenting the news of the Expo. So watch us. Come by our booth and see us. And have a good show.

Regards,

Judith Morrison
Editor in Chief

GUEST COLUMN

WHY SHOULD CONTRACTORS ATTEND THE NSCA EXPO?

By Steven J. Thorburn P.E.

"...If a contractor does not attend ... does his firm care about its commitment to my clients?"

Consultants design systems, but the design and specification of a system is only one part of our responsibility to our clients.

Steven J. Thorburn P.E. is the principal Consultant at Charles M. Salter Associates.

We appreciate when our designs are bid and installed correctly (the first time) and stay working for longer than just the warranty period. That makes our clients happy and provides the consultant with repeat business. This makes consultants happy and in the long run will get the successful contractor more work with consultants.

Then the next logical question one would ask is, how does a contractor bid and install a design correctly? He must understand the equipment specified, what is required by the contract documents, what is expected as the level of care by

the consultant, and whether he can make enough profit on this job to install the project correctly based on his bid.

At NSCA contractors can learn/refresh themselves on how different devices a

HOW DOES A CONTRACTOR BID AND INSTALL A DESIGN CORRECTLY?

consultant specifies will work. At NSCA contractors can freely talk or network (a new term for the 90's) with contractors outside of their geographical region to find new ideas to improve their profitability and installation techniques on projects. At NSCA contractors can learn how the consultant should have (at times) designed the system they just bid on, through training sessions.

AT NSCA CONTRACTORS CAN FREELY TALK OR NETWORK.

There are many Trade Shows that require part of our valuable time: NAB for individuals working in Broadcast, SMPTE for Film and Video, AES for mixers and large format audio systems, INFOCOMM for projection and audio/visual systems, NAMM for — well spandex. But NSCA is the *only* show that deals with the majority of the issues that audio contractors must deal with the majority of the time.

If a contractor does not attend the NSCA Expo, I as a Consultant must wonder — does this firm care about its commitment to my clients.

See you at the NSCA Show in Cincinnati May 18-22. ■

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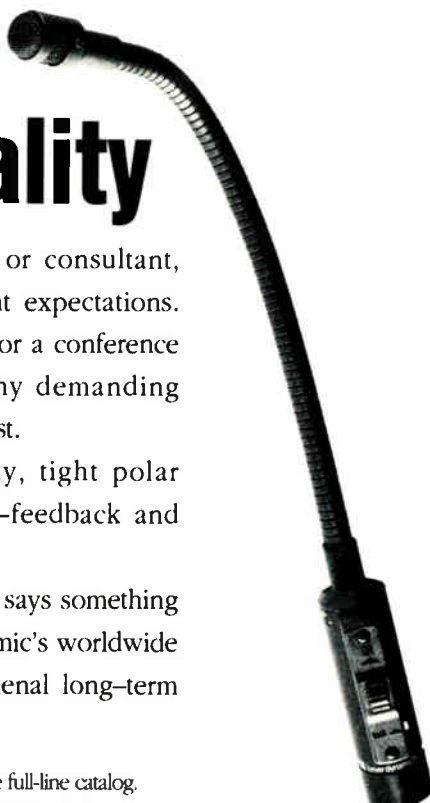
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This column was written as a service to the industry in response to a request by members of the NSCA.

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Digital Audio Compression

A New Means of Digital Encoding

BY ED FOSTER

Digital audio compression is not new. Dolby Labs and APT — Audio Processing Technology, Ltd., a subsidiary of Solid State Logic (SSL) — have been selling digital audio compression systems for professional applications for several years. Indeed, Dolby's DP85 codec was adopted by General Instrument for its digital cable radio system some time back and, reading between the lines, seems to have been adopted by Personics for its in-store cassette-compilation system. Dolby's more recent 500-series codecs and APT's apt-X 100 are second-generation systems with more effective compression ratios, outputting as little as 128 kilobits per second in a single-channel application (twice that for stereo).

Compression ratio is the name of the game and it's not difficult to see why. Based on the professional digital audio sampling rate of 48 kHz, traditional 16-bit linear PCM encoding outputs a data stream of 768 kb/s (kilobits/second) for each audio channel. Stereo takes twice that, 1.536 Mb/s. With 8 bits per byte, we're talking 192 kB/s which means that

a high-density floppy like the 1.44 MB 3½-inch disks used in a PC-AT computer could hold only 7.5 seconds of stereo audio — if you could write and read a floppy at that rate, which you can't! The consumer CD sampling rate (44.1 kHz) is a little more saving but only by about eight percent. For storage, transmission and manipulation of digital audio, data compression is a virtual necessity. Fortunately, it's possible and much more effective than what can be done with traditional digital information like bank records.

Effective digital-audio compression relies upon the peculiarities of human hearing.

A lot of high-level R & D has gone into this area, much of which was done under the auspices of the International Standards Organization (ISO) MPEG working group. MPEG stands for Motion Picture Experts Group which may sound like the wrong bunch of people until you realize that, if digital audio is awash in bits, digital video is even more so because video bandwidth is so much greater. To make digital TV a reality, "pictures" have got to be compressed and, somewhere along the way, MPEG got involved in the audio compression problem along with the video one.

Initially, there were many independent approaches to the digital-audio compression problem but, in reality, there are only so many different ways to go. Ultimately, the independent technologies coalesced into four techniques, each supported by a different group of companies. The groups were based upon commonality of approach, and each company in the group shared the best aspects of its system in order to develop the common system to its full potential.

Effective digital-audio compression relies upon the peculiarities of human hearing and, in particular, upon the "threshold of hearing" and the "masking effect." As you may know, there's a certain sound pressure level below which a sound becomes inaudible to the average listener. This "threshold of audibility" varies with frequency and is much greater at low frequencies and (to a lesser extent) at high frequencies than in the 3 kHz region where we are most sensitive, *i.e.* have the lowest "threshold of audibility." Furthermore, the threshold of audibility varies with sound level especially on a "local" basis. That is, the presence of a tone in one region of the spectrum raises the threshold of audibility in that region so that a weak tone in the same region of the spectrum as a strong one becomes inaudible even if it would have been audible had the strong one not been present. This is the so-called "masking effect" which, in

Ed Foster is President of Diversified Science Labs, a consulting and product evaluation firm. He is currently chairman of the EIA amplifier and tape standards committees, and is a fellow of the AES. He was previously manager of electromechanical research at CBS Labs.

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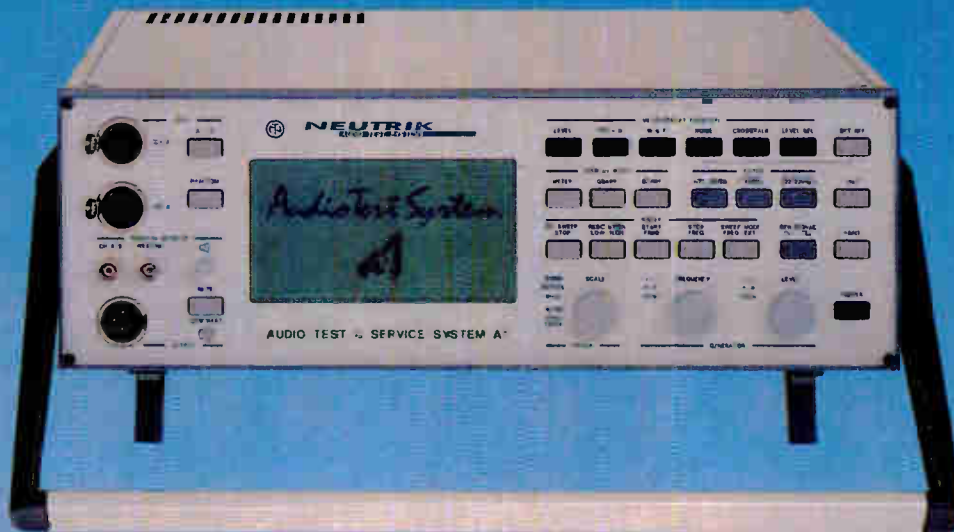
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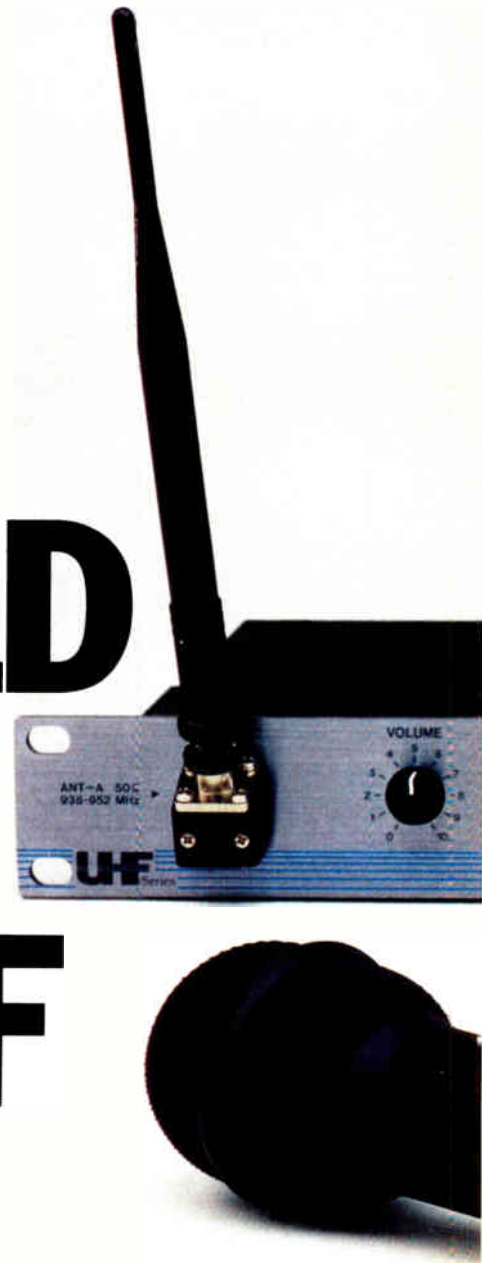
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°In case you were reading too fast, we wanted to remind you that this ad is about UHF, not VHF wireless.

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

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general, states that a strong tone "masks" a weak one of similar frequency.

Modern digital-audio compression systems make use of these phenomena to reduce the number of bits necessary to describe the signal; traditional "linear" PCM does not. With linear PCM, an attempt is made to translate every detail of the analog waveform into the digital domain without regard to whether some of those details are audible or not. Within the frequency limits imposed by the sampling rate and the amplitude limits imposed by the number of bits used to "quantize" the waveform, a linear-PCM digital signal is an exact replica of the analog one.

Linear PCM may be considered the "purist" way to go but it's very wasteful of bits because a lot of information is stored/transmitted/replicated that simply can't be heard and contributes nothing to

sound quality. Whether the coding schemes used by the various MPEG factors constitute "data compression" or "a new method of digital encoding" (as some


"Listening tests" are the only way to evaluate technologies that rely upon the characteristics of human hearing to "do their thing."

would prefer it be thought of) is a matter of semantics. The fact is, it works! With a good system and a reasonable bit rate, the final result can't be discerned from the original, analog or linear-PCM digital.

Last July, under ISO/MPEG auspices, Swedish Radio conducted a series of listening tests on the hardware submitted by the four surviving MPEG technologies: MUSICAM, SB/ADPCM, ASPEC, and ATAC. Obviously, "listening tests" are the only way to evaluate technologies that rely upon the characteristics of human hearing to "do their thing." And, properly conducted listening tests (which the Swedish Radio ones seem to have been) are as scientifically valid as technical measurements, *i.e.* they can yield results that are reproducible and statistically accurate.

MUSICAM (Masking-pattern-adapted Universal Subband Integrated Coding and Multiplexing) is a system supported by Philips of the Netherlands, CCETT (Centre Commun d'Etudes de Telediffusion et Telecommunications) of France, IRT (Institut fur Rundfunktechnik) of

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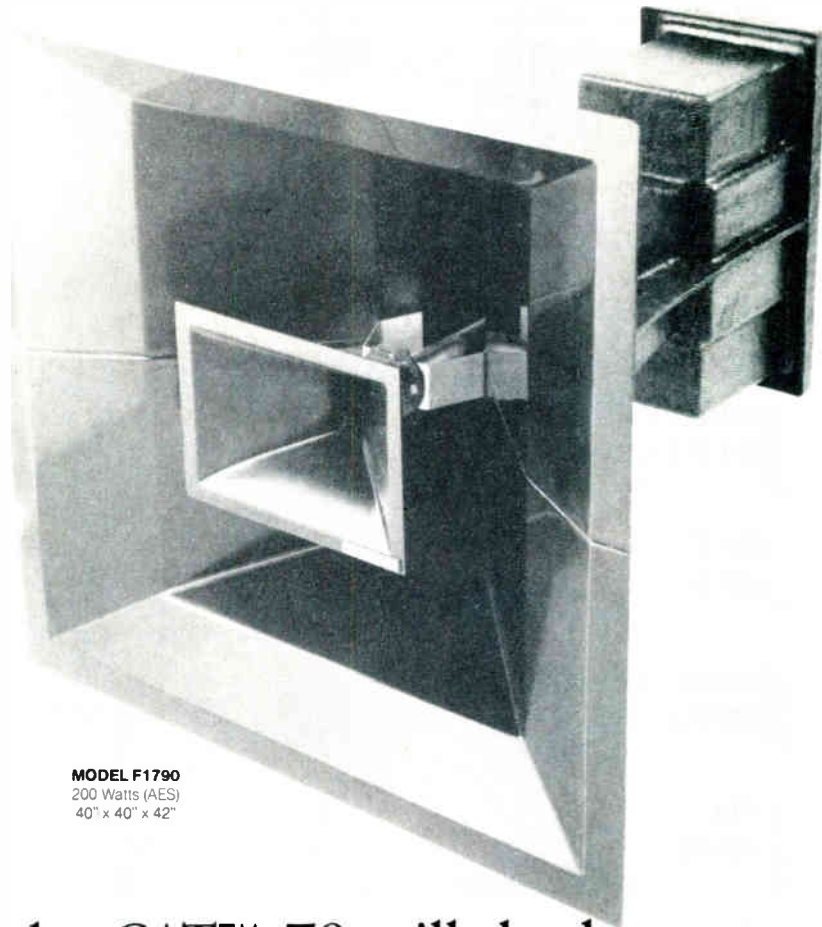
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Germany and Matsushita of Japan. SB/ADPCM (Subband Adaptive Pulse Code Modulation) was developed by NTT (Nippon Telegraph and Telephone) of Japan and BTRL (British Telecom Research Laboratories). MUSICAM and SB/ADPCM are "subband" coders; the others evaluated by Swedish Radio were "transform" coders. (The difference in approach will be addressed shortly.) The first transform coder — ASPEC (Adaptive Spectral Perceptual Entropy Coding) — came from AT&T Bell Laboratories, France-based CNET (Centre National d'Etudes des Telecommunications), and two German companies, Deutsche Thomson Brand and FhG (Fraunhofer Gesellschaft). The other "transform" coder — ATAC (Adaptive Transform Audio Coding) — was developed by Fujitsu, JVC, NEC and Sony.

Every one of these encoders starts off by dividing the audio spectrum into bands that subsequently are analyzed for signal content. Subband coders like MUSICAM and SB/ADPCM employ a set of digital bandpass filters or a "quadrature mirror filter" to split the spectrum into bands, 32 in the case of MUSICAM, eight in the case of SB/ADPCM. Transform coders like ASPEC and ATAC "time window" the data into sets of samples that are "transformed" to the frequency domain mathematically via an MDCT (Modified Discrete Cosine Transformation) — a series of calculations similar in function to a Fast Fourier Transform (FFT) but outputting less data. Transform coders are more complex to implement than subband coders (a factor that played a part in the Swedish Radio evaluation) but are capable of much finer frequency resolution, for example 512 lines.

The competing systems differ in other respects as well. The algorithms used to assign "bits" to the various bands is an even more critical factor in determining sound quality than the method of frequency division. In general, the idea is to analyze the signal content in each band and to dynamically reassign bits from those bands that do not contain audible informa-



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tion to those bands that do. The more bands, the better the frequency resolution but, with a fixed number of bits, fewer are available to assign to each band that does contain useful data.

The Swedish Radio tests were conducted at three data rates: 128 kb/s, 96 kb/s and 64 kb/s for single-channel (mono) operation. Compared with the professional

48 kHz/16-bit PCM standard, these represent compression ratios of 6:1, 8:1 and 12:1. Put another way, we're talking about an "average number of bits per sample" (which is a misnomer that I hate to countenance) of 1.33 to 2.67 compared with the "standard" 16!

So, now for the \$64,000 question. Who won? Needless to say, it's hard to say! It

depends upon what you consider important. In the high-speed derby (128 kb/s or 6:1 compression), Swedish Radio seemed to give the nod to MUSICAM, but ASPEC was very close in scoring. At 64 kb/s (12:1 compression), ASPEC pulled way ahead. Neither SB/ADPCM nor ATAC were close at any data rate, but neither was fully functional at the time of the tests and the rules stated that what you delivered when the tests began was what you lived by. Did SB/ADPCM and ATAC get a fair shake? Not for me to say.

Then came "system complexity." This was judged on the basis of the "chip area" needed to implement the technology, *i.e.* the potential expense of the system. The "chip area" estimates came from the developers and some assumed more on-chip functionality (thus penalizing themselves) than did the others. It's difficult to tell which technology is "best" in terms of being potentially the least expensive.

Whichever comes out ahead, one thing is clear. Digital audio compression (or should I say "new digital coding schemes") will make products and services feasible that would not otherwise be economic. Already, we've seen one: the Philips Digital Compact Cassette (DCC). Although using a different methodology than the ones mentioned above (PASC or Precision Adaptive Subband Coding), it's clearly related to MUSICAM. I'd not be surprised to learn that PASC was the basic technology that Philips contributed to the MUSICAM development. PASC uses a higher data rate than MUSICAM (192 kb/s per channel) but, even at that rate, it enables digital-audio recording on cassette-width tape and at the standard cassette speed (1 $\frac{1}{8}$ ips). If that can be done with only modest "compression," think of what the future holds!

Digital audio compression will impact not only in the consumer market, but every area of audio — delay systems, transmission systems, storage systems, you name it. Without doubt, you'll be hearing more about it in the professional installation market. ■

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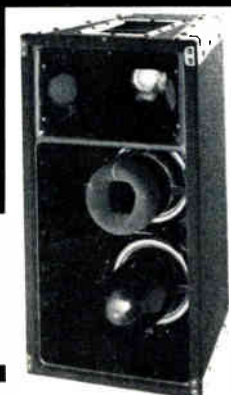
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CADP2: The Preview

*JBL's New Design Program
is a Glimpse into the Future of CAD*

BY MIKE KLASCO

When and where computer-aided design of sound systems originated is tough to pin down. As with many developments, various separate efforts evolve and eventually coalesce into a trend. In the early 1970s Tom McCarthy of North Star Sound gave an AES paper on mapping speaker coverage in rooms with isobars, and later he developed his Umbulus program. Bob Thurmond's overlay technique was also originated in this time period. In addition, Ted Uzzle and Farrell Becker contributed variations on mapping speaker coverage. Most of these techniques enlisted the aid of programmable calculators (such as the Hewlett Packard HP-41) or manual geometric approaches. John Prohs' early work used a clear plastic sphere for room mapping and this was briefly marketed by Community.

JBL's CADP, first introduced in 1983, was the first comprehensive sound system design program for IBM compatible computers. Instead of many separate utility programs for different aspects of the design, the entire project could be run on your computer, from modeling the room, to aiming the speakers, predicting sound uniformity, maximum sound levels and intelligibility, and the user could even create cluster drawings. By 1990 standards the original program seemed a little crude, but an update by an outside developer extended the usable life of CADP with high resolution graphics and many useful en-

hancements. CADP was the first program to be reviewed in this series (*Sound & Communications*, January and February 1989).

For years the rumors of CADP2 have floated around the industry. It was to have a Microsoft Windows environment requiring enormous amounts of memory and a fast computer. Steve Romeo, JBL's man in charge of CADP2 would occasionally show off tantalizing color printouts of this mystery program. As time went by, the release dates were pushed further and further back. The official release date is now scheduled for the October AES Convention.

JBL's CADP was the first comprehensive sound system design program for IBM compatible computers.

Is CADP2 for real? The answer is yes!

Last February I received a Beta (prototype) copy from JBL, although it consisted mostly of the room modeling module. In March, I received another more complete Beta version. Whether the program will be released exactly on time is beyond my guess, but there is the workings of a real state-of-the-art program here, combining both engineering sophistication and smooth user interface.

Up front, let me say that this report is not a review of CADP2, but a preview of its features. The purpose is to give readers

a glimpse of what's in the works. The menus and layouts have evolved between the first and second beta versions I have received and surely will continue to evolve before the first real release. A few of the displays shown here are not yet implemented in the beta version, so think of this article as a "teaser" and not our usual critical analysis. After all, when you insist on tasting the cookie batter before it goes into the oven, you should have enough sense to not complain that the cookies are not baked!

JBL's use of Microsoft Windows was a risk that seems to have paid off. A few years ago when CADP2 was first being defined, Windows 2.0 was a slow and marginal approach to getting around an IBM MS-DOS computer. Part of the problem was the available hardware, part was Windows 2.0. The time it took for the screen image to ooze down the screen, or the time spent pointing with a mouse to a pull down menu and waiting for the system to respond limited the number of software developers willing to work with this medium. JBL's timing on waiting for the release of Windows 3.0 is much to its benefit.

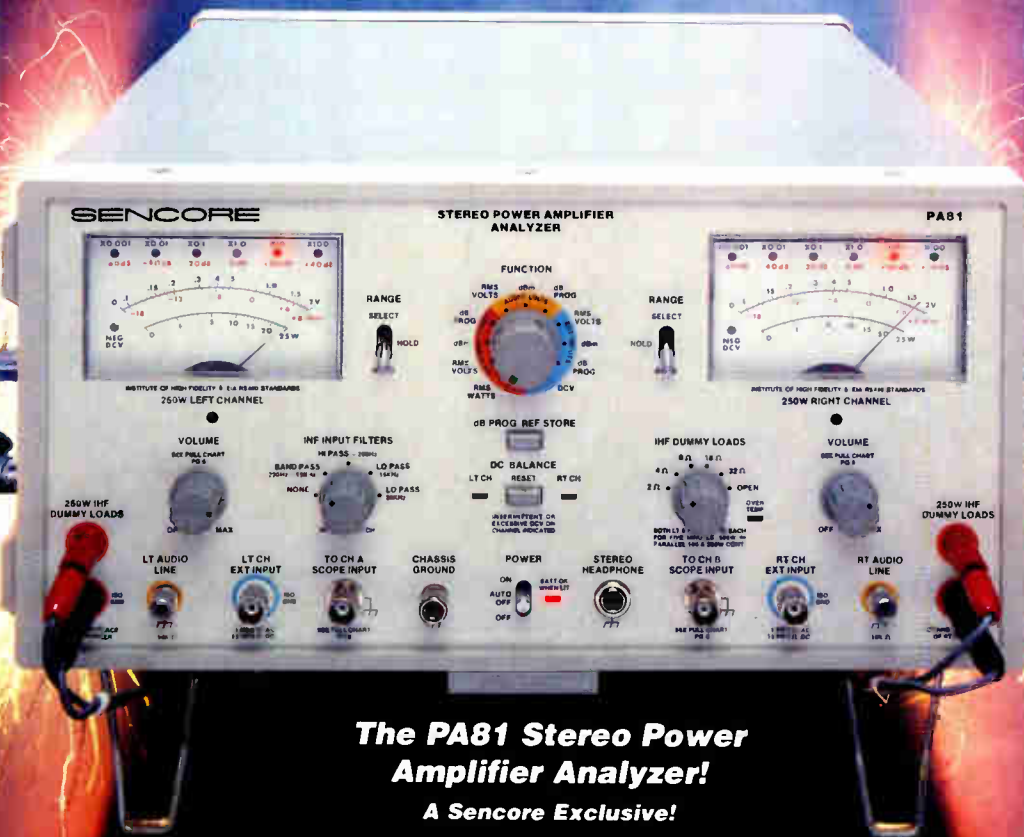
Windows 3.0 has been an unabashed success. Aside from the faster speed of operation, especially with appropriate hardware such as 386 machines, the overall operation has been improved greatly. The combined effect of strong marketing and availability of faster computers has enticed many software developers to embrace Windows 3.0. The typical 386sx machine now costs less than a 286 machine

Mike Klasco is the Technical Editor of Sound & Communications.

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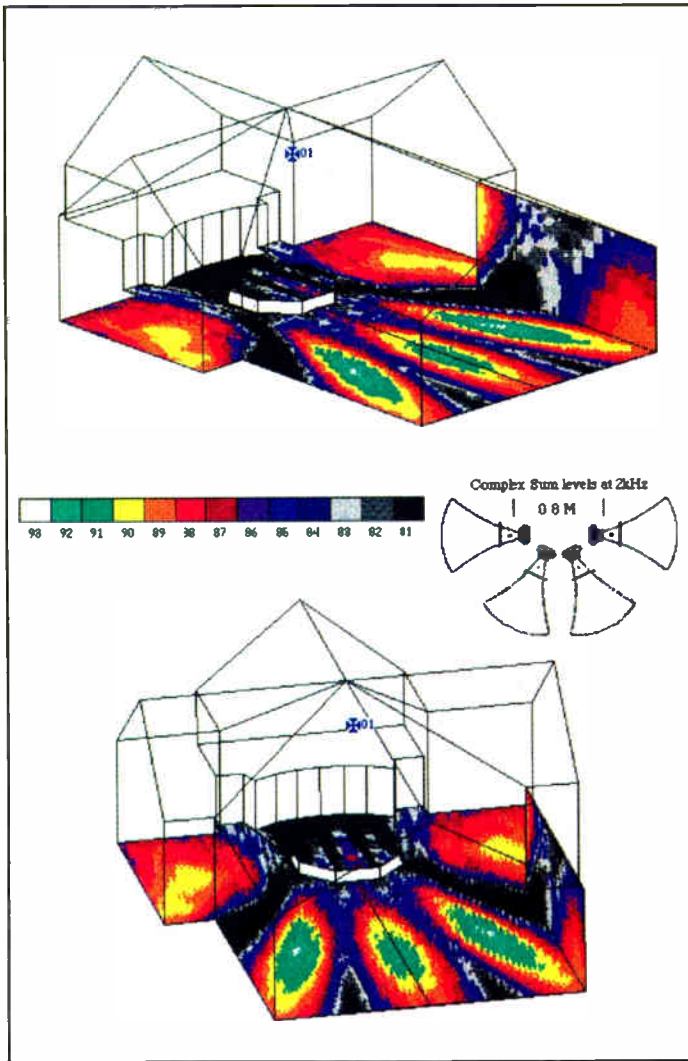
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JBL's goal for CADP2 was an efficient, high accuracy engineering tool.

under Windows 3.0, which is the easiest to use and most efficient way to get through using an MS-DOS computer. The user can switch tasks between CADP2 and other Windows applications, such as the Notepad, Calculator, or paint programs. Windows also gets through memory management and hardware compatibility (such

of three years ago. Another factor is that most 386 computers can accommodate 4 megs of memory or more on the motherboard, saving the cost of an add-on memory card.

Memory costs have also come way down during the last three years. In my review of CADP, the original program, I suggested that a bare bones XT 640k memory computer system with EGA monitor and hard disk would cost about \$1500. Today, a careful shopper should be able to pick up a 286 (AT), with 4 megs of memory and an AMD 287 coprocessor, 40 meg drive and VGA graphics for about \$2000. If you already have a 286 with 640K or 1 meg, you can add a memory expansion board with 4 megs for about \$600. JBL strongly recommends a 386 machine. A 386sx machine with 4 megs of memory, coprocessor and VGA graphics and 70 meg hard drive should cost less than \$3000. When

Scheduled release time for CADP2 is at the AES in October.

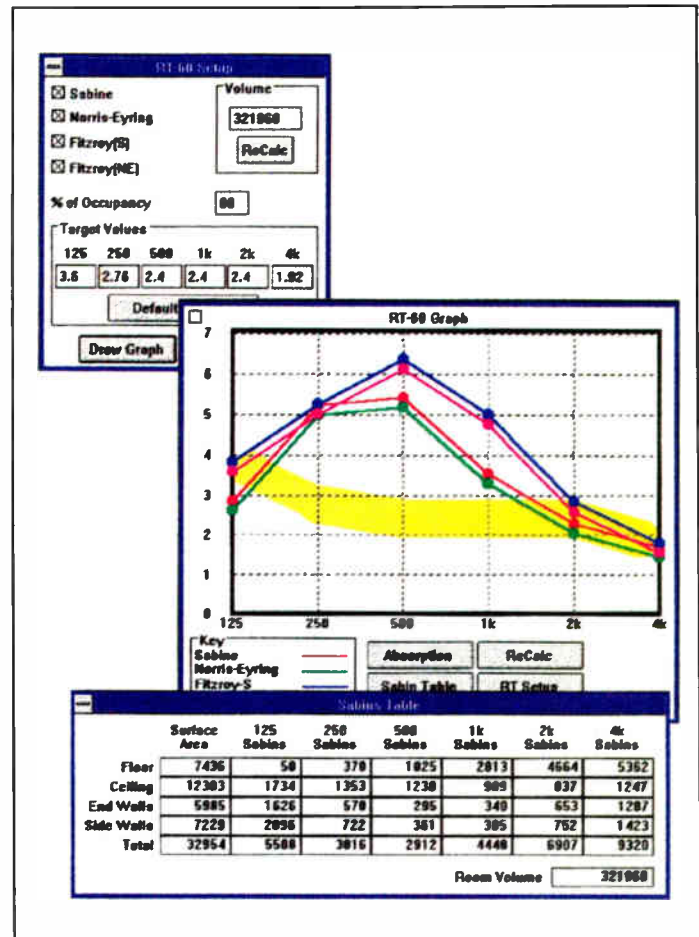
the release version of CADP2 is reviewed, we will address in detail the hardware requirements of Windows, in such critical, but obscure parameters as extended memory or expanded memory, and the subsets of LMS, EMS, EEMS, etc.

In CADP2, JBL's stated goal was in aiming first for an efficient, high accuracy engineering and design tool. Secondly, the information displayed had to be in a form that is suitable for customer presentation.

As we mentioned, CADP2 operates

as printers, mouse, video and other devices), which makes life much simpler for both the software developers and end users. While I am not ready to say that a 386 computer running under Windows 3.0 is as easy to use as a Macintosh, it certainly comes close enough.

During the coming months, I will have a little more time to play with the program, (and the extra time will yield more info on the next, and more complete, software release) but for now we will take you on



a quick tour of CADP2. JBL has divided CADP2 into three interactive sections:
Creation and editing of the room model

A three-dimensional room is entered by keyboard, mouse, or graphics tablet from the building plans. Several graphic drawing tools are used to reduce the effort required in entering room planes and assignment of surface materials. Computer-aided design file interchange is being developed and CADP2 will be able to generate DXF standard files that will be exportable to AutoCAD.

Cluster design and placement

The design of a speaker or a cluster consists of either "standard" 10-degree x 10-degree files or the new high resolution CADP2 files (more on the new file structure in an upcoming issue). Compatibility with the 10- x 10-degree files means data used in a number of other programs can potentially be imported into the program. An array location is assigned by the

user and devices are easily added to each array location. Aiming is accomplished by moving the cursor in a "quadview" room display that reduces ambiguity. Mechanical views of the cluster will also be offered.

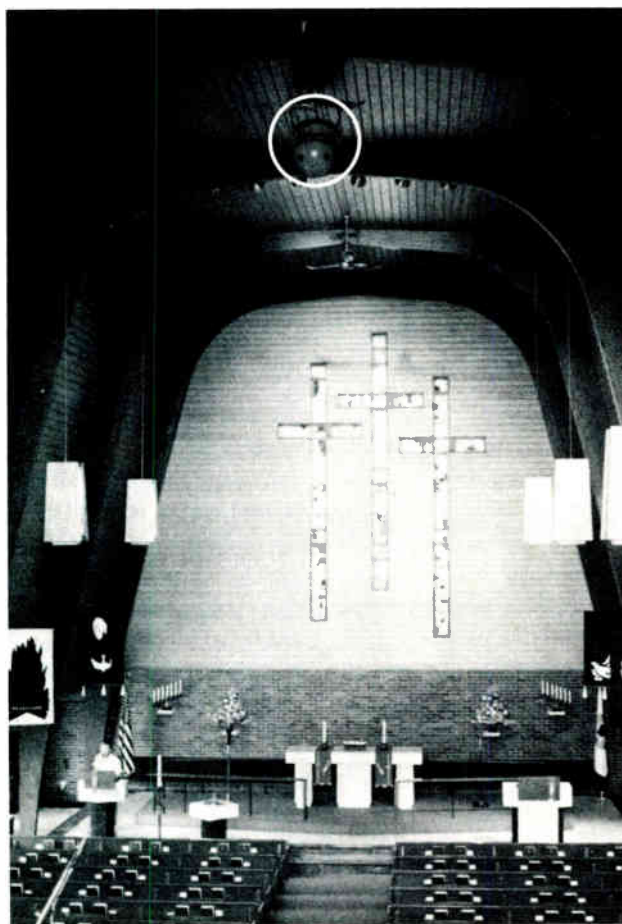
JBL has divided CADP2 into three interactive sections.

Performance Calculations and Presentation

Various direct, reflected and reverberant field calculations are provided. Direct field summations can be accomplished by either power or complex signal merging. Results are chromatically (color spectrum) painted on selected room planes to represent sound pressure levels. ("Selected room planes" means that you can display, in a 3-D image, the uniformity of sound levels

both on the seating plane as well as the spill over onto the back or side walls. This is nice, useful, and unique.) Obstructions (called "barriers" in CADP2) can be modeled. The surface resolution, reference scale type, color choice and increment are all user adjustable to provide high flexibility to adjust to designer preferences and philosophy. Intelligibility calculations are provided for %ALcons, AI (articulation index), and RASTI, as well as Level/Time/Path analysis window. All screens can be directly copied to clipboard or pasted in paint and saved as DFX files for use in drawing or presentation programs. In addition, room information and cluster data can be directly printed or exported.

We will take a closer look at CADP2's room modeling, performance simulations, RT₆₀ prediction, and acoustic analysis in a future issue. And, of course, a full comprehensive review of CADP2 will begin when the program is released. ■



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This Soundsphere installation was done by Monroe Sound in Monroe, MI. They have also installed Soundsphere loudspeakers in many other local churches, gyms, and auditoriums. A representative of Monroe Sound stated that, "Soundsphere speakers are a quick and easy installation. My employees can finish more jobs in a shorter time period resulting in improved cost efficiency for the church and for the company."

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Cincinnati's Omnimax Theater

Art Deco Details and a High Tech Theater Surround the Museum Center at Cincinnati Union Terminal

BY MARY C. GRUSZKA

For a time, it seemed that the beautiful Art Deco Union Terminal railway station in Cincinnati would never find its *raison d'être*. Completed in 1933 after three decades of planning and false starts, it became the last of the great municipal train terminals. It was designed to handle 17,000 passengers per day with 216 trains. Its exterior architectural feature was a 120 foot high semi-circle of limestone and glass. Inside, two 105 foot long panoramic murals filled the rotunda, a number of mosaics lined the concourse, and other paintings were located throughout the building.

Unfortunately, even by that time, automobile transportation was on the rise, while rail travel was declining.

The terminal finally closed as a railway station in 1972 and schemes for its use were proposed. Some of them, such as converting it into a convention center, a new City Hall, an Air Force Museum, and even an airport for vertical take-off jets, never took off. Others, like a shopping center, were tried, but failed.

Finally, in the early 1980s, events occurred that would transform the abandoned railway station into the Museum Center at Cincinnati Union Terminal. Both the Museum of Natural History and the Historical Society had outgrown their respective buildings and were on the lookout

for more space. They ended up getting together and negotiated the lease for the terminal with the city of Cincinnati. After county voters approved a \$33-million levy for the project, restoration began in 1988.

Included in the restoration was the preservation of all the remaining Art Deco details and artwork, the building of space for the two museums, and the building of an Omnimax theater. "The Omnimax theater does not belong to either museum," explained Dave Duszynski, Omnimax Theater Director. "It helps to defray the operating costs of the entire building and benefits both museums."

Named the Robert D. Lindner Family Omnimax Theater, it opened in November 1990 with the showing of "Blue Planet," a film that featured footage of the planet Earth that was shot from the space shuttle by the shuttle astronauts.

WHAT IS OMNIMAX

Cincinnati's Omnimax theater is the fourteenth such theater in the United States. It features a 72-foot diameter tilted dome that is made up of 400 individual panels of perforated aluminum. The seating area includes 269 upholstered reclining seats and four wheelchair spaces that are divided into 12 tiered rows that are inclined at a 30 degree angle.

The film that is projected onto this dome

is not your ordinary 35mm or 70mm film and the projector is not your ordinary sprocket-pull-down type. Since the film is projected on almost the entire surface of the dome, it needs to have a large format just so that the huge projected image maintains its quality and level of detail. In addition, since even a small jitter would be magnified all out of proportion on the large dome, the projection system also needs to be extremely stable.

The film that is used is the Imax/Omnimax 70mm format that is about three times larger than ordinary 70mm film. It has an image size of 1.96 inches by 2.74 inches.

The projector is the largest projector ever made and advances the film horizontally at 24 frames or 5.6 feet per second by using compressed air instead of mechanical sprockets. During projection, each frame is held in position on fixed registration pins and is held firmly against the rear element of the special fish-eye lens by a vacuum. A 15,000 watt, Xenon, short-arc lamp that is water cooled provides the strong light needed for a high resolution image.

SOUND FOR OMNIMAX

The Omnimax soundtrack and its playback system were designed to provide the same sense of realism on the same scale

as the stunning visual images.

The soundtrack consists of six channels: one channel each for front left, center, and right; one for the apex of the dome; and two for the left and right rear. Discrete channels are used.

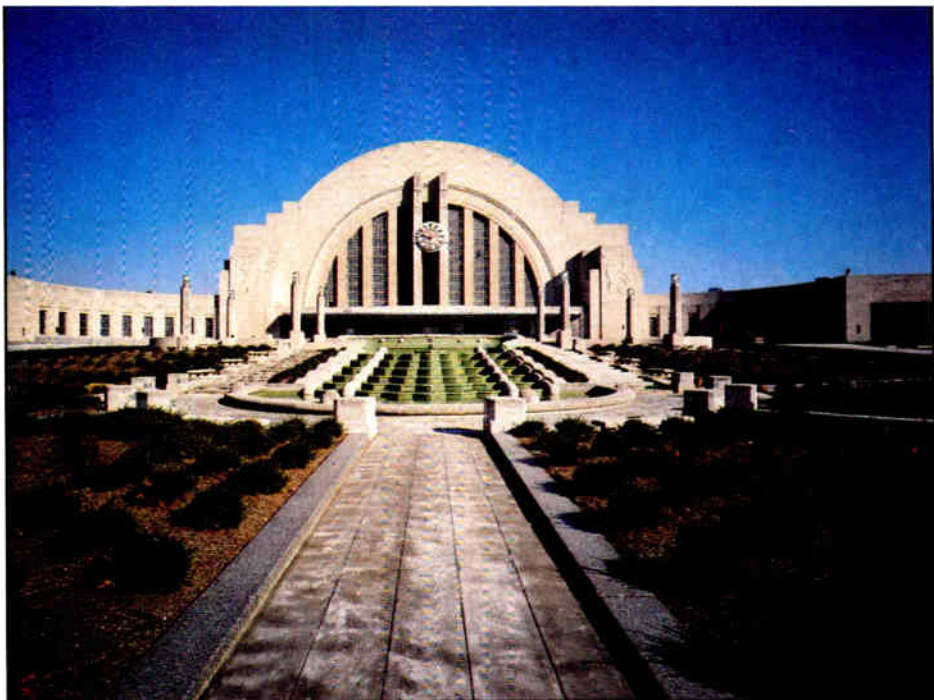
A sound system was created to play back this soundtrack to simulate the actual experience of the sound levels, spectral content, dynamic range and image location of the original sound source.

That task fell to Sonics Associates, Inc. of Birmingham, Alabama, who have been supplying sound and theater automation systems for all Omnimax and Imax theaters since about 1988. For Cincinnati, they also acted as the sound contractor, working as a sub-contractor under the electrical contractor.

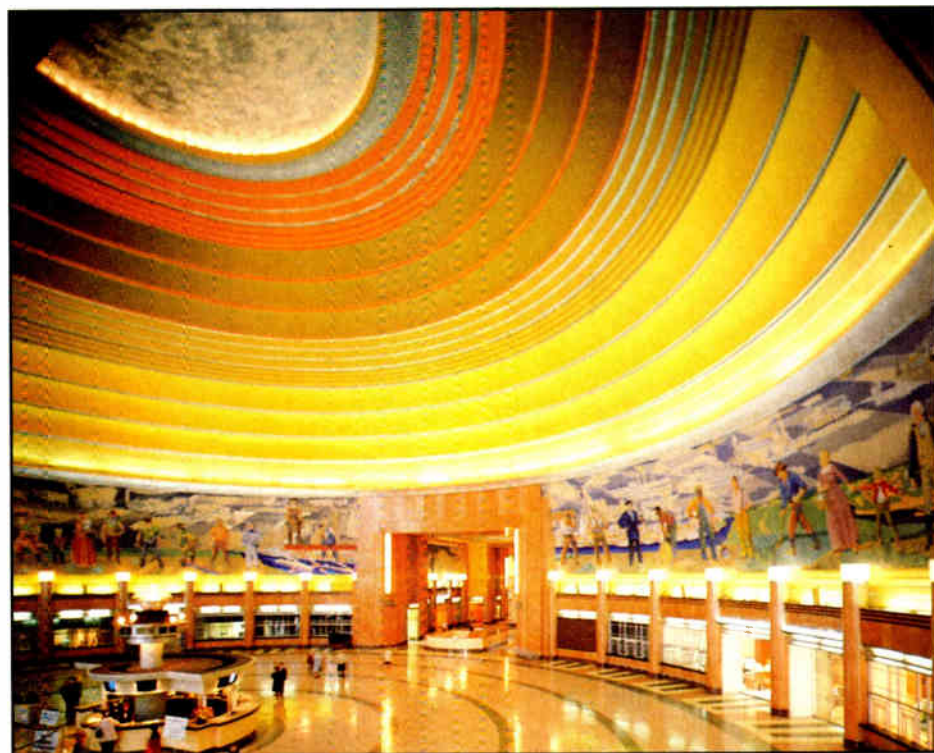
"Cincinnati is a nice theater, it has all the bells and whistles," said Paul Peace, Project Manager at Sonics, and project manager for the Cincinnati Omnimax Theater project. This is the first Omnimax theater to be outfitted with Sonics' new four-way loudspeaker system designed by Jay Mitchell, presently of J. E. Mitchell and Associates, for Sonics. This is also one of the first permanent theaters to use Sonics' proprietary fully-synchronized CD soundtrack playback system. And if that weren't enough, the Cincinnati theater is the second to have the newest version of Sonics' computer automated media control package.

"The design goal was to reproduce sounds at as realistic a level as possible," Mitchell said. "We wanted to get the SPL levels that are appropriate to what is being filmed." With such scenes as rocket launches, there are substantial sound pressure levels that need to be reproduced.

To cover the full frequency range, the sound is divided up into five frequency bands, each covering about two octaves each, according to Sonics. Each band is amplified separately. The top four bands are used to feed the four-way loudspeaker that is used for each channel, while the lowest two octaves (summed from all of the six channels) are fed to a single subwoofer system.



The Museum Center at Cincinnati Union Terminal.



The restoration preserved the Art Deco details and art work including two 105 foot long murals.

FOUR-WAY LOUDSPEAKER SYSTEM

The four-way loudspeaker system was recently redesigned by Mitchell. "We felt that we could improve the system and hired Jay to bring up the level of performance," Peace said.

"I took a look at what the [existing] four-way system did," Mitchell explained. "Without throwing the concept away, I did what could be done to optimize it." The new version of the four-way is similar in size to the previous one. "I didn't make any wholesale changes," Mitchell added.

The four-way loudspeaker covers the frequency range of 80 Hz to about 16 kHz and consists of compression drivers mounted on horns for the two high frequency ranges, and direct radiator cone drivers for the two low frequency bands. The same loudspeaker is used for each of the six channels.

“My work involved changing some of

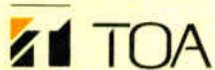
the components that didn't function as they should have,” Mitchell said. “I replaced a couple of horns and drivers with [those] from another manufacturer. I also redesigned the enclosure to optimize the volume for the transducers that were in them and developed a new crossover design.”

The components used in the new ver-



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The Media Control Console at the Omnimax Theater.

sion include an E-V DH1A driver mounted on an E-V HP 1240 horn for the third frequency band. The directivity pattern of 120 degrees horizontal was selected previously (for the earlier version of the system), and was still a requirement of the redesign.

The high frequency portion is provided by a JBL 2404 super tweeter with the low and mid handled by a pair of JBL 18 inch and a pair of 10 inch cone drivers respectively.

A unique feature of the enclosure is that they contain side wings that are opened after they are hung from the ceiling grid. “The wings enfold to extend the width of the cabinet,” Mitchell explained. “The wings extend the boundary for the cone radiators to make it look like a half-space.”

Because all of the speakers are mounted from the ceiling structure, it is not practical to mount the components in an actual wall surface, according to Mitchell. “The next best thing is to make the speaker front panel extend to a large enough dimension to make the woofer think that it is in half-space.”

The cabinets are approximately 90 inches wide, 65 inches tall, and 20 inches deep and weigh about 500 pounds, according to Mitchell.

Peace used the PHD sound system design program to work out in advance the exact speaker aiming criteria. “Cincinnati was one of the first theaters where that level of analysis was done,” Mitchell commented. “The common practice before

was pretty good; there were no earth-shaking changes made in Cincinnati, but it did allow Paul to try different options for hanging angles before the loudspeakers were actually hung."

Mitchell and Peace used the Techron TEF analyzer and a Larson Davis Laboratories integrating real-time analyzer to make their on-site measurements.

"The revised loudspeaker system showed quite an improvement in performance and imaging, as well as frequency and phase response," Peace said.

In addition to the Cincinnati theater, these speakers are also now installed at the Air and Space Museum in Washington, D.C. and will be going into other theaters as well, according to Peace. "This is now the loudspeaker system that is part of our standard package for Omnimax and Imax theaters," Peace said.

THE SUBWOOFER SYSTEM

"The sub-bass system is a dedicated system by itself," Peace noted. It is designed to operate from about 25 Hz to 80 Hz.

The subwoofer system for the Cincinnati theater is the SQ8 which contains eight 18 inch cone transducers that make up an array of driver pairs that face each other. The array is mounted in a large enclosure that has a vertical slot with which to radiate the acoustical energy out to the audience. "This is a good size device, bigger than a coffin," Mitchell said. "A person can walk into the slot."

The subwoofer is mounted on a concrete pedestal with enough mass so that it is decoupled from the building, and is located about 15 feet above the lowest level of seats. The audience in the center seating are about eye level with the system, according to Peace.

The single subwoofer channel is fed by a low passed filtered sum of all of the six main channels. It is capable of producing levels of about 110-130 dB at 30 Hz and still be linear, according to Peace. (Actual levels in the theater aren't set that high.)

The popular Omnimax film, the "Dream is Alive", with its space shuttle launch sequences, makes good use of the sub-

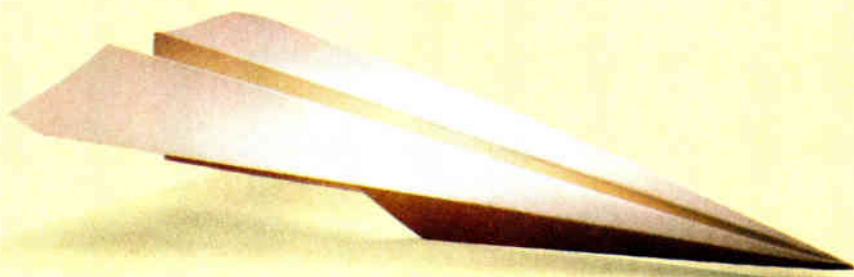
woofer system, according to Mitchell.

PLAYBACK

Unlike most projected 35mm or 70mm movies, the Omnimax soundtrack is not placed on the film itself, but rather, on a separate medium and is played back in sync with the projected image. The majority of the films use 35mm magnetic film

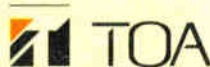
for their soundtracks and a mag dubber for playback. Sometimes an 8-track analog tape machine is used.

In addition to these two playback devices, the Cincinnati theater features Sonics' new DDP-6 CD playback system. This uses three CD players that are locked in sync with each other and with the film projector using the proprietary Sonics

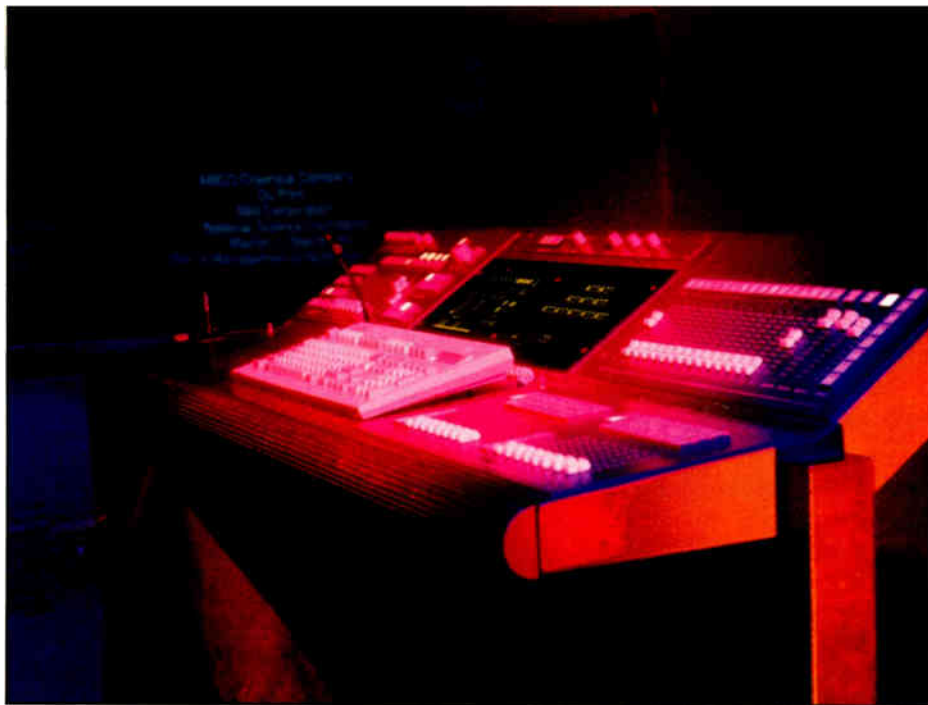


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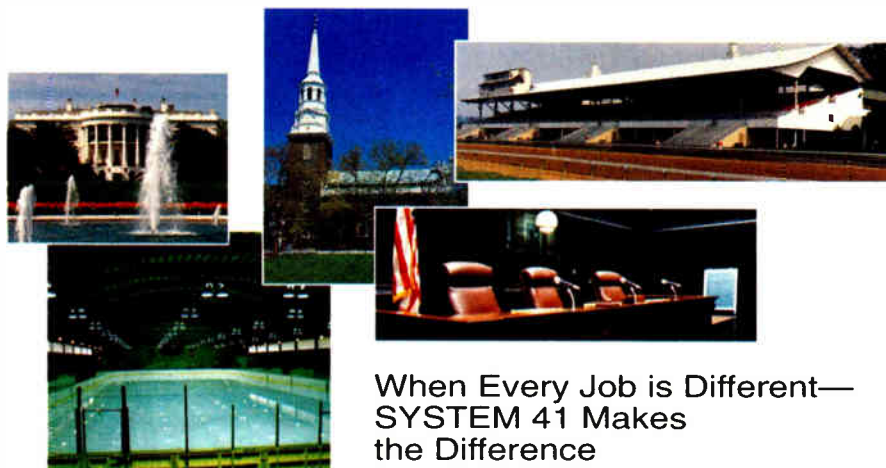
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The functions of Sonics' media control console include monitoring the status of all devices and allowing interactive programming of a sequence of events.

SampleLock technology. Other units, such as the dubber, can be independently locked to the projector for backup to allow the playback of a six-channel digital audio soundtrack. Currently, the analog outputs of the CD players are used.

A new Omnimax film, "Blue Planet," which just finished its run in Cincinnati in early May, makes use of this new digital technology. "We got a chance to A-B the mag tape and the CDs," Duszynski said. "We were able to hear the difference in



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ACOUSTICAL CRITERIA

Even before any kind of a sound system can be installed, the theater must conform to acoustical specifications set out in Imax Systems Corporation (ISC)'s "Design Facts." For example, the theater must be quiet so that the full dynamic range of the soundtrack can be heard. Noise levels should not exceed NC-25. The structure should be isolated from outside noise such as traffic, as well as internal noise from such sources as heating and ventilation systems. Vibration isolation is also a must. ISC, Sonics, and acoustical consultants Purcell Noppe and Associates of Chatsworth, California work with the architect and engineers to ensure that the theater meets these requirements.

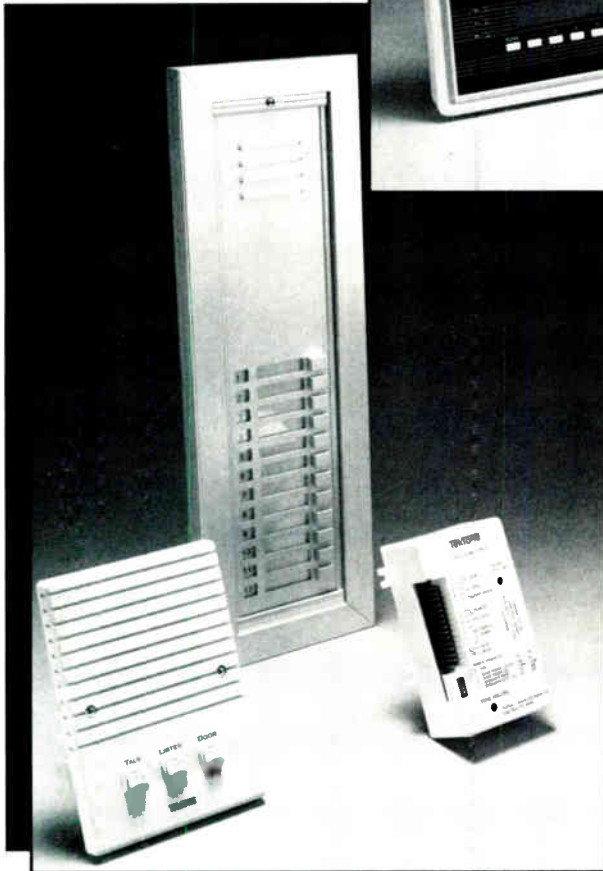
Once noise and vibration have been addressed, the internal acoustics must provide a neutral environment so that the sound images that are present on the soundtrack can accurately be perceived. "A lot of absorption material is used," Mitchell said. This helps to eliminate harmful reflections that can interfere with the sound from the loudspeakers. According to Sonics, the reverberation time ranges from 0.5 to 0.7 seconds, mid-band.

In addition, the theater must be treated to avoid the focusing of sound that the hemispherical or spherical shape of the Omnimax theater can potentially cause.

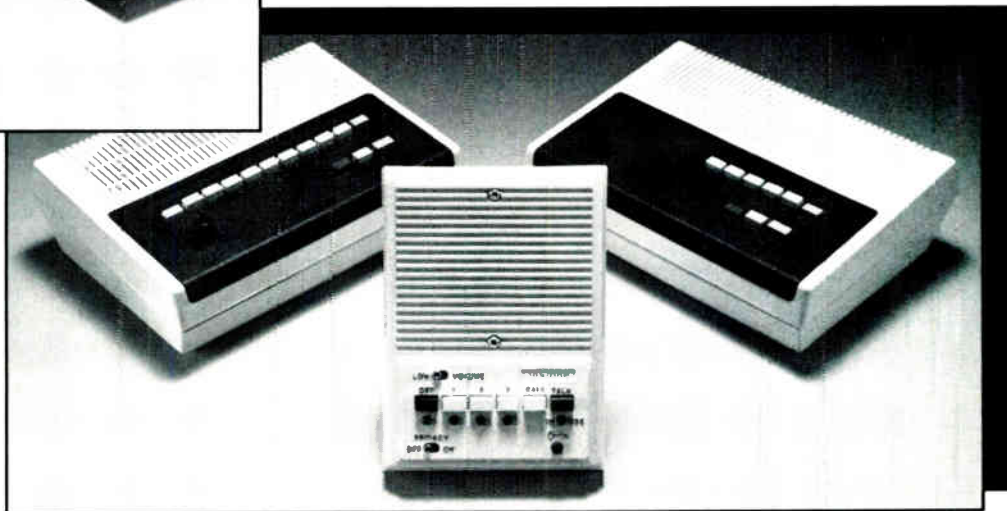
Since a subwoofer system is used, "you have to be careful in the theater design, because a theater can form a cavity that can act as a resonator," Mitchell added.

Built in the railway station, the Cincinnati theater was an adaptive use of an existing facility. This turned out to be good for the acoustics. "This was excellent acoustically because [the theater] has asymmetric hard walls, and is not a perfect cylindrical shape," Mitchell said. "The audience gets its acoustic cues from what's on the soundtrack." — M.G.

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quality." Mitchell observed that "the digital system is a night and day improvement over analog."

The Cincinnati theater is heavily marketing its use of digital sound, according to Duszynski.

ELECTRONICS

Sonics provided all of the electronics that were needed for the sound system. This included the Sonics TAC-86 theater audio controller, the media control system and power amplifiers with proprietary active crossover networks, all mounted in equipment racks in the projection booth. Sonics also used Oxmoor DEQ-29 equalizers in their system and their own OEM'd loudspeaker cable, as well.

The heart of the system is the TAC-86 theater audio controller which gives the sound system its flexibility. This unit has four inputs for multi-channel sources that



Detail of the media control console.

have up to eight channels each. When an input is selected, all channels associated with that input are simultaneously switched.

The TAC-86 also provides four inputs for single channel sources such as microphones and cart players. These inputs can accept either mic or line level sources. Since these "PA" inputs are often used

for announcements for crowd control and safety when they are activated, they cause the multi-channel inputs to be muted. The PA input can be sent to any or all of the output channels.

For multi-channel sources, the TAC-86 distributes each channel to its proper output. Individual level controls concealed behind the front cover allow the channel

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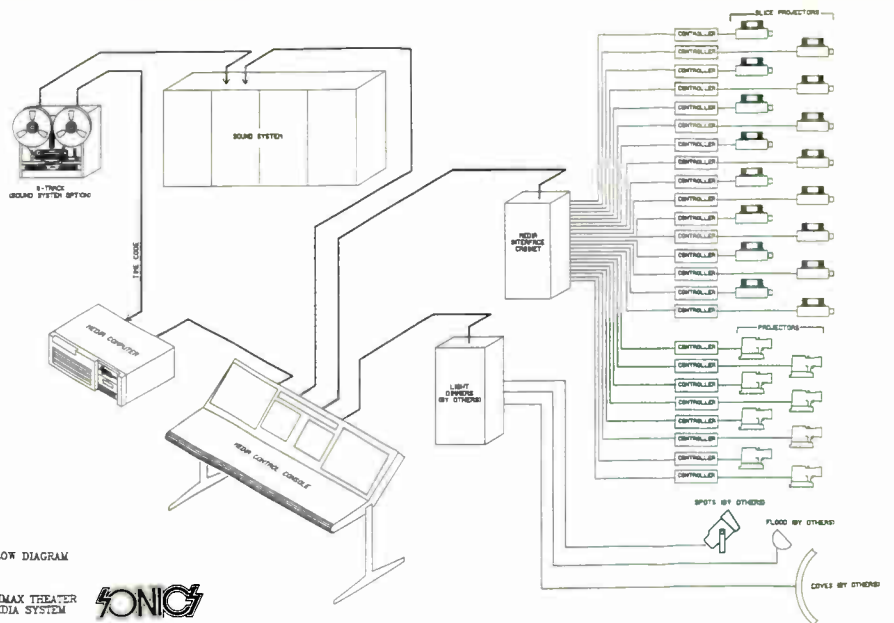


balance to be preset for each input source. This reduces the operator control to a single master volume knob which actuates a digitally stepped attenuator.

External equalization or signal processing can be added through insert sends and returns. The EQ or processing can then be inserted or bypassed on a channel by channel basis.

The outputs of the TAC are fed to the Sonics power amplifiers. Each amplifier has a plug-in crossover module, which was designed by Mitchell. The Sonics amp system includes other input modules as well, to allow easy design of different sound system configurations.

The amplifiers that are used for Cincinnati's Omnimax theater are the Sonics models 400X and 800X. Each output channel uses one 400X and two 800X amplifiers to drive each four-way loudspeaker, according to Peace.



Sonics' Omnimax Theater media system.

The 400X provides 400 watts into an 8 ohm load, in a bridging configuration. The 800X is comprised of the same building blocks as the 400X, according to Peace, but it has a heavier power supply and output devices to provide more current to operate into a lower impedance. It can provide 800 watts into a 4 ohm load.

The subwoofer system is driven by four 800X amplifiers. Here the sub-bass signal is derived in the TAC-86. For the Omnimax soundtracks, this is the low-passed sum of each of the six channels.

The TAC-86 can be controlled in a number of ways, from a simple switch panel to full-blown computer automation.

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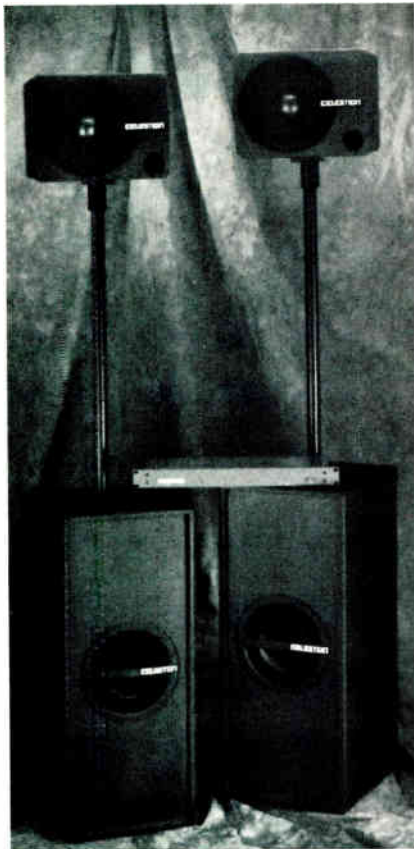
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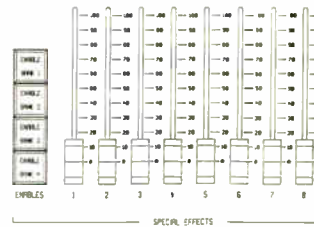
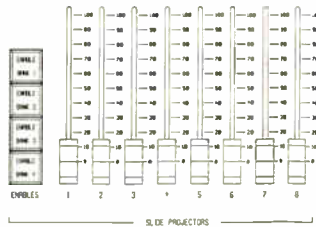
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SWH3	REV	REV	REV	REV	REV	REV	REV	REV

SWH4	EFFECT 1	EFFECT 2	EFFECT 3	EFFECT 4	EFFECT 5	EFFECT 6	EFFECT 7	EFFECT 8
SWH5	ACTOR	ACTOR	ACTOR	ACTOR	ACTOR	ACTOR	ACTOR	ACTOR
SWH6	RELAY	RELAY	RELAY	RELAY	RELAY	RELAY	RELAY	RELAY



1 PANEL DETAIL DRAWING
SLIDE CONTROL PANEL (CONCEPT)
FRONT VIEW
DATE: 23 MAR 1988

Panel detail drawing of the control panel.

MEDIA CONTROL SYSTEM

The Cincinnati theater makes use of Sonics' theater automation system to control not only the Omnimax presentation, but a multi-media show as well, and to provide a seamless transition between the two, according to David Millard, Project Manager at Sonics and the person responsible for the automation system.

The 10 to 12 minute multi-media presentation is a 32-projector slide show created by Encore Production Services of Cincinnati that tells the history of Union Station and is shown to the audience before the Omnimax film. The soundtrack for this is provided on the eight-track tape machine.

All the systems that are associated with the presentations are controlled by the automation system. This includes the theater lighting, sound source selection for background music, slide show audio, Omnimax soundtrack, announce mic, audio level control, and tape and film transport controls. About the only manual function that is required is the threading of the Omnimax film projector and the loading of the soundtrack. Once that's done, the automation system takes over with the push of a button.

The media control system uses an IBM-compatible 386 PC host to control the various devices, including the TAC-86 theater audio controller. It can interlock to any one of four devices through SMPTE 30 frame per second non-drop-frame, longitudinal time code.

The computer sits under its control panel and is located in the right rear part of the theater in a cutout in the wall so as to not take up any theater seating space. "Anything that the automation system can control can also be controlled here,"

Millard said. "All aspects can be operated by one person."

WHAT'S HAPPENING AT THE MUSEUMS

In addition to the Omnimax Theater, there is much more to see at the Museum Center at Union Terminal. The first phase of the museums' exhibits have already opened.

The Museum of Natural History will feature "Dinamation: Return of the Giants," an exhibit that features 20 or so robotic dinosaurs in their recreated natural habitat. Included is the full-size 20 foot tall Tyrannosaurus Rex.

If you brought your children along, they can take you through the Children's Discovery Center where "puzzles, computer games, satellites, time tunnels, even a pinball machine" explain how the digestive system works, according to the museum literature.

The Historical Society will display vintage automobiles from the 1920s and 30s in their exhibit, "On the Road to Union Terminal." Fifteen cars and two trucks will be shown, along with mannequins dressed in period clothes to help show the vehicles as if they were really being used.

The Preview Center lets you observe some of the work that is involved in the building of future exhibits such as the Public Landing, the Ice Age, and the Cavern.

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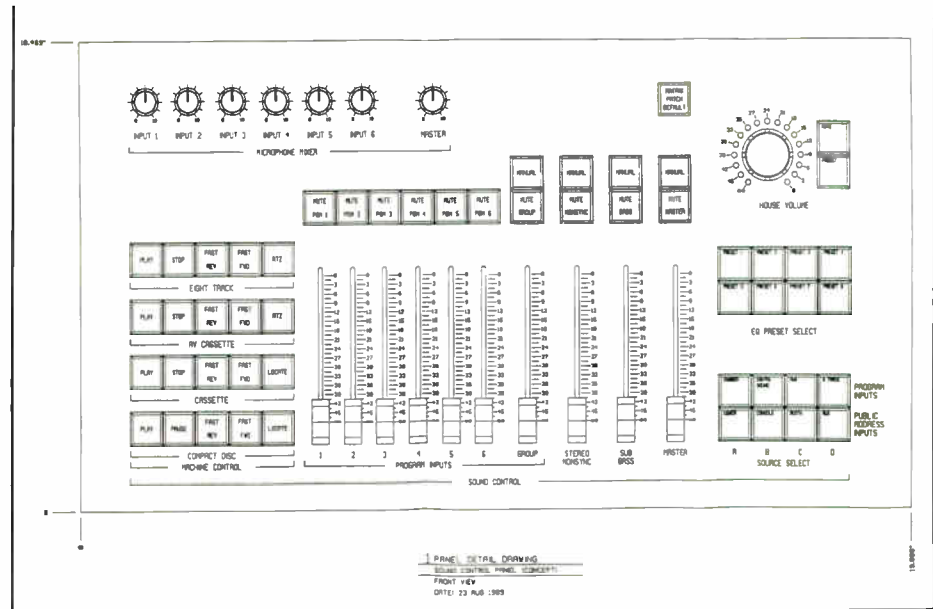
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The control console, which is designed and manufactured by Sonics, is a free standing unit that has switches, faders, potentiometers, a keyboard, and two flat electroluminescent monitors, and is used for a number of functions. It monitors the status of all of the devices under its control, indicates the portion of the multi-event program that is being executed, allows manual override and control of any device or system, even while the rest of the program is under computer control, and allows the user to interactively program a sequence of events. All programming is accomplished in a cue oriented language which is common for multi-media presentations.

The electroluminescent displays are fed from the EGA output of the computer and have the advantage of being only 1/4 inch deep, according to Millard. The left screen shows the current program running on the



Front view of panel detail drawing of sound control panel.

computer. It also displays the cue oriented programming language that allows the operator to enter instructions in simple terms and to execute them in real time.

The right screen shows the status of the various devices during the course of the program, such as slide tray number and audio and lighting levels.

For the Cincinnati system, the media controller controls the 32 slide projectors, and up to 20 special effects (or aux) de-

VICES, such as the lights. Currently about 12 of these channels are actually in use in the system, allowing for the addition of more devices in the future. The system is expandable to control up to 500 devices such as on/off switches, relay closures, dimmers, servo controls, low voltage controlled devices, videotape machines, videodisc players, and video projectors.

Each controlled device is connected to an interface unit that is then connected to the RS-232 port of the computer, and also to the manual control panel. The interfaces were developed in partnership with Sonics and Sky Skan of Nashua, New Hampshire and are manufactured by Sky Skan who make other interfaces for planetarium systems.

CLOSING THOUGHTS

The technology used in the Cincinnati Omnimax theater is so unique that the theater shows it off to the public. The audience can look through a large glass window into the projection booth to see the projector and all of the racks full of equipment. When the perforated dome is backlit, they can glimpse the dome grid structure, the catwalks, and of course, all of the loudspeakers.

When the NSCA is in town, the theater will be showing "Grand Canyon: The Hidden Secrets" in its regular schedule. This film focuses on the human history of the canyon and will feature dramatic views of the canyon, kayaking down the wild rapids of the Colorado River, and flying an ultralight plane between the canyon's walls. Although this film does not have a digital soundtrack, Mitchell guarantees that it will be a spectacular visual and aural adventure.

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BY MALCOLM HOWARD

It's an even smaller world, after all, now that a fourth major Disney theme park — this time called EuroDisney — is being built on 1,500 acres outside of Paris.

But it's a big job — involving millions of francs and dozens of contractors and suppliers. The mammoth audio undertaking will link live performances in the Magic Kingdom via fiber optics to a central digital recording studio and an international TV audience as well as require the installation of dozens of major audio and intercom systems throughout the park.

Any one of the seven main performance stages would be a healthy bit of work for most sound contractors. So with an installation season beginning in April and running to December, one might think the person responsible for putting all the pieces together for a spring 1992 opening might feel a bit like the Sorcerer's Apprentice — Mickey Mouse's starring role as an aspiring wizard flooded with chores.

"Timing is the biggest challenge," said Gerard Mandelka, audio coordinator for EuroDisney. Although Mandelka says he has a lot of chores to do, he says he's by no means swamped. The project is on

Malcolm Howard is a freelance writer based in New York City and was most recently the editor of the Music and Sound Retailer.



Master plan for Euro Disneyland.

schedule, but with all the systems that must interface, every job must be closely controlled, he noted.

EuroDisney owns roughly 5,000 acres in Villiers-Sur-Marne outside Paris. Roughly 1,500 of them will be developed by 1992.

A few years after that, construction of another Disney/MGM Studios facility (similar to the one in Orlando, Florida) will begin.

EuroDisney is not much different from the Disneys in Anaheim, California; Orlando, Florida; or Tokyo, Japan. What is different is that the audio and robotics technology is newer, there's an emphasis on multi-lingual access to exhibits, and names such as DaVinci and Jules Verne take precedence over names such as Lincoln and Crockett in park attractions.

The Dutch electronics giant Philips, is general contractor overseeing construction of the project; and a Paris company called Tech Audio is installing most of the audio systems, said Mandelka.

How much of the 22 billion francs total invested in EuroDisney will go to the audio systems, Mandelka couldn't say. But at least a few million dollars are being spent on the dozen or so major projects Mandelka is overseeing.

- There's a fully automated fiberoptic digital patching network that routes audio from seven stages to a central 48-track recording studio and to TV broadcast trucks.

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- There are intercoms within the attractions themselves that allow operational and emergency information to flow.

- Another large intercom system allows directors to talk to 50-odd camera operators and lighting techs along a park-wide parade route.

- Along that same parade route, which

winds through places such as Main Street U.S.A., hidden speakers will be activated by computer controlled soundtracks that follow the progress of parade floats.

All of these tasks have to be done with that Disney magic. Although Disney is using some of the most sophisticated audio systems available, none of the thousands

of daily visitors should notice where the sound comes from. The speakers along parade routes should be invisible to passersby, and the background music should be as natural as wind blowing in the trees, a soundtrack in a motion picture, or as Tinkerbell tapping her wand.

EVERYONE LOVES A PARADE

Invisible technology abounds in Disney parks — from the automated hippos with hidden speakers croaking in their esophagi, to speaker clusters camouflaged inside chandeliers.

But perhaps the best way to get a feel for this parkwide philosophy is by taking a stroll along the parade route, which winds through this European park via Western Land, Main Street U.S.A. and a few other places. The background music comes courtesy of Creative Entertainment, a Disney division also based in Orlando.

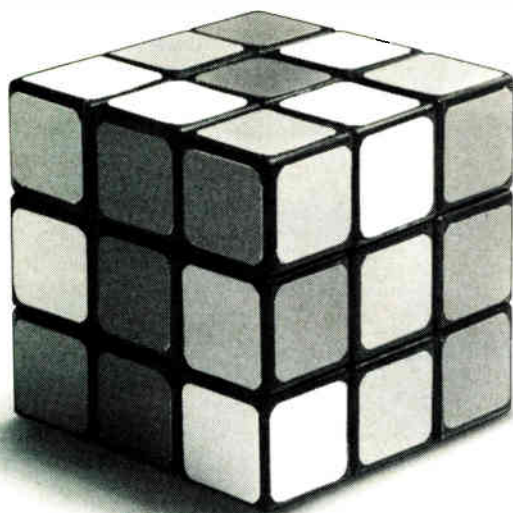
What is different is that the audio and robotics technology is newer.

Creative Entertainment designed the sound systems at the seven key performance stages, the parade route, and the parade preparation building.

But the design team also developed an automation package to cue sound at specific hidden speakers along a parade route so passing floats — alive with singing and dancing as they pass — get the spotlight while the speakers hidden behind windows go unnoticed, said Bob Owens, a consultant to Creative Entertainment. The group's work is a sleight of many hands: Bill Platt, Bob Owens, and Martin Collins, Karen Sitzburger and K.C. Ladnier.

The parade route is divided up into 33 zones of roughly 60 feet. As floats pull into those zones, speakers hidden behind windows in the facades of a particular attraction — Main Street U.S.A., for example — will begin to chime.

Before the parade starts, the computers



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Model of Le Parc a Themes at Euro Disneyland (top). Discoveryland in progress (right). Aerial view of Main Street, U.S.A. and Disneyland Hotel (below).



tell the windows to open so the sound isn't hampered by shutters. In most cases the hidden speakers are groups of two to three two-way speaker systems in each zone, said Owens.

Called Escon, the automation program runs on a customized PC-based computer designed by Creative Entertainment engineers. The computer also controls lighting, channel mutes, the opening and closing of windows, and a traveling "dead" zone, an area of silence that travels in between each group of floats.

Usually, several floats grouped together at 20-to 50-foot intervals will share a theme and a corresponding soundtrack. The dead zone — one of the 60 foot zones — thwarts any muddling of soundtracks between themes.

While past Disney projects were controlled by custom-made, VAX-style mainframes, this newer system uses 386 and 486 IBM-type MS-DOS computers with hard drive back up and more off-the-shelf components than in the past.

But the invisible hands of Creative

Entertainment are not restricted to the parade route. In Diamond Horseshoe, a typical saloon for Western Land, there's a huge chandelier which hangs more than just the usual constellation of gems. This chandelier will house six two-way speakers and function essentially as any flying cluster, said Owens.

Creative Entertainment also designed PAs and acoustical treatments for nine soundstages. The jobs ranged from Videopolis, a dance club with a 90,000-watt sound system to Coke Corner, a small American piano bar, or Western Cookout, which boasts both an indoor and outdoor stage. Other stages will be built at Sword in the Stone, the Train Station Stage, the Explorer's Club, the Magic Kingdom Castle, and The Diamond Horseshoe.

Although all the components for the stages are not finalized, Mandelka said key components of the house and monitor systems are likely to include Soundcraft, Soundtracs, and Midas consoles, as well as Crest amps, and EAW speakers.

VIDEOPOLIS

With a projected capacity of roughly 2,500 paying customers, Videopolis aims to live up to its name as a city of sound and sight.

Entrance to EuroDisney.



Work in Progress: Big Thunder Mountain.

RTS is now supplying three versions of their TW Intercom System to EuroDisney, said Bob Smith, a chief engineer with RTS.

Perhaps the most complex of those three is a customized version of the TW that will likely be laid down along the parade route as a backbone communications system for coordinating park-wide events, Smith said.

The system uses six of the many shielded pairs of copper cable running underground throughout the complex. The RTS system will essentially allow parade coordinators to talk to camera people, fireworks technicians, and lighting operators stationed at various hidden locations, Smith said.

“From the sound contractor’s point of view, perhaps the most significant thing is that [the customized TW system for the parade route] allows a large number of stations to communicate on a conference line basis,” said Smith. “There are six locations and each can support 20 stations or more. So you have more than 100 possible stations on a large party line.”

That means 50-odd people with headphones can be listening to instructions given by producers and directors. Often wearing belt packs and situated on rooftops or other remote perches, the camera people are plugged into stations that feed into one of the key locations.

The system’s six channels give producers choices as to which group of technicians they wish to talk to, Smith noted.

Whatever the case, TV producers running this kind of show need high-gain, low noise systems for several reasons, Smith said. With all the access points, noise must be kept to a minimum while each voice must be heard clearly. On top of that, the

Half the club is an open dance floor, Owens said. Behind the dance floor is stadium-like seating followed by an area for food and drinks. All around there will be video monitors and — omigosh — *visible* speakers.

In the wonderful world of Disney, Videopolis is one of few places in the park where the speaker systems will be out in the open. If it’s emulation of a dance club they’re after, then patrons should be dazzled by the speakers, the lights, the flashing color TV screens.

“In our design there were five clusters, three positioned on left, right and center and two in the rear that surround the dance floor,” Owens said.

Roughly \$700,000 will be invested in the nightclub’s PA, which will feature a 90,000-watt sound system, a huge lighting display and a large video wall.

In addition there are 16 double 18-inch speaker cabinets facing directly down from the ceiling just out from the stage and directly in line with the front three clusters. Owens said this was done largely for aesthetic reasons: “Flying cabinets in that location could be rather obvious and ugly and we’d have to use a lot of steel to keep them up . . . So we concentrated the sound in one place to get the full advantage of using a line array,” he said.

Engineers will have to wait until the hall is finished before acoustical tests can be

done and delay times calculated. But Owens said the pentagon-shaped room has few parallel surfaces to worry about. Fortunately for Creative Entertainment, Videopolis designers were able to incorporate acoustical ideas into preliminary designs, as opposed to making a system work in a finished hall, Owens said.

“The way it generally worked is that they came up with a conceptual sketch and then gave us that initial drawing,” said Owens. “Then we showed them where we’re going to need conduits, where we’ll need sound fill, etc. We gave them the basic noise specs, where we’ll need speakers, where there will be a concentration of sound and what not.”

Videopolis will also feature live as well as pre-recorded video playback systems operating simultaneously, although Owens could not be specific about what components would be used. The stage may feature moveable video monitors while many will be suspended throughout the club.

LOOK WHO’S TALKING

But without the invisible communications going on constantly behind the scenes, much of the Disney magic could not be pulled off.

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tone of the voices should not be harsh like a telephone receiver.

"It can get fatiguing if the sound isn't nice and clear," said Smith. "If [the voice] sounds honky, after a very little while it would be like listening to a trumpet. If you're wearing a paging headset for 12 hours that kind of sound becomes rather annoying."

In addition to supplying some basic customized TW systems for various purposes, RTS is also supplying systems for various attractions so ride operators can communicate.

"Let's say there's some kind of glitch," Smith suggests. "Someone drops something or some kid throws up, there's usually [a safety monitor] watching who can call the operator at the front and tell him, 'Slow down or hold it up for a minute.'"

Because Disney parks are floating with

electromagnetic interference — from the massive displays of lights, effects, radio communications and electric motors — all the cables connecting the intercom rings and stages are shielded.

The project is on schedule, but with all the systems that must interface, every job must be closely controlled.

FIBERLAND

Because many of the live performances to be held regularly on the seven EuroDisney stages will be recorded for broadcast, Mandelka said the sound had

to be impeccable. That's why one of the most unique aspects of the Old World Disney park is that it will be among a few places using the burgeoning technology of fiberoptic audio.

"At one station especially — the Castle stage — lighting and other factors would be interfering with audio," Mandelka noted. "But [our decision to use fiber optics] is mainly because there's a lot less wire. You can put a lot of channels onto one wire, so all the wiring becomes very easy to handle."

Lester Audio is providing a fiberoptic brain for this complex job. Lester Audio's DAS-2000 is a point-to-multi-point multiplexing system that routes audio from each of the stages to a central recording studio, said Laszlo Olah, president of Lester Audio.

"The neat thing is that I can say, 'I of-

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fer a 50 lb. fiber that does the same as 1.5 ton copper wire,'" said Olah, noting that the DAS system operates at 96 dB. "It's sort of neat to say I can run 15,000 feet of fiber where copper can only run 500."

While the ease of installing fiber optics is one selling point, the amount of audio that fiber can process quickly and cleanly is another. The DAS can handle 64 channels per each input mainframe and it's able

The audio and robotics technology is newer, there's an emphasis on multi-lingual access to exhibits, and names such as DaVinci and Jules Verne take precedence.

to handle three output mainframes, said Olah. In this case, those three output mainframes feed a broadcast truck, the house PA mix, and a master that would presumably run to the recording studio, where performances can be recorded on a 48-track digital Studer-Revox.

Control is another key selling point to all digital sound, he said. "The DAS system also replaces the patch bay," said Olah. Routing, mute, and channel configuration settings can be stored in one of 190 preset memory slots inside the DAS," he said.

Once the basic links are made, engineers can steer the sound using the DAS's automation features.

"You can set the memory in different ways," he noted. Broadcasters might set up two 'parallel' configurations of gain, mute, phantom power and channel configurations. If engineers are unhappy with one scene, they could set up another and edit it while the other is engaged. Then they can noiselessly engage the second configuration when they're ready, he said.

But the other big benefit of fiber optics is the elimination of ground loops, Olah

said. "The input and output mainframes are completely isolated; there's no metal connecting them . . . just light."

Fiber optics multiplexing systems essentially break down the signal on various channels into split-second pulses that are sent through the fiber and then decoded into separate channels on the other end.

In a nutshell, the DAS system works like this: At each stage, there are four Whirlwind distribution boxes, each with 16 channels allowing for 64 mic or line inputs on stage, Olah noted.

Sound travels from the mics and direct boxes into the 64-input mainframe of the

(continued on page 96)

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New Energy at Pleasure Island

When Income was Down, Sound, Lighting and Videowalls Came to the Rescue

BY NEIL HELLER

Pleasure Island, the mega-club within the vast Orlando Disney complex, had been open nearly a year when it became apparent that attendance figures were not up to expectations. The island, in its original form, had gift shops, a roller skating rink . . . and nightclubs for comedy and dancing. Designed to entertain both locals and visitors to the Disney World attractions, it also included a kid's night club. For \$6 visitors could go to one of the island's clubs; for \$15 they could visit all of them. While the concept was good, in practical application it didn't work. After spending money for admission to the other area attractions, tourists were not rushing to Pleasure Island. Locals would pay the \$15 general admission fee — once. After selecting their favorite club, they found little reason after the first foray to pay any more than the single club \$6 admission charge. One club, "Mannequin's" was doing well. The island itself wasn't. The other clubs weren't making money since the traffic between clubs was low.

Pleasure Island marketers knew they needed a change. According to Charles C. Paysinger, Pleasure Island's Stage

Neil Heller heads up DJM PR and Advertising which represents Sky Tracker of America and other companies in the sound and communications industry.

Manager, "If we are going to make Pleasure Island a great attraction, we better have a lot going on. . . . We needed more than just the clubs. We needed to give the island energy." The leading idea centered on creating excitement in the streets. "The clubs were exciting, the streets were not," noted Paysinger. The goal was to create a nightly New Year's Eve Party, complete with confetti and fireworks.

A stage was built on the island's West End, lighting grids and an outdoor DJ booth were installed, and the kid's club shut down. Street dancers were borrowed from other Disney attractions. The pre-show in the Comedy Warehouse was dropped. Pleasure Island became Disney's first adult entertainment attraction. The changeover cost about 1.7 million dollars, but took only three weeks to complete. Work was done around the clock.

Pleasure Island brought in buses, which crew members used to catch some sleep. On April 5, 1990 an ad in local newspapers announced that Pleasure Island was closed till New Year's Eve. An ad immediately following in the same paper announced that New Year's Eve would arrive the following night at Pleasure Island.

The pricing structure also changed. General admission to all the island's attractions was set at \$10. For \$25 (since upped

to \$35), locals could purchase a pass good for 365 days. And for a few extra dollars over the regular admission fee to the theme parks, tourists could now purchase a "Super Pass." Paysinger noted, "We had to give people a reason to come all the time. This required offering more — for less money."

Even the greatest ideas are just ideas if no one hears about them. To attract people into the park, Pleasure Island rented 15 lighting systems. Each of the systems, commonly known in the trade as Sky-Trackers, contain four lights which rotate in a fixed pattern. The 2 KW lights project a collimated light. Each of the Sky-Trackers was positioned in a perimeter around the island — two at the entrance of the parking lot and others leading down to the theaters adjacent to the island. "We wanted lighting that could be seen from a distance. A single light wouldn't have been enough, we wanted people to say, 'What's going on over there?'" noted Paysinger. The lights can be seen from Orlando International Airport some 18 miles away. This proved so successful that two months into the rental, Pleasure Island ordered eight units for a permanent installation. The locations at the front of the parking lot and to the theaters were dropped. The positioning of the lights provided an unexpected effect. When all the lights are in

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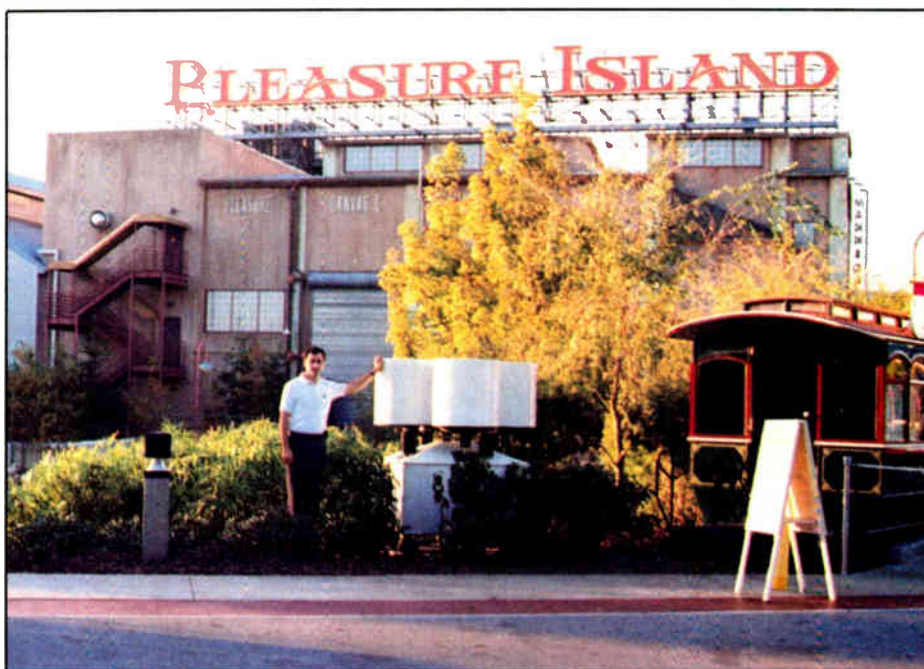
their home position pointing straight up, they appear to converge at the center of the island.

Projecting over 64 KW of lighting into the night sky achieved its goal of attracting people to the island. The lights were so bright that they interfered with the nightly light show held at Epcot Center. To avoid interference, Pleasure Island had to turn off the lights during the Epcot light show. The activation of the lights is in keeping with the spirit of New Year's Eve. The DJ counts down, and starting at 10, one of the lights is turned on. Thus, by the count of three all of the eight lights are on. At zero, when "New Year's Eve" is reached, confetti is released along with a pyro display. Communications among personnel is via walkie-talkies.

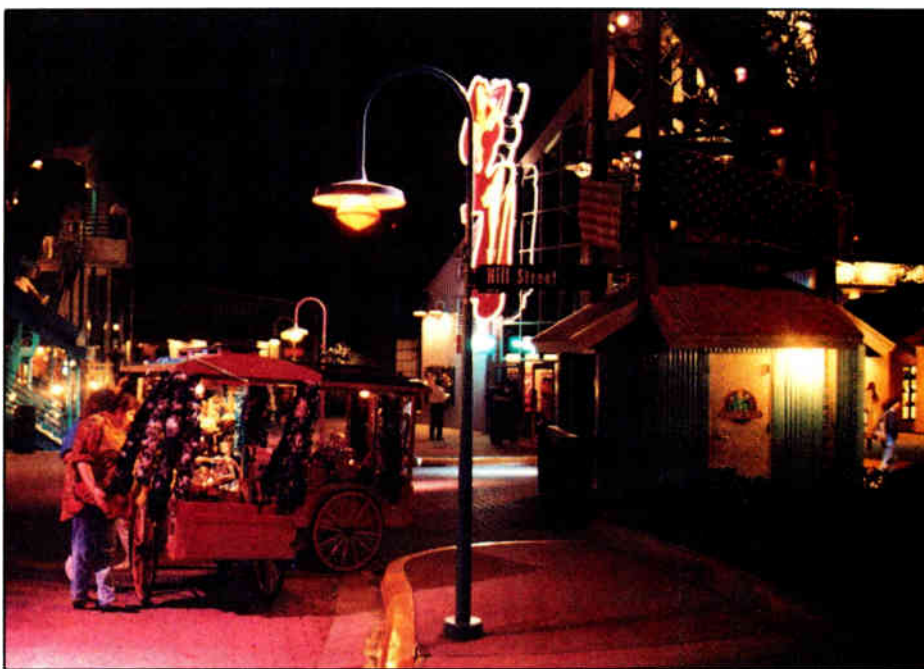
After the permanent installation, it was determined that continuing with eight individuals (one for each of the lights) would prove to be too expensive. To cost effectively operate the lights nightly, a remote control system was designed to control the lights from the sound booth near the West End Stage. The controls are simple. Each of the eight light locations is hardwired to the sound booth. Each function for an individual Sky-Tracker can be set to articulate, stop, return to home (pointing straight up), lamp on and off, and ignition.

While there was no doubt that the lighting attracted people to the new Pleasure Island, the level of excitement had to be maintained once people entered the island. To accomplish this, color lights were run up and down the island's main "street." These lights, both fixed and rotating, are colored. Color was also added to the street lighting, by painting the lighting poles and changing the white lights to color.

A videowall was added at the island's center. The wall serves two purposes. First, it shows scenes from a variety of locations around the island. These scenes, particularly those of dancing park attendees, add to the excitement. The second use is to control crowds. The total capacity of Pleasure Island is estimated at approximately 7,000. The capacity in front of the



General Manager Charles E. Paysinger at the entrance to Pleasure Island.



The three elements of lighting, sound and video contributed to the success of Pleasure Island's makeover.

West End Stage is only 1,300. Using the videowall, street goers in the center of the island can see and dance with the performance without crowding the stage.

Key to maintaining excitement on the island is the music. An outdoor disc jockey booth was built. A nightly music program called "Pleasure Island Live" is designed to build up excitement by increasing the pace of the music during the night hours. The DJ is also key in counting the final 10

seconds to New Year's Eve. The pace of the lighting show is tied to the music.

Adding street audio presented its own set of demands. First, the sound systems were segregated between the West End Stage and the street. Each is controlled from the West End Booth, which also houses the Sky-Tracker controls. The street speakers are strategically positioned on the street to maintain a constant level with the fewest dead spots. Total sound

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Space, the Final Frontier.

Planetarium Sound

BY MALCOLM HOWARD

These are the voyages of the contractor Sky-Skan. Its two-month mission: to install a new, automated sound and light system in the Hayden Planetarium, New York City's premier indoor universe.

To transport the Hayden's sound system into the 21st century, the Nashua, New Hampshire-based planetarium specialists had to boldly go into the dusty firmament above the planetarium's dome and install five speaker clusters.

Sure, people have been up there before, but strapping 75-pound cabinets to the arching steel beams that crisscross the 45-foot-high dome was no ordinary trek. The beams on which the workers balanced are about two inches thin, and the space between the dome and the outside wall is barely big enough to squeeze in one worker — let alone a speaker cabinet.

Between the four workers and the seats 35 feet below was the metal projection screen — roughly $\frac{1}{1000}$ -inch thick — that would hardly thwart a fall from grace.

"We used safety chains and ropes [for the speakers and the workers], but on jobs like this you do everything slowly, deliberately, and very carefully," said Steve Savage, president of Sky-Skan Inc.

But hanging speakers in the heavens was only a small part of the mission. Because the Hayden's budget didn't allow for



New York City's Hayden Planetarium.

a complete acoustical and architectural remodeling, Sky-Skan would have to rely on crafty speaker placement, precise equalization, and sheer power to balance the omnipotent rumbles of a shuttle launch with the intelligibility and clarity needed for subdued narrations inside the highly-reverberant dome.

On top of that, all the sight and sound must occur in sync.

So Sky-Skan, which also designs and sells hundreds of automated gadgets for planetariums, installed its own proprietary Spice Clove Audio Controller, a combination mixer and voltage control amplifier that reads time code off one track of an eight-track tape recorder and triggers other tape players, CDs, video players, and a constellation of other planetarium effects

via computer.

Short for Specialized Projector Interface Control System, SPICE essentially acts as an automatic pilot that allows the program's narrator to concentrate on manipulating non-automated aspects of the show.

At the Hayden, the least automated machine is literally its centerpiece: The Zeiss Mark VI is a mechanically operated gizmo with really a thousand lenses that project stars and planets onto the 75-foot diameter dome. The Zeiss beams a moving and astronomically correct background for comets, black holes, and super novas projected by video players and slide projectors.

"It's all gears and motors," Hayden producer Suzy Gurton said of the Zeiss, a \$2.5 million machine manufactured in Germany and installed in 1968. Much of the Zeiss's functions can be achieved by video projectors these days, but Gurton noted that video resolution on a large dome does not outshine the Zeiss.

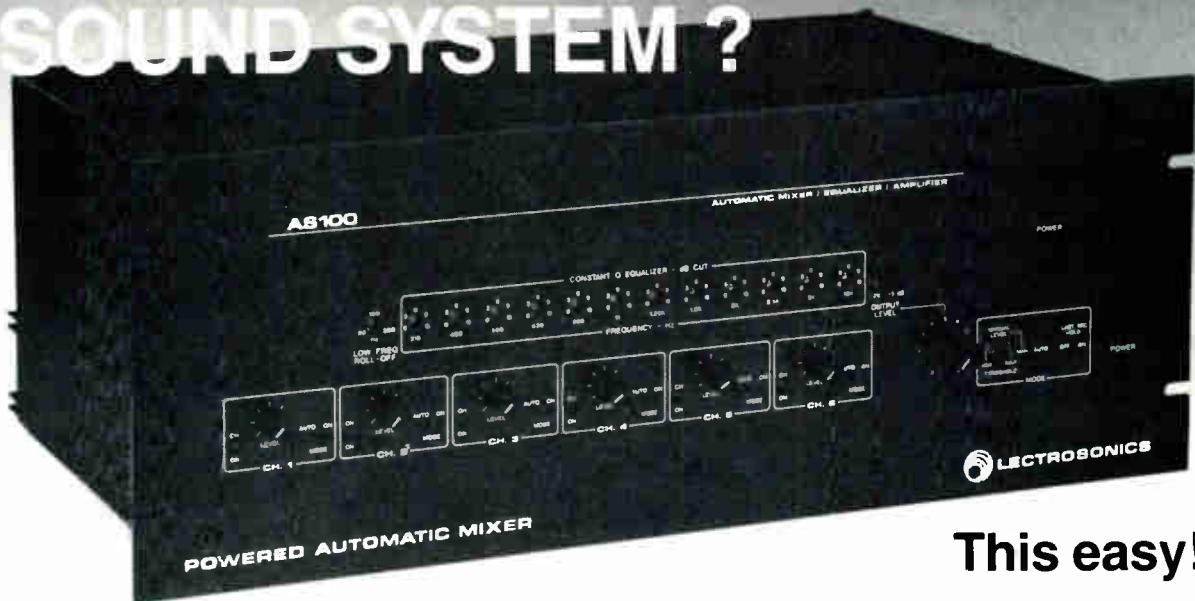
Twisting and turning like a caterpillar, the Zeiss is as interesting to look at as the stars themselves. But the system controlling other aspects of the show, most notably the sound, are behind the scenes machines that use more contemporary computer technology.

While Gurton narrates a typical show and operates the Zeiss by manipulation of round pots (similar to the pots on radio mixing boards), Sky-Skan's Spice system triggers two VCRs below the Zeiss to pro-

Malcolm Howard is a freelance writer based in New York City and was most recently the editor of the Music and Sound Retailer.

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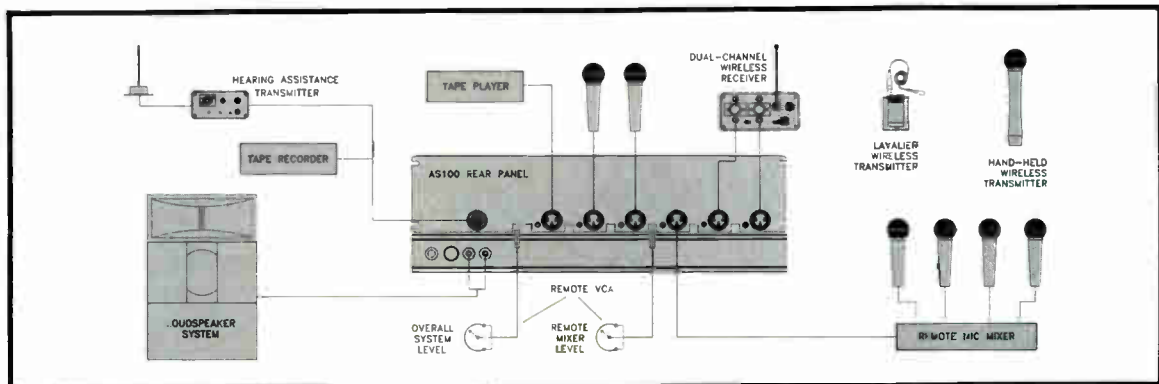
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This diagram illustrates one example of the versatility of the AS100 system. Each channel can be jumpered pre or post EQ. Remote VCA level control is provided for each input and on the main output. Each input may be operated in an "auto" or "direct" mode.

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World Radio History

ject moving images of Star Wars' R2D2 and C3PO or of a black hole sucking in cosmic debris.

Meanwhile, another computer system, developed by Audio Visual Laboratories (AVL), controls about 71 slide projectors which ring the rim of the domes' lower edge. The AVL software reads time code

from another track on the eight-track recorder to relay precise information to the slide projectors. At various times, projectors are synched to make the dome appear like the cavernous interior of an observatory, project a 360-degree Martian landscape, or send various satellites through their orbits.

INTERSTELLAR IMAGING

Forget for a second that sound doesn't travel in space, because in this planetarium at least, sound is coming from all directions.

Five of the remaining six tracks of the Otari eight-track carry discrete and pre-mixed audio to each of five speaker clusters behind five distinct screen areas: North, East, South, West, and the zenith of the dome. There is also another sub-bass system installed near the planetarium's control booth.

The idea of the placement is to give complete coverage while the discrete channel alignments allow for precise imaging as interstellar events take viewers to different parts of the screen.

Sky-Skan needed a degree of direction-

The software reads time code from another track on the eight-track recorder.

ality so that young viewers of "Robots in Space" can follow R2D2's voice from one side of the dome to another as they shuttle between black holes and super novas. For most shows, however, the goal is to give the audience no clue as to where the sound is coming from, Savage said.

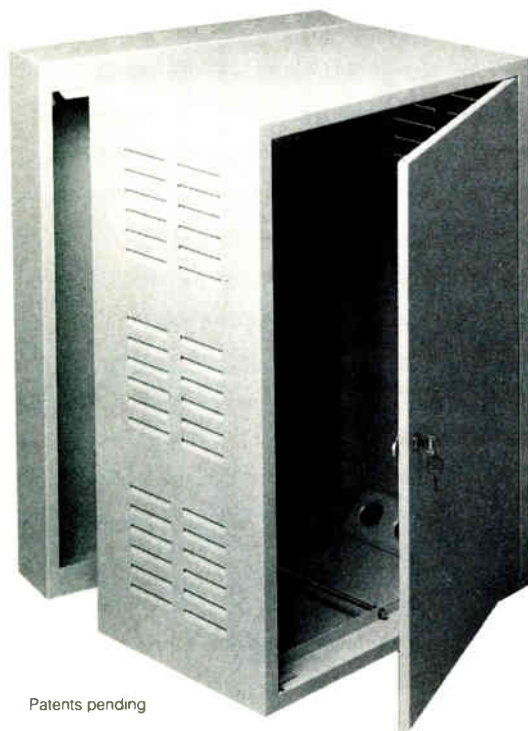
"As a young kid, I remember going to planetariums and always being able to tell where speakers were," noted Savage, who apparently learned from his early experiences. "So, we had to come up with a way to fill a pretty large space in which you could still tell left and right, north and south, but not tell exactly where a speaker is. The audience should not be able to say, "Hmmm, I think the speakers are right there."

Speaker placement had to be balanced between the separation needed for imaging and complete coverage.

"In each screen area, there's an upside-down equilateral triangle of speakers," said Savage. "We had to make them pretty tight triangles. Although we want a large sound field for coverage, you don't want to destroy any imaging."

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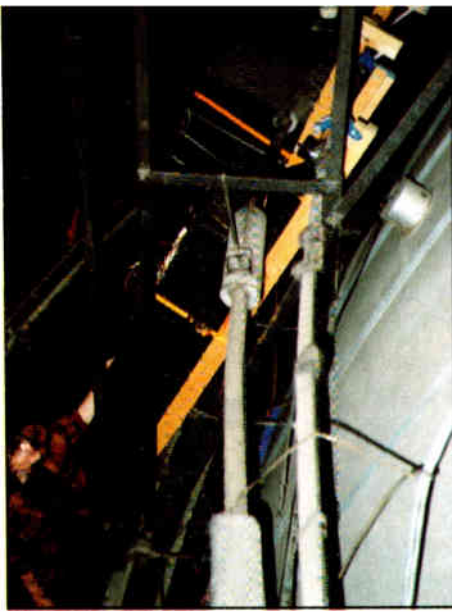
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One of the JBL clusters in the Planetarium.

Each cluster contained JBL 4671A theater loudspeakers, and JBL 2404H ultra high frequency transducers to help boost the high end that was dampened by the thin holes in the steel screen.

EQing THE HEAVENS

Placing speakers behind the perforated dome is common practice in planetariums, although some planetariums use plaster domes, Savage said. But because the Hayden is a relatively old planetarium, its steel atmosphere is relatively thick and its holes are especially small.

“That put pressure on the high end because the high frequencies couldn’t get through the screen,” said Savage.

Although there was some tweaking necessary, the dome also helped in some ways, another Sky-Skan engineer noted.

“The dome actually lends a hand somewhat,” said Glenn Smith, a systems engineer for Sky-Skan. “We had to reinforce the high end with the tweeters, but the roll off produced by the screen is close to the ISO curve we try to achieve in a theater. It’s kind of an oddball situation where the place acts as a filter itself.”

In this specific application, the EQ was rolled off 3 dB per octave after 2K, Smith said.

Because the frequency response of the system is pretty wide — “From 25 all the way up,” Savage said — careful EQing was necessary.

Improved miking and notch filtering cut down feedback significantly but the room still reverberates, said Savage. Because there was feedback in several bands around the 800-to-1K area, Sky-Skan rethought the placement of some mics but also employed an Ashly PQ-26 parametric

equalizer, Smith said.

Savage said he knows the speaker placement might raise questions among some contractors.

“I know some people are going to say: ‘Omigod, that’s comb filtering,’” he said. Although some frequencies might cancel each other out, experimentation with many theaters like this one lead Sky-Skan engineers to believe their placement is the best trade-off.

Because the Hayden wanted the voice coming from above — for the “voice of God effect,” to use Smith’s words — and because there had to be an even sound field, there weren’t too many alternatives, Smith added.

Smith said that there are plusses to being able to produce shows with EQs specifically catered to the individual theater.



Hayden producer, Suzy Gurton.

“You know what you’re getting when you’re doing a planetarium mix, while in the theaters, the room that a movie is playing in is always changing,” he noted.

Using the serial port on the ART programmable EQ, Sky-Skan hopes to incorporate more EQ programmability into the system. But because the Hayden’s shows will always play in the same room, much of the EQ can be pre-programmed and then remain untouched. Savage said he used the ART machine to measure the ISO curve, then invert it, coming up with a flat response. Sky-Skan then finetuned it from there.



The control booth at the Planetarium.

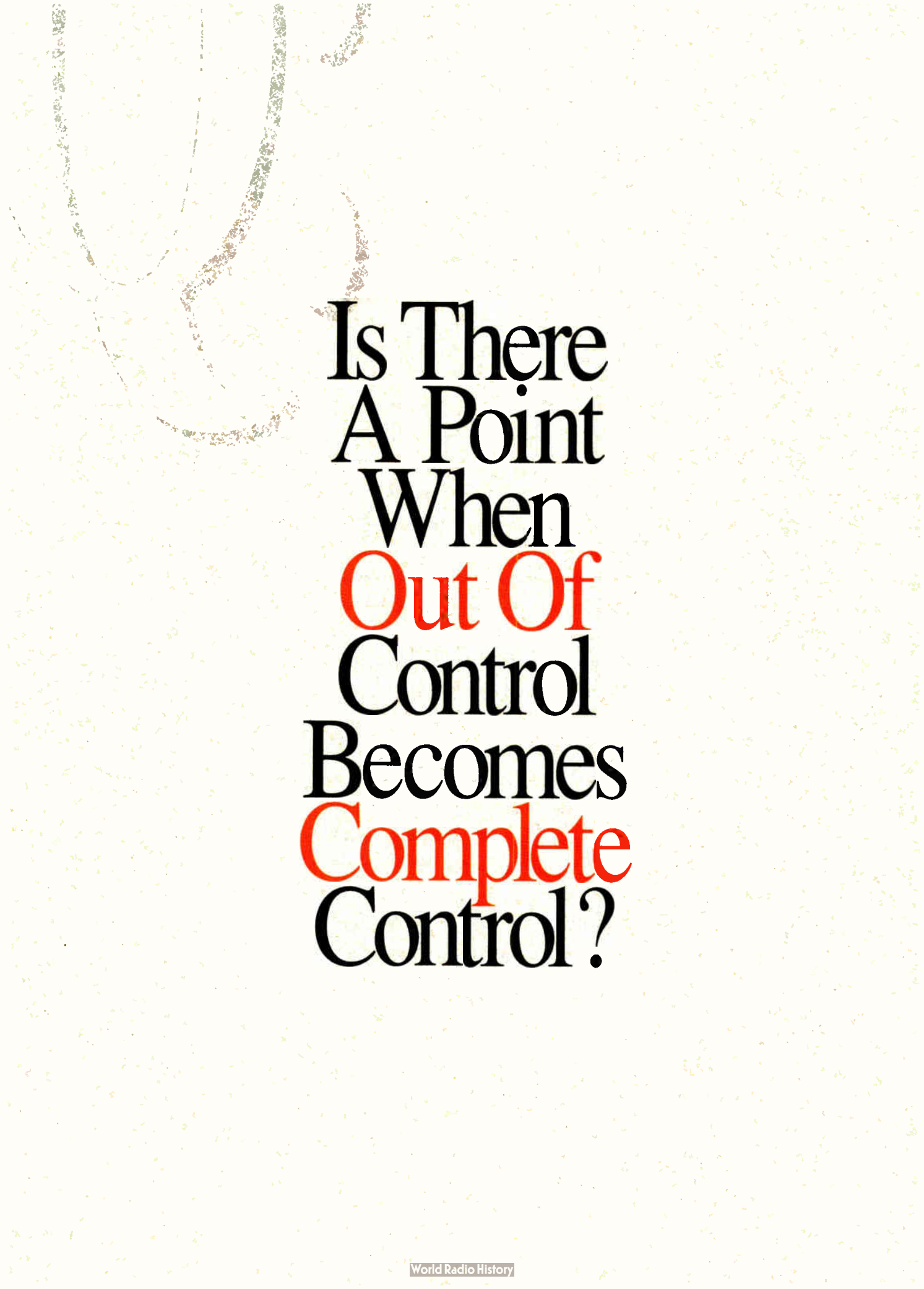
Behind the screen are concrete walls covered by a thin layer of old cork, while below, carpeting and chairs may absorb some of the sound. Although Sky-Skan said the planetarium would have benefited from an acoustical treatment, it is not as reverberant as it could be.

The dead center, near the Zeiss machine, is the only spot where the reverb “gets kind of funny,” Smith said.

INTERSTELLAR OVERDRIVE

Because the dynamics inside range from curatorial whispers to galactic explosions, distortion would have to be kept to a

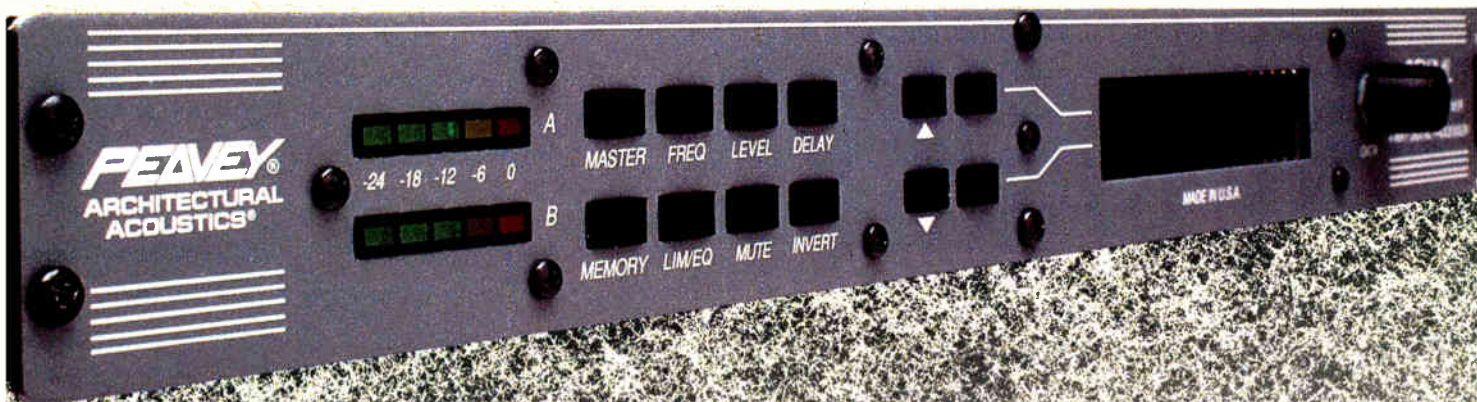
minimum. In this case, 11,000 watts power 110,500 cubic feet of the planetarium’s inner space, Savage said. Because all speakers are biamped, visitors can lean back, look up at the sky and hear levels of 115 dB during the noisiest of big bangs with a minimum of distortion, he added, although laser shows such as “Laser Floyd” test the Sky-Skan system at sustained periods of high decibels on songs such as “Interstellar Overdrive.” But the company that produces Laser Floyd and Laser Bowie essentially rents the theater for the laser shows and uses its own system. ■



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Output delay: max delay 10 ms, step size 20.8 ms
Delay line mode max delay each tap: 675 ms*, step size 1 ms
- *NOTE: When both inputs A and B are used, the maximum delay time is shared between the inputs.
- NOTE: 0 dB = .775V

The Toledo Museum of Art

Preservation and Innovation in a Concert Hall

BY MARGARET McDONALD

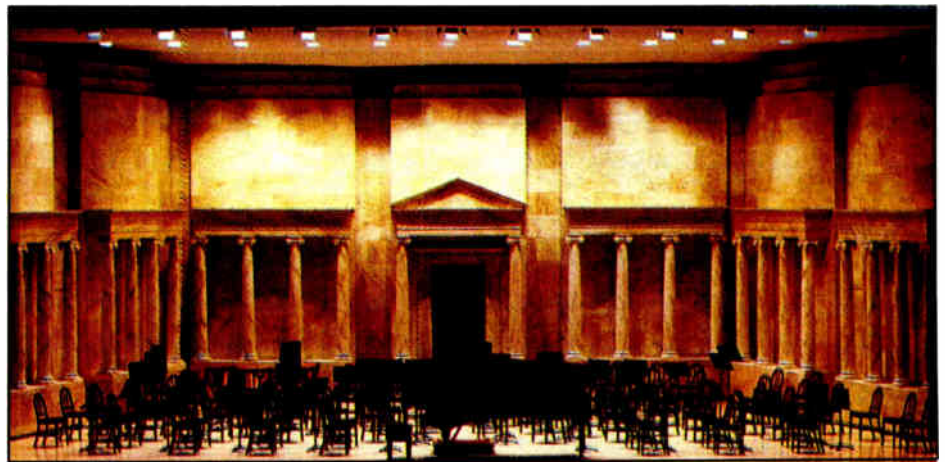
When directors of The Toledo Museum of Art developed a master plan to restore and upgrade their concert hall, they decided to look to the past as well as to the future.

The Museum's music hall, built in 1933, is designed in the style of a classical Greek open air amphitheater. The Peristyle is named after its most distinguishing feature, a curving row of twenty-eight ionic columns which surround the main seating area. The seats themselves are arranged in tiers reminiscent of the theaters of ancient Greece. The amphitheater style ceiling implies the open air of a Greek sky and even the lobby is inspired by the ancient Greek agora or marketplace.

The challenge was to upgrade the Peristyle, technically, and make it more available to different kinds of performances while, at the same time, preserving the "truly beautiful" looks and integrity of the hall. "Visually, the hall is beautiful, gorgeous," says Joseph Myers, acoustical consultant with the firm of R. Lawrence Kirkegaard & Associates Inc., "The museum directors wanted the stage area to architecturally complement the hall as well as to improve sound quality."

Since 1933, there had been only minor technical upgrades of the facility, and the museum's plan included a new stage floor, new rigging and a new set of draperies as

Margaret McDonald is the Product Manager for Wenger Corporation.



The concert hall at the Toledo Museum of Art.

well as a complete new orchestra shell.

Joyce Smar, the Museum's Manager of Performing Arts, admits, "We were not satisfied with the sound or versatility of the previous shell. The sound was flat and didn't reflect enough warmth or resonance. Performers in one part of an orchestra couldn't hear the way the various instruments sounded together. They wound up playing by themselves on stage...not able to hear the rest of the orchestra."

"We also wanted to better meet the needs of all kinds of performers, from a full orchestra to a soloist, and to make the hall more available to dance, theater and community groups. We had never been able to adequately meet their technical

needs before."

The Peristyle was originally constructed for the acoustical needs and attitudes of the 1930s. At that time, radio was in full flower and many orchestras were on the air weekly. The ideal in designing a hall for radio performances was to achieve clarity, which usually meant a degree of dryness and lack of reverberation. In addition, Peristyle designers tried to create a hall that would be as perfect as possible, acoustically, for orchestra concerts, with the belief it would then automatically meet the needs of other performances as well.

However, the original acoustical shell apparently did not meet the requirements of Leopold Stokowski, the famous conductor

of the Philadelphia Orchestra, that was to open the new hall with two concert performances. Two weeks before opening night, Stokowski had the new orchestra shell torn down and erected his own flat 3/4-inch thick plywood screen, painted blue. "The Blue Mouse Trap," as the Stokowski shell was later affectionately called, remained in place until the mid-1960s when it was replaced by a 3/4-inch plywood screen in a folded plate design patterned on Cleveland's Severance Hall. The new shell, while it improved the tunnel sound of the old "mousetrap," still did not reflect a full range of frequencies. The shell was still relatively thin and tended to absorb the lower frequencies, resulting in a flat and somewhat muffled sound. In addition, although the new shell could fold into storage against the back wall, it only had one configuration and was



The Japan Philharmonic Symphony Orchestra in concert.

cumbersome to remove, permitting little flexibility for a variety of performances.

In the fall of 1989, the Museum Board of Directors assembled a design team that included the architectural firm, The Collaborative Inc.; acoustical consultants, R. Lawrence Kirkegaard & Associates Inc.;

and theater consultants, Jean Rosenthal Associates, Inc. They developed a design concept for the Peristyle, and Rudolph-Libbe, a construction management company, was commissioned to oversee the project.

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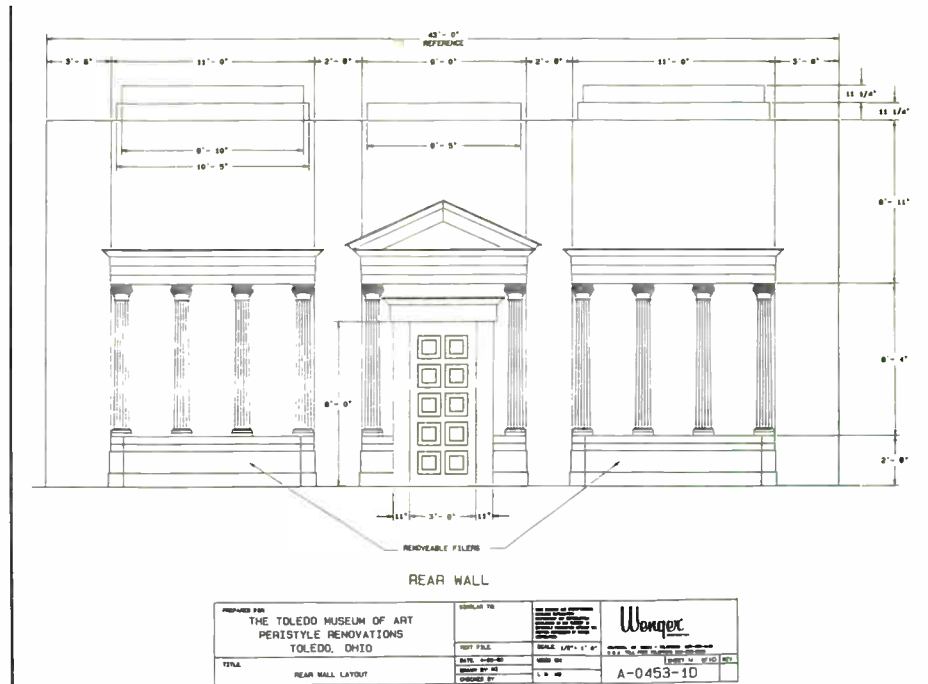
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to submit design/build proposals for construction of a new orchestra shell and ceiling. After several meetings, the Museum directors chose Wenger Corporation of Owatonna, Minnesota to do the work. The new shell was completed by the fall of 1990, just one year after the project began.

Ron Probst, sales manager for Wenger Corporation, called the process, "One of the finest examples of collaborative effort I have ever been involved with. The Museum, the architect, the consultants, the construction and manufacturing firms all worked together, contributing ideas; each playing an important role."

Myers, of Kirkegaard & Associates, agrees. "It was a truly collaborative effort. Everyone offered constructive suggestions to solve problems and cut costs."

The architectural firm, The Collaborative Inc., and the construction manage-



Rear wall layout of the peristyle renovations.

ment firm, Rudolph-Libbe, both had a history of previous work with The Toledo Museum of Art. Wenger Corporation had completed a number of smaller projects for the TMA. Acoustical consultants Kirkegaard & Associates and theater con-

sultants Jean Rosenthal Associates were brought in specifically to work on the renovation of the Peristyle.

The design configuration of the new orchestra shell consists of seven towers — three across the back of the stage and two

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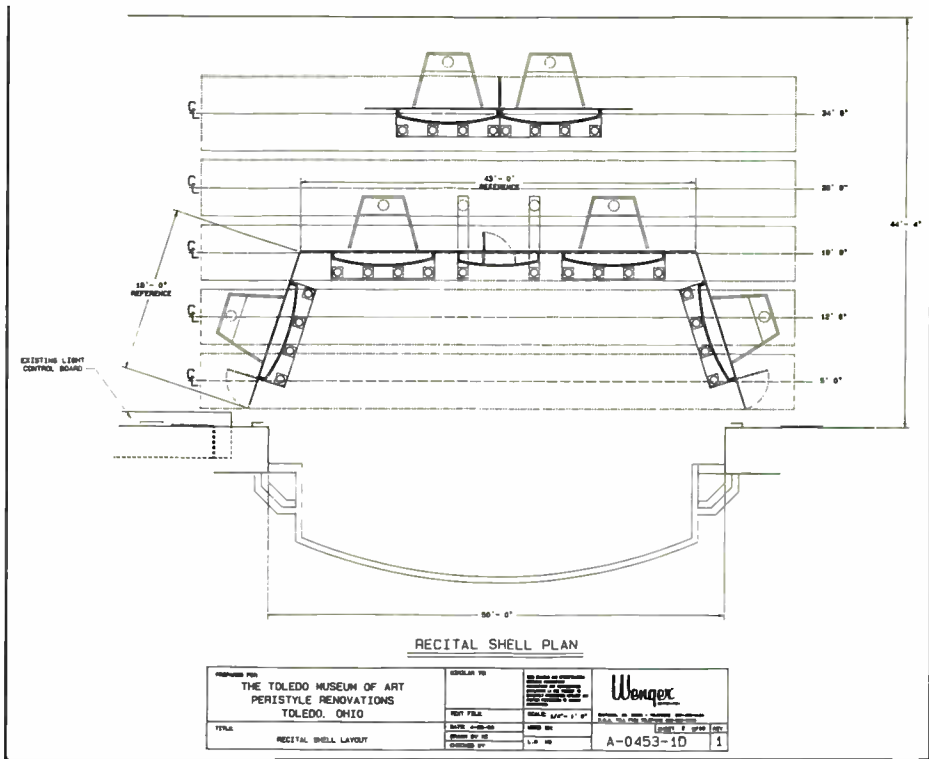
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on each side. Six of the towers boast four ionic columns over a convex plywood back. The central tower has a door painted to look like bronze and only two columns. The towers are designed to reflect the Greek columns in the hall as well as to diffuse sound. They were painted by Toledo artist Dean Barger to resemble the faux marble so prominent in the rest of the auditorium.

A primary acoustical consideration was that construction of the shell be massive to reflect a full spectrum of frequencies, especially the low frequencies required for good bass response. Each tower is 17 feet wide and 22 feet high with an eleven foot central portion and two three foot hinged panels on either side. The wings on either side of the towers are a design pioneered by Wenger to allow maximum flexibility. When all the towers are used with wings

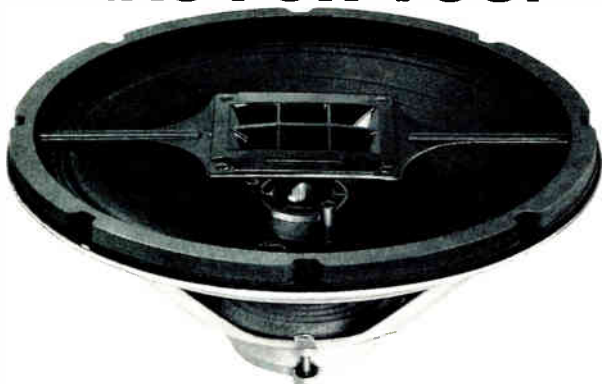


Recital Hall layout.

folded out, the shell can accommodate an 85 to 95 person orchestra. With the wings folded in and one tower removed from each side, it assumes an intimate configuration

for a soloist or a small ensemble. The shell can be rearranged in a number of configurations, providing the particular acoustical requirements and atmosphere

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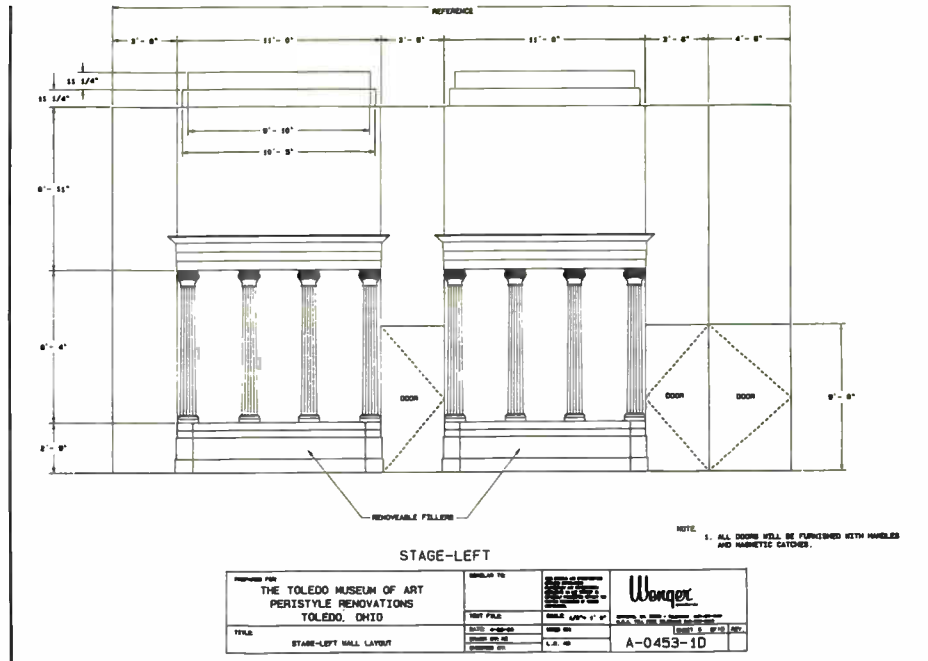
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appropriate to each performance.

The towers are constructed from three layers of 3/8-inch thick plywood, providing a total of more than an inch in thickness to create the necessary mass required to meet the acoustical design. Each tower is supported in the rear by an eight foot trapezoidal weighted steel base. The front part of each tower has a removable skirt, so the tower bases may be nested inside of each other for storage. A tubular steel frame forms the structure of the shell towers. Horizontal tubes of this frame are curved to create the curved surface of the plywood. Vertical steel tubes are attached in a random pattern to the back of the plywood for a more smoothly acoustical response. These tubes brace the plywood in a random manner to prevent it from resonating at any specific frequency. If the plywood were to resonate at a particular

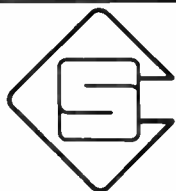


Stage-left wall layout.

frequency, notes of that frequency would be absorbed by the plywood and could no longer be heard by the orchestra or the audience.

Because of the massive size of the towers — they weigh more than 3,000 pounds each — and the need for easy mobility, Wenger created a special wheel

and caster design to enable the towers to move smoothly over the newly installed stage floor. A two man stage crew can now take apart and nest the towers, one inside the other, in less than two hours. Before, if the shell needed to be stored, it took four people more than eight hours to do the job.



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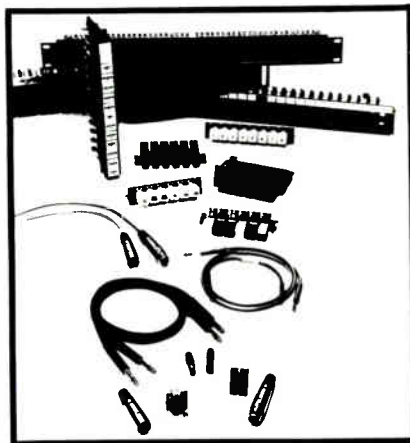
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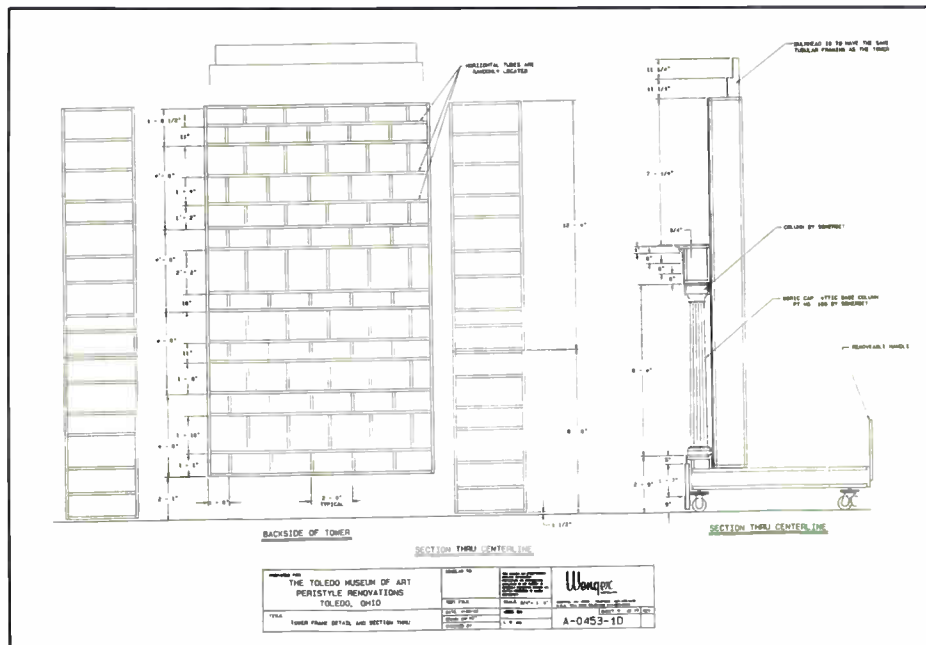
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Wenger also built a special docking area as well as specially constructed carts to be able to move the huge towers into the music hall at the precise angle needed to fit through the building's solid brass outer doors. The only other alternative would have been to cut a hole in the roof and lower the towers by crane.

The ceiling portion of the shell is designed to match the amphitheater impression of the auditorium ceiling. The new shell ceiling is installed flat to maximize the volume on stage, given the relatively low proscenium. This also allows the towers to be all of the same height: so they can be positioned anywhere on stage. This increased volume permits the different parts of an orchestra to hear one another and provides for a more pleasing mix of sound and musical environment for both musi-



Tower Frame detail and Section Thru.

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cians and audience.

The ceiling of the shell cannot be totally flat, however, as that would provide a poor diffusing surface. Instead, it has been broken into a series of strips, each made of a deeply bowed piece of heavy cotton canvas, in order to project sound out to the auditorium as well as back onto the stage. The canvas is reminiscent of the sunshades used in the original Greek open air theaters and was used to permit the extreme bow shape of the ceiling. It is also easy to collapse and store when the stage is being used for dance or theatrical performances. Each strip of canvas is weighted with metal mesh (like that used in fireplace screens) to improve reflection of sound at the lower frequencies. The actual construction of the rigging suspension system for the ceiling was subcontracted to the Tiffin Scenic Studios.

According to Myers, "The complete configuration of the new orchestra shell is not as deep, but is somewhat wider than the previous shell. This provides the musicians with comparable playing space while, at the same time, bringing them closer to the audience." In its very deepest configuration, with all towers in use and all

wings extended, the shell can accommodate a full chorus with orchestra.

Other acoustic changes in the Museum's master plan for the Peristyle include the isolation of practice rooms and hallways, renovation of the orchestra pit, and an upgrade to the hall's existing sound system. The music hall has currently only a "very basic" monaural system that is used primarily for lectures. Until it is replaced, the completion of the new orchestral shell and ceiling already constitute a major acoustical improvement to the hall. According to Probst, of Wenger, "Symphony concerts (as well as many other performances) are traditionally played with all natural acoustics. The acoustic shell takes the place of a sound system. By itself, it blends and projects the sound."

Joyce Smar of the TMA says, "The shell projects every nuance of sound from the softest strings to the brightest brass. The muffle is gone and the orchestral mix is excellent."

"I'm also very pleased visually," adds Smar. "The new orchestra shell complements the rest of the auditorium and gives the hall the sense that the stage is now truly part of the theater." ■



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Software Review

Part III: Methods to Determine Quality and Intelligibility of the Sound System

BY MIKE KLASCO

In parts I and II of our review of EASE we explored this sophisticated program's procedures to create a room model and its visualization capabilities to augment the designer's ability to select and aim speakers and depict sound distribution throughout the room. In this last part of the review we will examine several of the methods used in EASE to determine the quality and intelligibility of the sound system.

ENERGY-TIME-CURVE (ETC) DISPLAY

The ETC display shows calculated sound pressure levels and arrival times of the direct sound for all activated speakers, relative to the first arrival. The nearest speaker is set to 0 ms. The simulated ETC can provide rough cut time alignment of main speaker clusters to secondary speakers, such as underbalcony speakers. EASE also offers a function called "Aligns Lsp's" (align speakers) which automatically provides the delay time settings required to eliminate time delay differences between speakers. Note that this ETC does not show room reflections, as it only displays the direct sound path between the speaker(s) and a user defined seating position. For viewing room acoustics the operator would then go on to the Surface Reflection display.

SURFACE REFLECTIONS

The arrival times, sequence and

Mike Klasco is the Technical Editor of Sound & Communications Magazine.

amplitude are calculated for room reflection sequences, starting with the arrival of the direct sound from one or more speakers. This is known as a reflectogram. This (especially when viewed in conjunction with Beamshow, described below), is a handy tool as an early warning system for flutter echoes. Too bad diffusion can not be included into the room model. If you see a strong reflection in the reflectogram, determine the offending surface, and specify a diffuser at this location, there is no way to plug this into the program. Presently, none of the sound system design programs can yet account for diffusion effects, but EASE promises this capability, perhaps by the end of this year. There are a couple of acoustics programs such as Dynam from HiPAS Software Systems and SYSNoise from Dynamic Engineering that can model diffusion (and more), and one acoustician is using lighting design programs to model diffusion. But I am getting ahead of myself as in an upcoming issue we are going to take a closer look at new developments on this topic and on exporting to software such as Hyperception.

BEAMSHOW

Beamshow displays the calculated reflections, indicating which surfaces are responsible for a given reflection. Three dimensional and multiple cross section views are available to easily visualize which surface area might best benefit from acoustical treatment. Display control allows for continuous viewing of all possible reflections, or stepping through one reflection at a time.

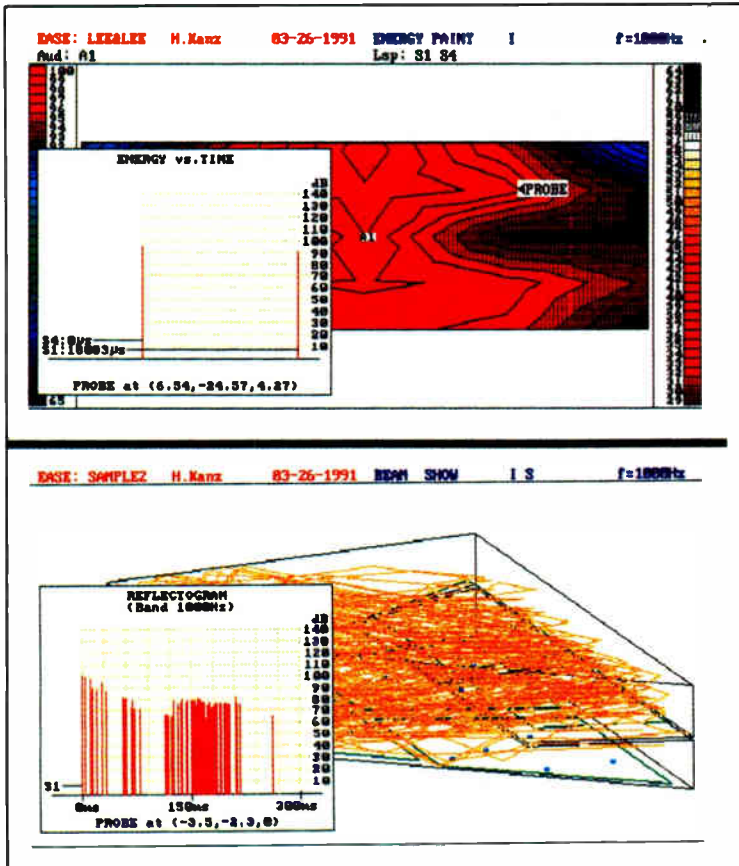
At the Los Angeles AES, Dr. Ahnert presented a paper on his technique for efficiently calculating the image model. Before the program proceeds to calculate each ray, an algorithm checks to determine if that path is significant. If it is not, then it is skipped over, if it is significant, it is calculated. Beamshow is very useful for acoustical work, and partially answers the question of what purpose these graph image models/ray tracings serve in sound system programs. Aside from the graphic aide to the path the sound takes (at least at some wavelengths), another use of image modeling is to synthesize the impulse response of a user specified location and then derive the RASTI from this data.

ENERGY FREQUENCY CURVE (EFC)

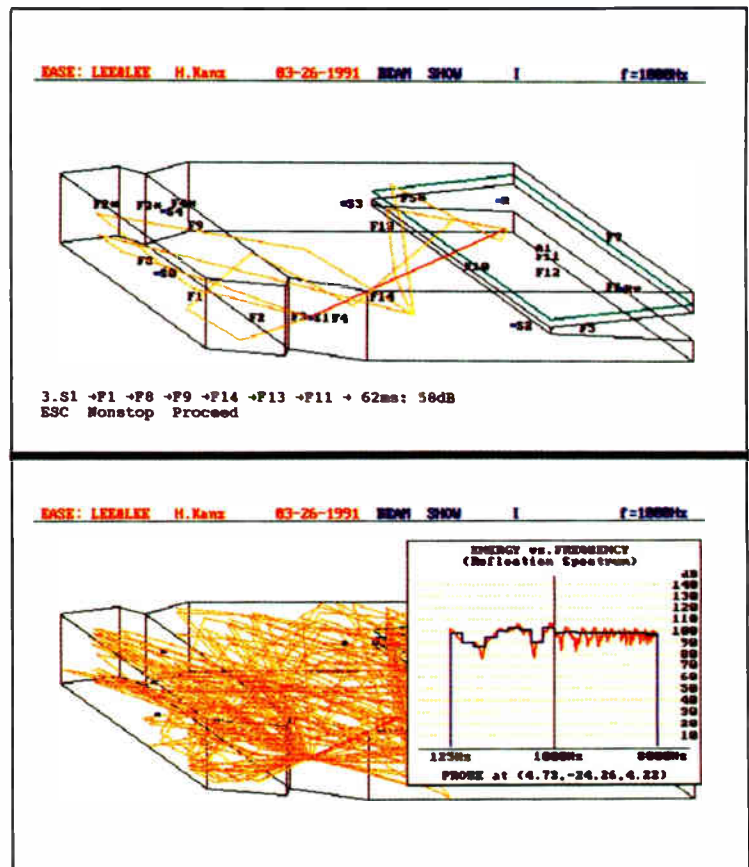
The Energy Frequency Curve shows frequency response, under the various conditions. The designer can select 1/3 octave averaging, unweighted frequency response, energy in a specific band (with user specified bandwidth and center frequency) and response including reflected sound energy. You also have the capability to see interference effects between speakers by selecting Interference in the SETUP Menu. Multiple source phase interference effects will then be included in the Energy Frequency Curve. EASE is not the first program to offer EFC, but it is the first to provide enough user control that it is a useful function.

REVERBERATION TIME

RT60 can be calculated using the



ETC Display (top). Reflectogram (bottom).



Beamshow (top). Energy Frequency Curve (bottom).

Schroeder or Eyring methods. The Schroeder method is the default technique, using back integration of the calculated reflectogram. An extensive library of materials is included in EASEBASE, and these can be edited and new materials can be added. One short cut for quicker sound system design estimates is to only define the floor plan of the room (omitting the walls and ceiling in the room model), and specify the reverb time (estimated or measured) rather than using the program to predict the RT60.

INTELLIGIBILITY MEASURES Ct (Ct time)

In Europe, "Ct" measures are common, both in test equipment, such as the Scantek analyzer, and in sound system simulation software, such as Nexocad. EASE also includes Ct measures. Not everyone is enthused about these measures: There is a lack of consensus on the specified time window of early reflections that ought to be included and the direct to reflected ratios, as well as what is really beneficial or detrimental. The manual does not provide references for these measures. Many U.S. designers may not be familiar with the work done in Europe or

Canada and some sort of bibliography would be useful. The three "standard" measures offered by EASE are:

- C7 — a measure of the direct sound and should be -15 dB.
- C50 — a measure of intelligibility and should be -0 dB.
- C80 — a measure of clarity, and for music should be 4 dB \pm 2 dB.

PEUTZ %ALcons

Using Eyring RT60 calculations, (and without consideration of background noise), the display will show PEUTZ %ALcons.

Direct %ALcons

This measure is useful in estimating the effect of vertically stacked sound speakers on speech intelligibility. The effect of background noise may optionally be included by deactivating Eyring in the RT60 setup menu. By running this simulation both with and without noise, its effect on intelligibility will become apparent.

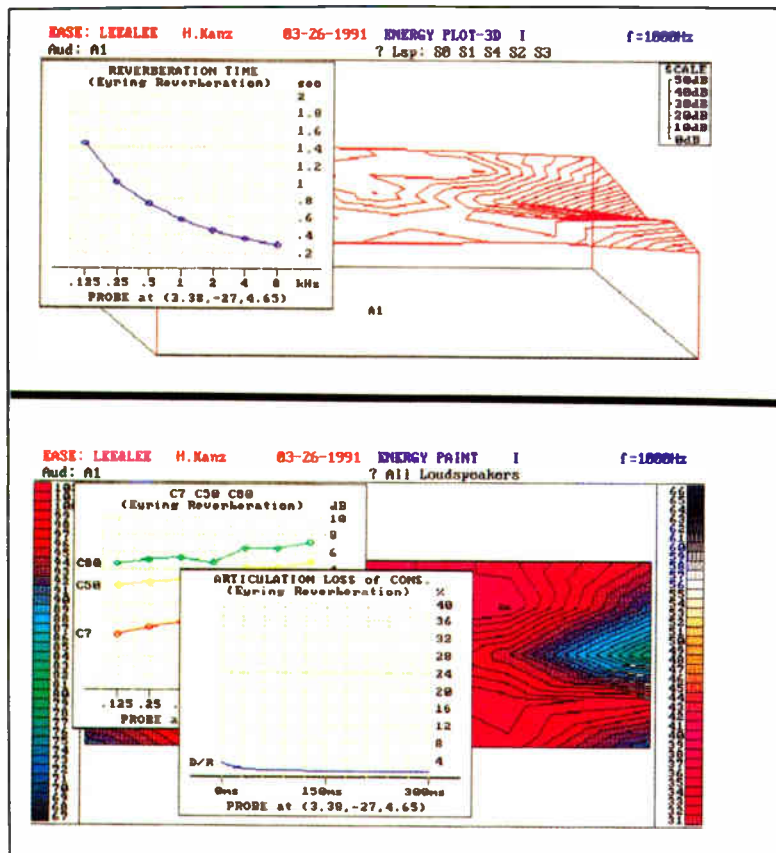
RASTI

Both RASTI and %ALcons scores are provided for any location as specified by the probe (cursor). RASTI is a measure of

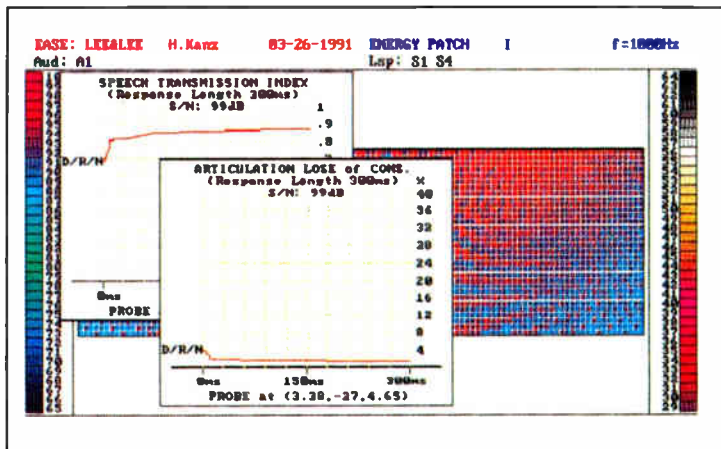
speech intelligibility, first commercialized by B&K test equipment, in Techron TEF machines, and more recently DRA's MLSSA added this measurement capability. Ariel/Bell Lab's SYSid has also promised their latest release (scheduled for this month) to have this capability (along with %ALcons, automatic determination of critical distance, and 3D RT60). While RASTI is a physical measure, not a prediction, it can be simulated. Bose Modeler was the first software to provide this feature, with EASE being the first MS-DOS program with this enhancement. AcoustaCADD's latest release, 1.2, is moving in this direction, with a more sophisticated ray-tracing/image modeling module, although RASTI measurements cannot yet be made.

I am looking forward to comparing the predictions between sound system software programs, using the same job, and following up with actual measurements (using various test equipment). This report should be ready later in year. Dr. Ahnert presented an AES paper in Paris last month on the accuracy of EASE comparing two different CAD predicted designs to measurements after installation was completed.

The software developer has a number



Reverberation Time (RT60) — Eyring Method (top). Ct (Ctime) and %ALcons — Eyring RT60 calculations.



RASTI (STI) and %ALcons — noise level included in calculations.

of possible ways to depict the data. The sound field in EASE is shown both graphically (paint) and numerically (plot). In the case of JBL's original CADP, intelligibility is also shown as ratings ("good", "bad", "ugly") plotted throughout the entire seating area and for me, this is the preferred approach.

Most of the other sound system design programs have tended to plot data for intelligibility measures using a user specified location (as plotting the full seating area with many data points would be too time intensive). It is my feeling that spot checks are a good idea, but not as a final measure. It is tedious to check performance out, point by point.

There is also an underlying premise that the user will be able to ordain where the problem points will be. Much of the idea behind these programs is the elimination of nasty surprises, that is, the factors that you were not smart enough to account for might (hopefully) be caught by the program. The program should function as both a safety net and early warning system. EASE is not alone in using a probe or cursor to mark spot check locations, as this technique is used by Modeler, AcoustacADD and the PHD program. With the PHD program, at least comparative statistical data is provided for different data points.

My wish list for EASE would extend the ENERGY mapping style of simulations to include intelligibility, that is, give the user at least the option of fully mapping the intelligibility throughout the room. User defined data point density (10 uniform locations to a few hundred) would also be desirable. Even if this would take all night for the computer to chew on, so what? Alternatively, the user should at least have the option to use a mouse to click off multiple points of interest on the screen (point 1, point 2, etc.) and have the data calculated and displayed on the screen and also in a spreadsheet format. Also, I would like to be able to more efficiently compare soundfield coverage in different frequency bands, maybe using an animation technique similar to the type used in the Bose Modeler program.

CONCLUSIONS

EASE is an important program, with a number of unique capabilities. The program's ability to aide the designer in intuitively selecting and aiming speakers is the best I have seen, so far. The simulations on the acoustic conditions of the room are both sophisticated and comprehensive; overall at least the equal of any other commercially available program. So are its simulations on the performance of the sound system. The high resolution

EGA/VGA color graphics are excellent.

EASE boasts a number of firsts such as complete file interchange with AutoCAD and auralizing interface with DSP hardware. Also in EASE's favor is the lack of copy protection and "no strings attached" licensing. Not too bad for release 1.0!!

On the other hand, the 'pop-up menus' user interface is a bit clumsy, although there is extensive on-line help built into the program. Room modeling is somewhat more tedious to input than the Mac based Bose Modeler program and JBL's Windows based CADP2, although EASE does allow easy corrections and modifications of the model.

I intend to use EASE for at least my next few design projects and will further report on my experiences with this program. For the knowledgeable and really committed acoustician and sound contractor working on a critical and well budgeted job, EASE is the current state-of-the-art in sound system design programs.

COMING SOON

In the coming months we will be previewing JBL's CADP2. JBL will not formally release this program until the October AES; I think most readers are curious about what features this program has. I have been receiving Beta (pre-release) versions for the past few months and have gotten JBL's permission to give our readers an early preview. Of course it would be unfair to critically review a program that has not finished Beta testing (debugging) so a full scale review is scheduled for the fall. ■

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Speakers in the Great Outdoors

Striking a Balance Between Projecting Efficiency and Sound Quality

BY PAMELA MICHAEL

Sometimes, as every sound contractor who does outside installations knows, the "Great Outdoors" is not so great. The problems inherent in outdoor installations are two-fold: sound transmission and equipment survivability. Outdoor sound gets very little reinforcement from walls, and — alas — there are no ceilings. If there are no buildings or structures nearby, the sound continues to drop 6 dB every time you double the distance from the source. The difference in sound projection outdoors versus indoors is roughly akin to the difference between shining a flashlight on a white ceiling and shining it skyward in the middle of the night: the light disappears quickly, and so does sound in an outdoor setting. Bass is also a tricky proposition in open space, although it can often be enhanced by positioning a speaker against a wall or under an eave. Proximity to the ground can provide some bass reinforcement, as well.

In selecting an outdoor speaker, the contractor and client often must strike a compromise between projection, efficiency and sound quality. In many situations, particularly those with high ambient noise—a parking lot or recreation area, for example—highly directional paging horns are

the most effective choice, almost essential for intelligibility.

Some of the first speakers ever stuck outdoors were paging reentrant-type horns. Their very design renders them somewhat weather proof because the most vulnerable part — the speaker part — is tucked away in the middle of the compound-curved horn. Engineered to avoid the necessity of a three foot long horn for efficient projection, the reentrant horn splits from the center, in effect, and folds back on itself, providing the same essential length in half the space. Reentrants are best suited for paging and voice warning, where music quality is not that critical. Fidelity is limited by the fact that the horn mouth has to be small for practical considerations and yet it needs to be large if it's going to carry a voice naturally and musically. If the size of these horns is practical, they may go down to 500 Hz, some even to 200-300 Hz. As a consequence, they often deliver a nasal-sounding "telephone speech." Despite their limitations, reentrants are an industry staple, and many times the most cost effective solution when projection and efficiency are more important than sound quality.

Bogen has an exceptionally large selection of all metal, weatherproof paging horns with a variety of options. The

SPT15-8A has a built in variable impedance selector for matching the speaker power requirements to a 25v or 70v constant voltage line.

The SP15-8A (8 ohm) has an all-purpose mounting bracket for easy installation. It also affords easy maintenance — a must in many multiple horn sites — and a self-aligning, field-replaceable diaphragm. A few of the many other Bogen horns suitable for outdoor settings are the BDT-30A, a bidirectional; the SPT-5A, a reflex horn with many applications; and the AH-5A, a self-contained, amplified paging horn with volume control. Atlas/Soundolier also has quite a few waterproof horns in their WT and WR Series, including an interesting two-way all metal coaxial (Model WT-15T) with an integral high frequency acoustic driver, a low frequency cone loudspeaker, and a crossover filter with dividing network. It is mounted within a reflex type compression-loaded housing and designed for use in communications systems where music reproduction and optimum efficiency for maximum intelligibility and sound reinforcement are essential. Over the years, manufacturers have worked to improve the sound quality of reentrant horns and have experimented with various materials — plastic, fiberglass, metal. University Sound made a modest improvement in usefulness and

Pamela Michael is a freelance writer who lives in Berkeley, California.

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Fostex In-Wall speaker systems are also perfect for offices, restaurants, hotel lobbies and other commercial applications for background music sources. Their outstanding clarity makes them ideal as public address speakers for halls and meeting rooms. Their thin profile, designed for recessed mounting in walls and ceilings, plus a unique "cam action" mounting method requiring no external screws, make them the easiest to install in standard 2 x 4 stud construction.

Space is already provided for in-line transformers when multiple SH2020 units are used in larger systems. When two SH2020s are wired to the SH2510 you have a full response stereo system which rivals that of many high end (and often visually unappealing) speaker systems. You can take advantage of the human ear's low directional sensitivity to bass response and position the SH2510 with a great degree of freedom--it does not need to be contiguous to the SH2020s.

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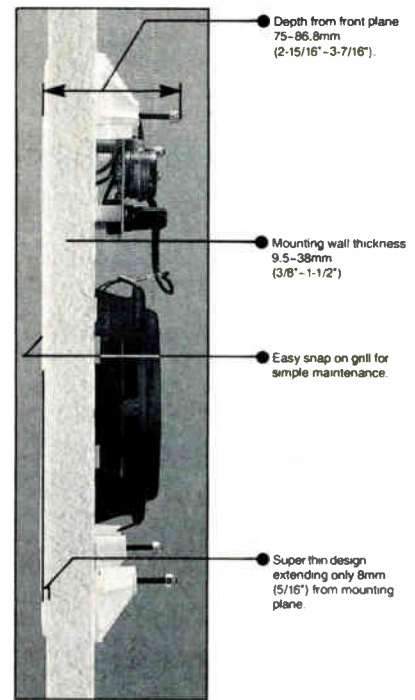


Photo: SH2020

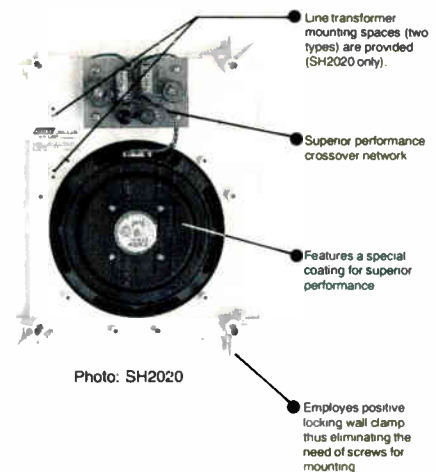
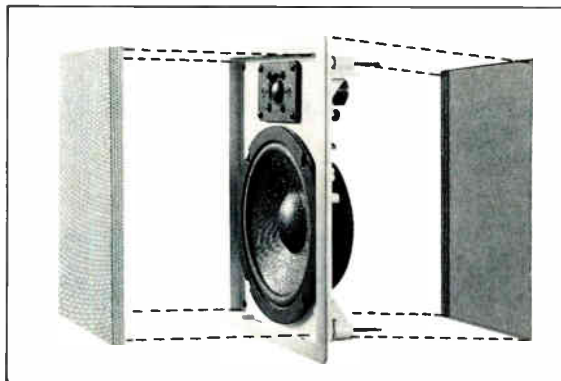
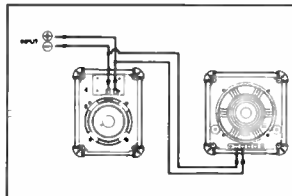


Photo: SH2020

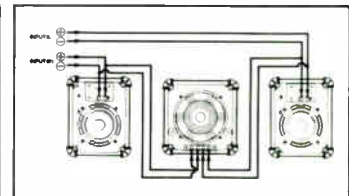
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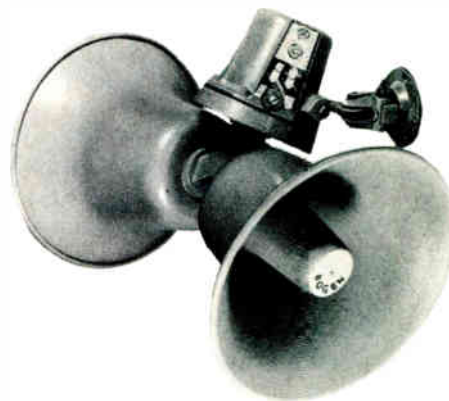
quality with the constant-directivity, coaxial Direktor horn. Its sound coverage is more constant over its frequency range: it doesn't narrow at high frequencies and it doesn't boom out in mid range.

But even the most advanced paging horn is not the speaker of choice in many outdoor installations. In both the indoor and the outdoor speaker market, the quality of sound demanded by today's customers is increasing as the listening audience grows accustomed to the generally higher standard now exhibited in home, commercial and auto sound systems.

The current boom in the residential custom installation market has resulted in a growing demand for outdoor components, as well. Many companies offer their regular speaker products in a weather-proofed version for bathrooms, patios and the like (JBL's popular in-walls, the 8305

and the 8306, can be ordered with special water proofing, for example.) Why not have good sound in the living room and at pool-side? This new demand has generated a flurry of new outdoor speakers, and brought quite a few new players onto the field. The general trend in the last decade or so toward fitness, sports participation and outside activity has brought more people outdoors, and many of them are anxious to bring hi-fidelity sound with them.

Speaker manufacturers are responding to these needs in a market that only a few years ago had very few participants. As the number of outdoor speakers available to the commercial sound market expands, so does the number of companies bringing out new products or modifying existing speakers to withstand environmental factors. At NSCA, Fostex is introducing new outdoor speakers, OWI is showing its new



Bogen's model BDT-30A Bidirectional re-entrant horn speaker.

all-surface-mount outdoor and JBL is showcasing its new waterproof versions of the Control 1 and Control 5 speakers. The Control 1 has a 4-inch woofer with a titanium tweeter, the Control 5 features a 6-inch woofer.

Bozak (whose technology was purchased by employees Bob Adams and Bill Kielyka who went on to start their own company, NEAR [New England Audio Research]), was one of the first to attempt high quality outdoor sound for the com-

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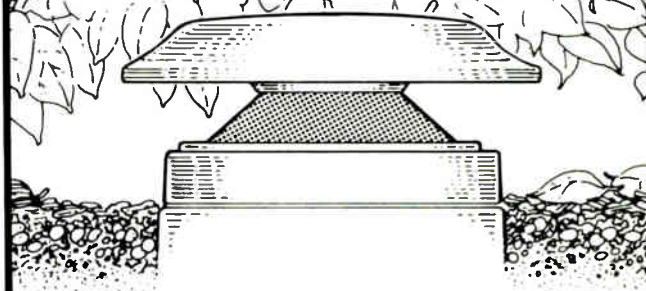
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mercial and residential market about 20 years ago. Their Bard model, no longer made, featured an impressive spun metal cone. The Electro-Voice Musicaster, which came out around the same time, was a weatherproof, direct radiant speaker in a plastic enclosure. It was semi-portable; you sort of dragged it around the pool. The Musicaster is still on the market, in a 60 watt, 12-inch coaxial version called the Musicaster 100, a University Sound product. (University, along with E-V, Altec and Gauss are now owned by Mark IV Industries. They share technologies and products rather freely.) The Musicaster 100, used in many theme parks is a compact 12-inch coax with a 1.5-inch dome tweeter, coupled to a constant-directivity Direktor horn, with a 1,500 Hz crossover.

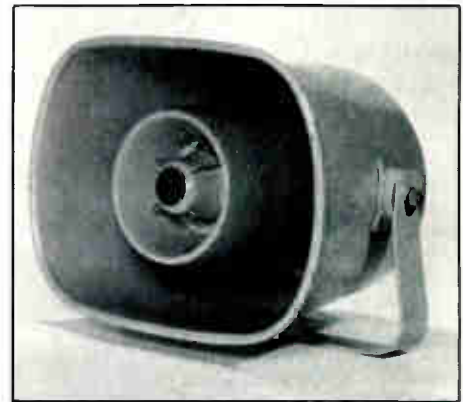
One of the most critical areas of research and development in the outdoor

speaker market is durability — components must be designed to withstand a daunting array of damaging elements: temperature extremes, dust, moisture, fungus, wind, insects (some lubricants attract them like, well — flies). Most

One of the most critical areas for outdoor speakers is durability.

destructive of all is UV radiation: sunlight. Manufacturers have tried a variety of high tech materials to solve these problems, including tempered plastics, stainless steel, and synthetic blends.

The advantages of various polys and patented concoctions are hotly debated and the claims of indestructibility are as



Atlas/Soundolier's WT-15T.

difficult to evaluate as the shades of difference between "weather resistant," "weather proof," "water resistant," "water proof," "environment protected," or even OWI's registered trademark designation "Weatherized." There are some speakers, the Rockustic, for example, that can be left outdoors year round in unprotected settings. Some models in their seven-speaker outdoor line, like the Econorock, are guaranteed to withstand 96 hours of total immersion in water



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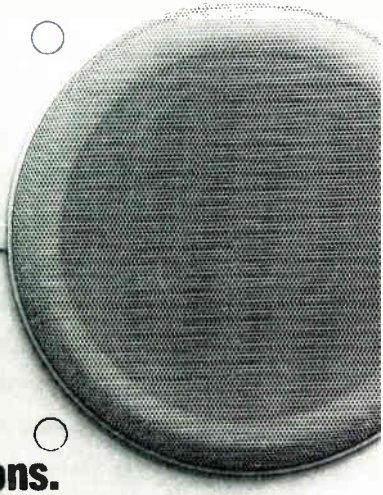
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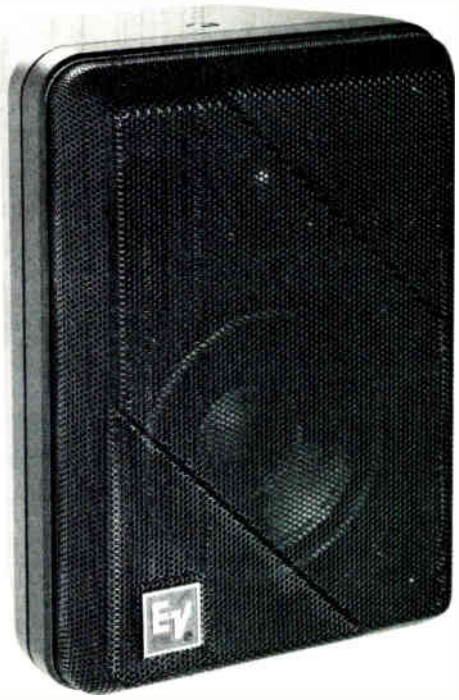


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without deterioration of sound quality. Fabricated by hand from natural minerals, oxides, and a cement-like substance, Rockustic speakers are designed to look like rocks, and come in a variety of shapes and specs. Company President Tony Mulé cited Rockustics, founded by a group of sound contractors in 1986, as the first to offer outdoor subwoofers. Although Rockustics speakers were originally designed for use in theme parks (they are in use at Disney's Splash Mountain, at the whale tank at SeaWorld, and all the Busch Garden water rides), they are now moving into the residential market, cropping up in gardens, walkways, a variety of terrains. There are even Rockustics for hillside installations, a commercial model offering 350 watt continuous with all aluminum cone drivers, called "Hillside." The "Sub Rock" is a 250 pound subterranean speaker (of its 34-inch height, about 12 inches extend above the ground), with a 15-inch poly woofer.

Rockustics speakers were originally designed for use in theme parks and are moving into the residential world.

Soundscape and Paramount are two other companies offering in-ground speakers, both look something like a mushroom and both, it turns out, were designed by Soundscape's Martin Collins. These omnidirectional speakers have an advantage in some situations: placement is not as critical and their diffused dispersion patterns may prove less disturbing to nearby neighbors. Soundscape's ATS 360 comes in both green and brown and can be hidden in foliage, soil, or even cement. Paramount (formerly Portland) offers several in-ground omni speakers in its line; they are available with transformers or without. The 377B Granite has an 8-inch aluminum cone, a 2-inch piezo tweeter and 75 watts rms. It comes in shrub green and granite color and can be buried so just a

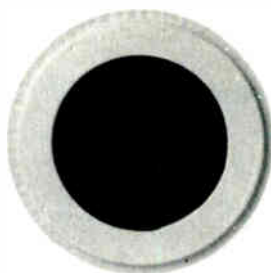
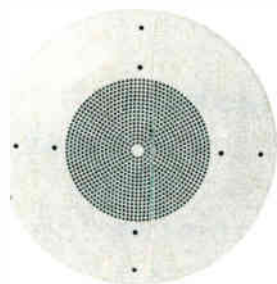
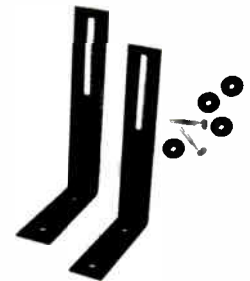
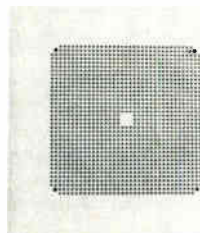
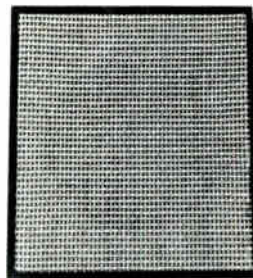


The Electro-Voice model S-40 compact monitor.

few inches protrude above the ground. Paramount also manufactures weather resistant in-wall speakers.

Audio-Technica has an unusual looking cylindrical omni in its Design Acoustics line — the DA360 — that is used in above ground applications. It is pre-threaded to fit on a standard fence post, but can also be mounted under eaves. The DA360 is a two-way, with 6-inch cone woofer, and a 2-inch piezo tweeter. Its housing is made of ABS, a rugged synthetic that is also used by the Samsonite Luggage Company in suitcase construction. ABS accepts paint very well; thus the basic almond color of the DA360 can be painted to fit any design situation. Altec Lansing also utilizes ABS in the fabrication of its Model 55, a small full range speaker. The 55 has a carbon fiber woofer and a glass-filled ABS plastic cabinet that is sealed with eight rubber gaskets. The Model 55 has a tonal balance that is slightly different from an indoor speaker, taking in to account the special acoustics of open spaces. Argos, too, uses ABS in the Weathermaster 500 Series, which has five models, including the "Eaves Mount," which is angled to project the sound exactly where you want it. The "Eaves Mount" is useful in drive-through installations. Argos also makes an unusual wooden patio speaker of rot resistant redwood. They also offer a full range redwood sound column with

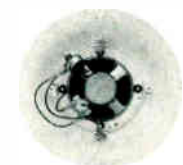
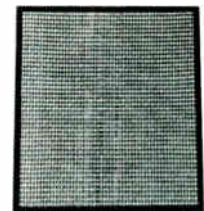
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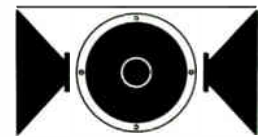
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a perforated aluminum grille, backed up by a fiberglass grille. Argos President Don McLaughlin echoes a sentiment heard from many manufacturers and sound contractors: the worst enemy of the outdoor speaker is sun, not rain. As much time and money is spent improving speaker construction materials and techniques as is spent on improving sound quality. The reasons are clear — a great sounding speaker that can't withstand the elements is of little value to the contractor or client.

Another manufacturer of rugged, year-round speakers is Misco (Minneapolis Speaker Company). General Manager Dan Digre suggests that grueling local winters have provided an ample proving ground for Misco outdoor speakers, all of which are made in Minnesota by this 40 year old company, which entered the outdoor

market five years ago. They offer an extensive line of waterproof speakers from 2 inches-8 inches, which includes several speakers designed for difficult environmental applications. The Waterproof Series can withstand total immersion for 96 hours, as well as extremes of temperature ranging from -67 degrees to 185 degrees F. These speakers typically are used for outdoor intercom, paging or background music. Misco's Waterproof Intercom Series is designed for voice communication in difficult environments — extremely dusty situations, for example. They are a good choice for a drive-thru services application. The WPS80, newest product in the Misco line, is an 8 inch wall mount coax in a plastic enclosure, with a slope baffle and a sturdy grille material of the same material used in automotive seat



Rockustics' "Sub-Rock" speaker.

upholstery. It can be ordered with a 50 watt volume control and is also available with an 8 watt, 70v transformer. It is also suitable for boat installation.

Parasound speakers are also used on boats (as well as outdoor, dry land installations). Their AWM Series speakers all have diecast aluminum enclosures, ferrofluid-cooled tweeters, and polycarbonate diaphragms. They are specially equalized to compensate for what you lose outdoors. The AWM 360 has a 4-inch woofer and a 1-inch dome tweeter. The AWM 380 has a 5-inch woofer. The AWS

Marine speaker manufacturers must factor in an additional consideration when building a speaker — corrosion.

280 offers a 5 1/4-inch woofer and a 2-inch cone tweeter. Ohio loudspeaker accessories company, Fourjay Industries, offers horns for marine use with stainless steel hardware. (In addition, they market a water resistant multi-baffle HF8 Series for non-marine applications.)

Marine speaker designers and manufacturers must factor in an additional consideration when building a speaker — corrosion. Salt is more destructive than

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water to many components. JVC entered the marine market one year ago and already has six models in their marine line, which is distributed through marine distributors and supply houses and boat makers. Their Model CS-MR626 has proved popular. Jensen has two new marine speakers, designed to overcome

wind, surf and engine noise — Model JM1600 and JM 1610 — both 6.5-inch two-ways, available in black or white with plastic grilles and stainless steel hardware. Jensen also markets an Advent Series indoor/outdoor mini-speaker that can be moved from an indoor setting to an outdoor site.

In seeking speaker materials and techniques suitable for marine application, speaker designers have learned some tricks from boat builders. Marine fabrication methods have been studied and borrowed by more than one outdoor speaker manufacturer. NEAR uses a cabinet material for its AES Series based on construction techniques employed in surfboards and boat building, a combination of

Marine fabrication methods have been studied and borrowed by more than one outdoor speaker manufacturer.

fiberglass, foam core, and resin paint finish. The AES 2 has a sloped baffle of structural foam that can be set on the ground or wall mounted. Its 8-inch aluminum cone woofer, 2-inch aluminum tweeter provide one or two more dB more efficiency than its "little brother," the AES 1.5. Both feature neoprene rubber surrounds, which Vice President Bob Adams says stand up to UV better than foam. NEAR manufactures its own drivers,

In seeking speaker materials and techniques for marine application, designers have learned from boat builders.

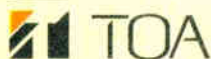
cones, and magnet and assembles its products in house. (An additional note: Bozak products can be repaired by NEAR technicians). They are working on a prototype of a smaller model for the AES Series, which will be shown at CES in June. According to Adams, it will feature new drivers and use the same aluminum cone as its predecessors.

Sonance is also introducing a new outdoor product at CES. Jeff Spencer, Vice President in charge of Research and Development, says Sonance's sales of outdoor speakers is increasing, particularly



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NEAR's AES 2 speaker.

for the residential market. Sonance just entered the outdoor market last winter, with their SB-30, a woofer in a sealed and enclosed box. Many of the in-wall speakers in the Sonance line, as with many manufacturers, can be "waterproofed" for exterior use, or for use in saunas and bathrooms.

OWI's National Sales Manager, Ned Morioka maintains that no speaker will last for very long in a sauna or steam room. "There's nothing that will last in that kind of environment," he says. OWI's newest in-walls, the MF-4 and the MCX-5, which feature patented casings, are excellent

The explosion in the home installation market could result in unqualified installers doing the work of sound contractors.

choices for bathrooms or pool areas, he feels, but putting them in the environment of extreme moisture and heat found in a sauna will nullify their five-year warranty. "OWI speakers will probably outlast other speakers in a sauna, but they will not last five years. No speaker could." Morioka expressed concern that the explosion in the home custom installation market could result in unqualified installers doing the

work of sound contractors, and choosing components inappropriate for the job.

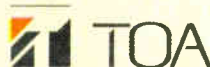
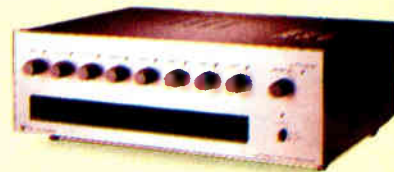
OWI specializes in small aluminum die-cast speaker boxes, both low and high impedance. They have recently released a spate of new speakers including the Thindy 3-3300 — a "Weatherized," full range, in-wall; and an all-surface mount

speaker, available in low impedance (the 502), high impedance with built-in transformer in 2.5, 5, 10, and 15 watts (the 572); and the 5742, also with built-in transformer in 20, 30, 40 and 50 watts. The latter was designed in response to the demand for high powered equipment for discos and bars where it is necessary to



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get the level above that of the crowd. Also just introduced — customized stainless steel stakes, ready to install in the ground. The stakes (Model SS 3) come with pre-drilled holes that fit with all brackets.

Mounting versatility is one of the strong points of the B.E.S.T. anodized aluminum BT-82, a full range transducer. The BT-82 can be used with a variety of mounts—floor, swivel, column, pole, truss/beam. They have been in place at the Hollywood Bowl for over eight years and are used in many malls throughout the country.

Big outdoor sound is the forte of Peavey Stadia speakers. They are available in basic black or white and feature enclosures that lock together to create speaker clusters. E-V also offers equipment suitable for high

output announcing. Many of their compression drivers are used in stadiums. They recently introduced a new product, shared with University Sound, another Mark IV company — the S-40. (University's version is called the EV S-40). The

Manufacturers are accepting the challenge presented by the elements.

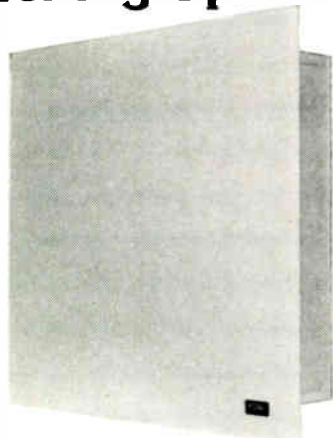
S-40 is a compact two-way with optional transformer.

They call it a personal-sized monitor. It was designed to accommodate a variety of monitoring and playback applications from

recording and live performance to foreground and background music. The polypropylene enclosure features threaded inserts in combination with optional mounting hardware, providing a flexible mounting system.

An increasing number of manufacturers and designers are accepting the challenge presented by the elements, producing durable outdoor speakers with good sound. Yet another challenge is being accepted by fewer companies — underwater speakers. Perhaps the small field is a reflection of the limited market they represent. 'No one is going to get rich on underwater sound,' says Ron Bull, president of Canada's KDM. KDM sells only complete underwater systems. These are

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U.L. approved and are manufactured with oddball connectors to prevent users from connecting any non-KDM components, as a safety precaution. The lack of specs on U.S. underwater equipment surprises him. Working with water and electricity is not the most risk-free proposition.

Bull believes there is untapped market potential for underwater sound — among his suggestions: entertainment and voice warning capability for lap swimmers; and aqua culture farming, providing communications and music to oyster farm workers, for instance. A large portion of his sales are to swimming clubs for synchronized swimming teams. It is important for the swimmers to hear instructions and music both underwater and above water, with no confusing sound delay, which presents interesting technical problems.

La Belle, University and Fostex are

other members of this select group of underwater speakers manufacturers. (The United States Navy is probably the biggest end user of underwater technology for submarine communications and such).

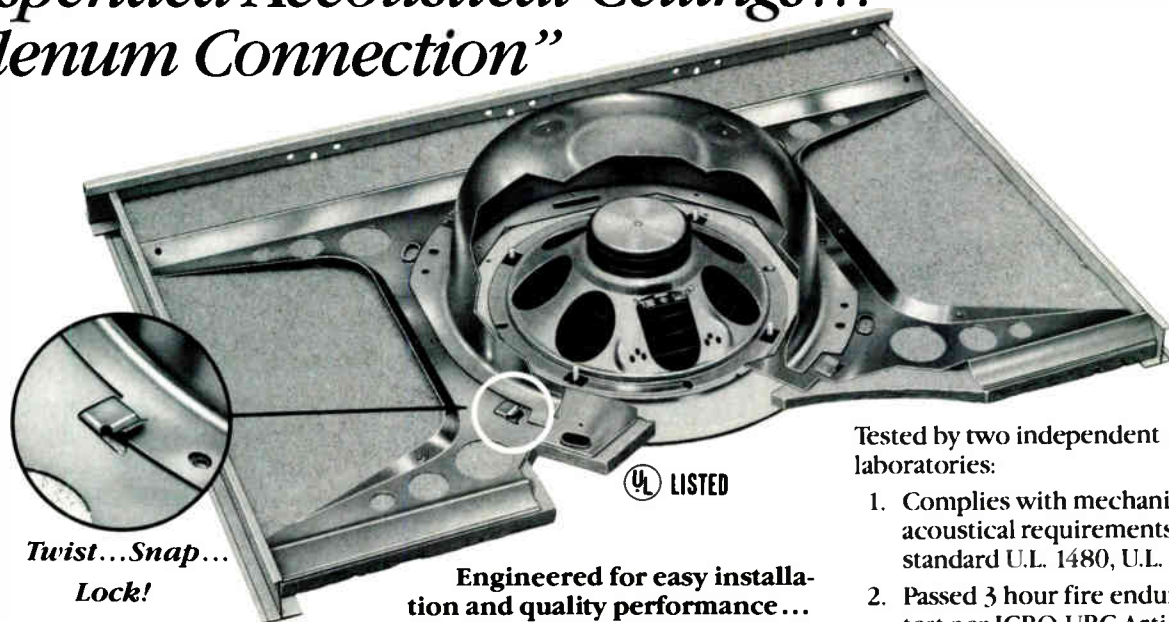
The outdoor speaker market has come a long way from the drive-in movie theater market.

Fostex's US3000 can be installed temporarily, as from a float, or installed permanently as a standard pool lighting fixture. The speaker and cable are coated with plastic resin to protect against salt and chlorine corrosion. Safety features include a three-wire conduction system with a dedicated ground wire. University Sound

has marketed an underwater speaker for 16 years. Their UW-30, what they call the Diatran is a patented transducer type speaker that utilizes the case's structural enclosure as the sound transducer. This UL-listed product can be used in fresh or salt water and comes with a five year warranty.

The outdoor speaker market has come a long way from the drive-in movie theater market of the '50s and '60s, which comprised a good portion of customer base to companies like Projected Sound, which now sells only one percent of its speakers to drive-ins. The market dried up in the mid-'70s, says Projected Sound Vice President Dick Hilligoss, when drive-ins switched to radio sound. The applications for outdoor speakers, however, can only diversify in response to demand in ways we can only imagine. ■

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JOEL LEWITZ: "YOU HAVE TO BE ORGANIZED"

By Pamela Michael

With this issue of *Sound & Communications*, we begin a periodic series of interviews with consultants who are out there designing the systems and managing their businesses. Pam Michael visited with Joel Lewitz who recently set up his own shop near San Francisco.
— Editor.

Driving across the Golden Gate Bridge from San Francisco, the first town you encounter is Sausalito—quirky, quaint, and quintessentially Northern California. It is here that audio consultant Joel Lewitz decided to locate his business after ending his 14-year partnership with Dennis Paoletti, leaving a large, complex consulting operation (and a long commute) for the hands-on involvement and personal atmosphere of the four-person office of Lewitz and Associates.

From his desk, Lewitz can keep an eye on his sailboat, bobbing in the Bay less than 50 yards away. Staff meetings and client consultations are often held on board "The Cygnus." No doubt such perks contribute to Lewitz's seeming sense of contentment.

Sound & Communications: Can you tell us a little about your background?

Lewitz: After graduating from Highland Park [Illinois] High School, I went to the University of Michigan and got a Bachelor's Degree and a Master's Degree

in electrical engineering. Even though I know a lot about electronics because I've got a Master's and a Bachelor's degree in electrical engineering, I never took a course in architectural acoustics and I never took a course in sound system design. The University of Michigan in the late sixties didn't have those courses.

There are some schools now where you can get a PhD in acoustics, but that doesn't make that person the best acoustical consultant. Most of those people end up going into teaching or research — they do the theoretical acoustics, the way-out stuff like psychology of sound and such.

Good design skills are mainly a matter of experience; you just have to do it long enough. I was lucky enough to go to work for a firm where there were people with the capability and experience and willingness to teach me, and so after awhile I got pretty good at it.

Lewitz: At the University of Michigan, they had a placement service. One of the companies who came to interview students the year I was graduating was Bolt, Beranek & Newman. This was in 1968. At that time BB&N was the largest acoustical consulting firm in the country. They were opening a branch office in San Francisco and they were looking for someone with a graduate degree in electrical engineering to design the sound systems for the projects that they were doing in architectural acoustics out of their San Francisco office. When BB&N came along, they were making a graphics tablet, sort of like a digitizing pad that we use today. This was 20 years ago, and by chance, I had one of those things, because as a grad student I was running the computer graphics lab.

Sound & Communications: What

did a 1968 computer graphics lab have in it?

Lewitz: Well, we had a Digital Equipment PDP 11, a mini-computer. The graphics had more to do with graphs and things, it wasn't CADD. We would draw Nyquist plots. In other words we would have a program that would calculate Nyquist plots, so you could get the numbers, but you could also get it to draw it, and so most of the stuff we were doing was graphical, not graphics. It was pretty primitive stuff. In fact, my masters' project was in computer graphics, and it was mostly because I was interested in computers and programing. The actual work had to do with electrical engineering, though, not audio.

Anyway, I recognized the name of BB&N when I saw it on the list of companies coming to campus, and they were looking for someone to place in San Francisco. Sounded good, so I went to the interview and liked them and they liked me. They had a Chicago office with a couple of pretty good guys, well known now — Dave Klepper and Peter Tappan. I visited the Chicago office over a Thanksgiving holiday, and what they were doing there was pretty interesting. Although at that time, I'd never done any sound systems, I certainly knew circuits and I certainly knew systems. Didn't know too much about loudspeakers, but they hired me. I started to work for them in December of 1969.

Sound & Communications: Were computers being used in audio in 1969?

Lewitz: No. The first computer I ever used in audio design was an HP 35. We got one when they first came out — 1972, I think. That's how we used to do it, before AcoustiCADD and CADP. It was all done graphically, and coverage patterns were

done using descriptive geometry. The story I heard about the HP 35 breakthrough is that there were only two people in the world who knew the algorithm for doing logs. Both of them worked for Hewlett Packard, and so the breakthrough key was the log key. This was the big breakthrough for acoustics, as well, because decibels are all logarithmic. In terms of doing all of our analysis and calculations, the HP 35 was invaluable. Then I got my first IBM PC in 1980. As far as I'm concerned, one of the biggest, if not the biggest, change in our industry has been computers. Of course, almost every industry can say that, it doesn't have to be acoustics. But it's not just the calculations, it's word processing, spec writing, reports, correspondence, CADD, AutoCAD, everything — the drawings, specifications, design and communication.

Sound & Communications: Are you "on-line"?

Lewitz: Yes. For example, some architects, rather than sending me a disk, will just modem information. We don't have an E-size plotter. We used to have one, but it was a pain. I decided I didn't want to be in the plotting business. I wanted to be in the acoustical consulting business. There are people who do it better, such as blueprint services. Many of them will give you the modem to use, and the software. You can't argue with that.

I modem the AutoCAD file and they send back the plot later that afternoon. That means we're not cleaning pens, paying for maintenance contracts on the equipment. I don't have to worry about buying paper and supplies. If you really look at how much time you spend fixing paper jams and starting over and setting

up, and troubleshooting, you're not saving any money. Just about everything else we do in house. We have laser printing in house, do check plots, and so on.

Sound & Communications: What are some of your current jobs?

Lewitz: We're doing a lot of work now for Bill Graham, because at these outdoor amphitheaters like Shoreline and CalExpo there's a concern about environmental noise. At Shoreline, for example, you can hear the concerts in Palo Alto, five miles away. It turns out it has a lot to do with the weather. It's not *that* noisy, but they get calls and people complain. They're a responsible organization and so they want to respond to it.

Sound & Communications: What's to be done in this type of situation?

Lewitz: Any noise control problem can be solved by one or more of five general

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solutions to noise control. Number one is quiet the source. Two is enclose the source. Three, enclose the receiver. Four, remove the source and receiver farther apart. And five is to mask the source.

Having said that, here's what we're trying to do at Shoreline specifically. We're implementing number one, controlling the source. What we're trying to do is establish limits at the console, so that they monitor the level at the console and try to keep it to a level. We also employed number two, which is to enclose the source. That's a big one because all of these amphitheaters have been designed with sound walls. When you do noise control analysis, if you have control over the venue, as in this type of permanent installation, you try to move the wall in closer to the source. You have a lot more control if you can participate in the design of a facility, of course, because you can put up the sound wall and you can locate and orient the loudspeakers, and select the loudspeaker in a way that will minimize the amount of sound energy that gets out of your container.

Now in touring sound, the groups will tour with their own sound system, so you end up not having much control over the kind of devices that are used, as you would in a permanent facility. And Shoreline, for example, has some permanent installation. The law: sound system is permanent. The group's sound system, then, is primarily for the fixed seats, and so they have a very little bit of control over it.

I'm often called on to testify before city



Joel Lewitz at his office in Sausalito California.

councils about these kinds of environmental noise problems. You learn a lot about psychoacoustics and politics at these public forums. Of course, for every person who calls to complain about concert noise in their neighborhood, you'll get someone calling in saying, "I can't hear it well enough, turn it up!"

In the Bay Area, especially after September, we get temperature inversion layers in the atmosphere. Because of the density of the air and the physics of the way sound propagates, the little air molecules are vibrating, and you can propagate sound pretty far. In fact, it bounces over — you know, no complaints a mile away, but five miles away they're calling. And that has to do with the particular atmospheric conditions.

Sound & Communications: Who are some of your other clients?

Lewitz: Everybody from Levi Strauss

to Stanford University and the Mormon Church.

Sound & Communications: I understand you do quite a bit of work for the Mormon Church.

Lewitz: They have selected consultants to do work for them regionally, and when they hit upon a good consultant, they like to keep him. They have quite a few facilities, and the work is surprisingly challenging. We've done some unique teleconferencing systems for them where they link a bunch of chapels together on an audio teleconferencing system. You don't see that very much—most of the church jobs we do are just a church. It might be pretty big, 5,000 seats or something like that, but it's just one congregation, generally. I'm on my way to Hawaii this week to do a church teleconferencing job, in fact. There's a church on Kauai, one on Molokai, and one on Maui.

When they have group meetings, when they all want to get together, there's no way they would fly everyone to, say, Maui. Whereas on the mainland, everyone would just drive 30 miles or so to a central location, in the islands, that's impossible. So the only way to do it there is with teleconferencing.

Sound & Communications: What has been your most challenging job?

Lewitz: The most challenging jobs are the ones that have the most acoustically challenging environments. You can design the best sound system in the world, but if the room acoustics are poor, it's not going to sound good. So the jobs that come to mind are the most acoustically challenging. A room becomes acoustically challenging when it gets big. When a room gets big, it gets reverberant.

There are two jobs that come to mind

and that were a lot of fun. One was the Diablo Canyon Nuclear Power Plant because it was big, reverberant and noisy. The other was the Kingdome. It was big, reverberant and noisy, too. That's the definition of acoustically challenging—big, reverberant and noisy. Most of the arena jobs are not so big, in terms of enclosed volume, so you can get enough absorption in there to get a well-behaved space.

Sound & Communications: How do you get most of your jobs?

Lewitz: Most work comes from referrals. That's the best kind of work, because then you don't have to spend much time on marketing. After you've been around for 20 years, you have enough projects and enough former clients, so that people know your work. Satisfied customers are the best way to generate new business.

I've gone on interviews, and you bring

all your fancy brochures, and brochures are fine, don't get me wrong, but what the prospective client most wants to see is a list of former clients and projects.

Sound & Communications: Do you advertise?

Lewitz: Acoustical consultants used to be sort of like lawyers or doctors. It was considered "unprofessional" to advertise. But now, it's okay. And there are a lot of ways to advertise, both directly and indirectly. If you write an article for Sound & Communications, for instance, you get your name in Sound & Communications, and it's a great way to advertise, plus it's cheaper than taking out a one page ad. There are trade magazines where it's wise to advertise, but I don't believe that many acoustical consultants get the majority of their business from advertising. Most

(continued on page 102)

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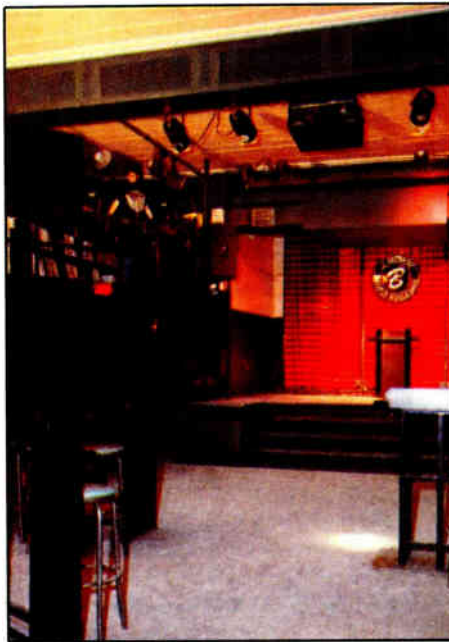
Le Belmont in the Heart of Montreal

BY RICHARD J. GRULA

When club-owner Marc St. Marie decided to renovate his popular venue, Le Belmont in Montreal, he gave contractor Michel Berard, president of ABC Sound Inc. the kind of simple instruction everyone in the installation business dreams of hearing. As Berard says in his French-tinged English, "He told me he wanted the best."

Berard took the advice to heart, providing a rental system which included E-V Deltamax enclosures, Crown amplifiers and Klark Teknik equalizers in the main house rig, plus an ambient system featuring compact JBL Control 5 enclosures.

Le Belmont, a medium-sized club with a 380-person capacity, is situated on Montreal's Saint Lawrence St. — a buzzing thoroughfare of nightclubs and eateries. As contractor Berard describes it, this former tavern with 16-foot ceilings, stakes out a niche as a "modern, hi-tech dance-club with a very relaxed atmosphere." To create this unusual blend, several projection systems run old films and television programs on the concrete walls above the audience and a 15-foot wide video screen above the middle of the dance floor. A surreal edge is provided by a bevy of attitude-heavy mannequins casually placed around the room. The final touch is a state-of-the-



The stage at LeBelmont, a medium sized club with 380-person capacity.

art sound system playing popular alternative and rock music.

The club offers a main room with a three and one-half-foot high stage at one end and a small mezzanine at the opposite end, and a 100-capacity terrace overlooking the street. The dance floor occupies two spaces — the stage and the area directly in front of the stage. The DJ booth is

located eight feet above the dance floor, against a wall.

The E-V Deltamax was installed in Le Belmont during a complete renovation done two years ago. At the time, owner St. Marie received proposals for three systems. Contractor Berard, who owned the system then being replaced, recommended the E-V Deltamax.

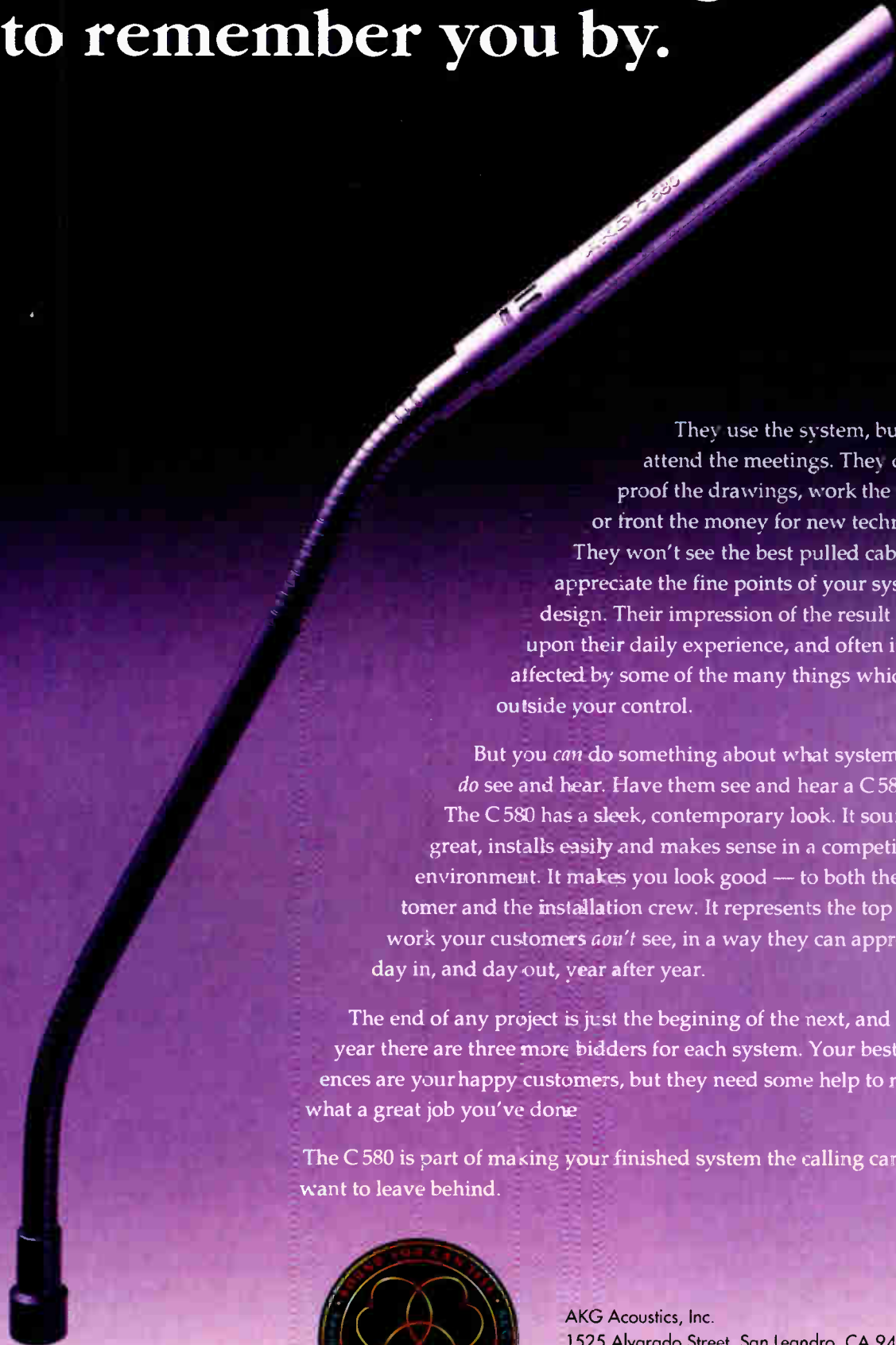
A main function of the Deltamax was to correct weaknesses in Berard's old system, a 2,300 watt rig. The system was located almost against the wall at the rear of the stage, pointing out to the rest of the club (at that time, the stage was the only dance floor). This system layout acted with the hard surfaces of the club to produce a less-than-ideal sound.

"We had some real problems with reverberation," admits Berard. "It was booming because the club had a lot of concrete surfaces, floors of tile or marble and that 16-foot ceiling. And there was no way the owner would change it because that would alter the look of the place. So there was no absorption material — very reverberant."

Since the area in front of the stage was being converted to a second dance-floor, Berard decided the main Deltamax enclosures would be located at the edge of the stage, between the two dance-floors. He arranged the enclosures into two stacks, each containing a single Deltamax DML

Richard J. Grula is a freelance writer based in Hoboken, New Jersey.

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2181 AP (measuring 36 inches × 22 inches × 30 inches with two 18 inch drivers) for bass and two Deltamax DML 1152 AP (each measuring 30 inches × 18 inches × 16 inches and containing a 15 inch driver and a horn) for the mid- and top-end. The DML 2181s and one pair of DML 1152s were faced out toward the new dance floor and the rest of the club. The top pair of DML 1152s were turned to face the stage dance floor. Since the Deltamax bass bins are omni-directional, this resulted in an even spread of sound pressure levels across both dance floors.

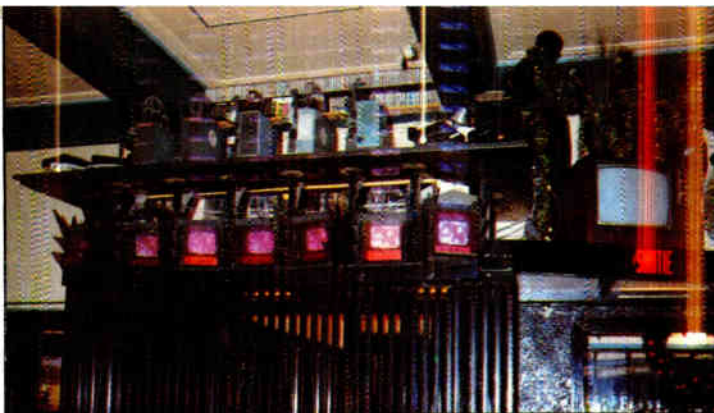
“The projection of the Deltamax helped a lot in controlling reverberation problems,” says Berard. “We avoided the wall reflections by the way we aimed the boxes. And we used an Ivie realtime analyzer to calibrate the system and check problems with reflection. Then, at night when the club was full of people, we went back and tuned the system again so it would sound warm with an audience.”

Whenever Le Belmont presents a live band or has a stage orator (if the club is rented for corporate presentations, for instance), the top pair of DML 1152s are rotated outward to face the rest of the club. To facilitate this movement, Berard secured each enclosure on floor to ceiling poles with custom clamp mountings.

“We had to create a kind of swivel clamp at a local metal shop,” says Berard. “It bolts onto the back of each speaker box. There’s one clamp on the bottom and one on the top of each box. The top one is a little longer than the bottom one so it tilts the box downward a bit.”

Power for this main house system is supplied by Crown Macrotech amplifiers. A Crown 2400 provides 1500 watts to each bass bin while a second 2400 drives the 15-inch drivers in the DML 2181s. A single Crown 1200 drives the four horns. A stereo, 31-band Klark Teknik DN 360 B2 graphic equalizer handles the curve of the system.

Additional signal processing and speaker protection comes from four E-V Deltamax Controllers, which are part of the total Deltamax system. As with other con-



LeBelmont is modern, hi-tech danceclub with a relaxed atmosphere.



Several projection systems run old films and TV programs.



‘Attitude-heavy’ mannequins are casually placed around the room. The DJ booth is at the right.

trollers of this type, the Deltamax controllers are hooked into the signal chain at multiple points to monitor and fully control signal level, protecting the drivers from distortion damage. In order, the signal chain at Le Belmont goes: DJ mixboard — KT EQ — Controller — Crown amps — Controller — Deltamax enclosures. In this setup, the controller hears the signal coming from the amps and can reduce the level by 3 to 6 dB if a speaker-damaging overload is present.

Rounding out the house system is the DJ gear — three Technics SL1200MKII turntables with Shure SC35C cartridges, one E-V 757 microphone, a Tascam 112 cassette deck with remote and a Tascam M216 mixboard. The microphone is typically in the booth. If a mic is required on stage, it can be plugged into one of three permanent stage mic inputs which are routed up to the booth.

To complement the house system, Berard installed an ambient system in parts

of the club far away or not directly in line-of-sight to the house system. For this, Berard used six small JBL Control 5 enclosures arranged in three stereo pairs. One pair is used to fill the mezzanine, one pair hangs from the mezzanine and fills in the back of the main floor and one pair covers the terrace area. Each pair is powered by a University MA 605A amplifier.

"The distance from the front of the club to the rear is just small enough so that we could avoid using a time delay on the ambient rear system," says Berard.

Berard and ABC completed the installation of the new system in two days while the club was closed for other renovations. Since he'd installed the previous system, he knew what to expect in terms of potential wiring and sound problems. As he says,

"We were so used to this place that we knew the problems and exactly which solutions we would be using." Such familiarity with the venue made installation and tuning a fairly easy task.

Berard and ABC completed the installation of the new system in two days while the club was closed for renovations.

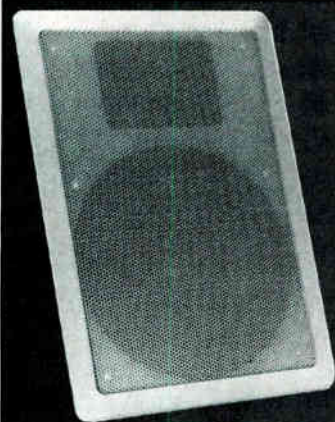
Twice a month, when Le Belmont presents a live band, Berard brings in additional gear to handle the job. This includes a Soundcraft board (24 or 32 channels, depending on the performer's

needs), E-V FM-1502 and FM1202 stage monitors, another Klark Teknik EQ (so the house EQ remains untouched) and a rack of Lexicon and dbx outboard gear. Le Belmont's Deltamax enclosures are used as the house system.

Having tuned the Deltamax system with musical selections from Sting, Phil Collins and Technotronic while the club was both empty and full, Berard rated the system operational and judged the installation a success. It was an opinion shared — to some degree — by owner Marc St. Marie.

"You want to know his honest opinion?" laughs Berard. "He doesn't care about it. Marc said, 'As long as my customers are happy, then I don't have any complaints.' Everybody has said they're happy with the sound system, so it's a beautiful thing, hmm?"

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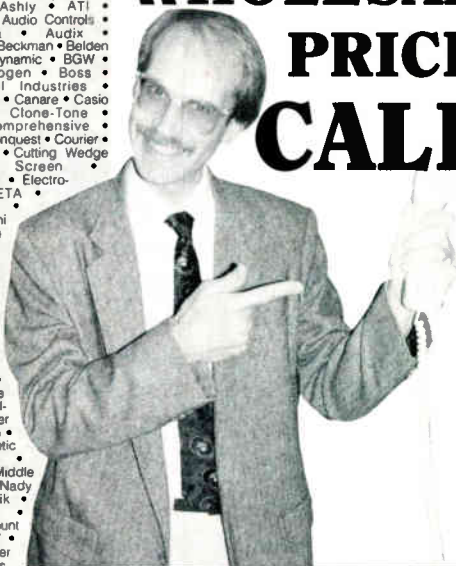
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EURO DISNEY

(continued from page 49)

DAS system, where the signal is converted to zeros and ones. At the output mainframe, engineers for live or broadcast sound can choose whether they need analog audio from XLR outputs, digital hard wire signal or a continuation of fiberoptic information, Olah said.

The Dutch electronics giant Philips, is general contractor overseeing construction of the project.

First introduced at the 1989 AES show in New York, the Lester DAS-2000 sells for roughly \$37,000. The system is designed mainly for temporary broadcast applications such as the Olympics, for which Lester is reportedly negotiating with NBC. The other key fiber optics player, Klotz, has a highly specialized system that costs

roughly \$200,000 and is designed for permanent installations. England's Wembley stadium now uses a Klotz fiber optics system, for example.

There haven't been many real-case uses of these systems.

Lester Audio beta-tested the DAS system by broadcasting 17 days worth of boxing and basketball at the Goodwill Games in Seattle last August. Still, there haven't been many real-case uses of these systems in live sound, recording or broadcast, Olah noted.

"This whole technology is brand new," said Olah, who attributes the rise in fiberoptic audio to the development of 16- and 18-bit digital converters. He credited much of the DAS's technological features to colleagues in the Technical University of Budapest, Hungary — from which Olah graduated with a masters degree. Lester Audio has an on-going partnership with the University, Olah said.

Lester may have to further customize its

system depending on what sampling rate and digital format Disney chooses.

"It's very easy to change formats," Olah said. "We could just take out the transmission function from the digital CPU board and simply modify the transmission board and build a format converter. We could have it done in three weeks."

Olah said that if Disney chooses a digital mixing board or digital workstation, the audio could be piped in digitally via copper or directly on fiber.

Videopolis is one of few places in the park where the speakers systems will be out in the open.

But Olah said the biggest challenge for him on this job is not merely a technical one.

"To work for the Disney operation in Europe is really number one," said Olah. "Disney is of course a very fair customer, but also a very tough one. It's sort of make it or break it." ■

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Installing Arthur's Landing

A Restaurant with Sound Fit to Please an Emperor

BY ART STEINMARK

Arthur E. Imperatore is called the *Emperor of the West Bank* — this West Bank being the New Jersey side of the Hudson River overlooking Manhattan. He's rebuilding that once thriving industrial area with a vision of a "Venice on the Hudson." *Emperor* is English for the Italian *imperator*, but, more than that, the nickname is a tribute to Imperatore's style: He likes to do things right.

In fact, he's known to demand perfection. His trucking company is not only profitable, but is a model of efficiency. His yacht is not only large, but houses a collection of paintings by artists such as Toulouse-Lautrec, Renoir and Matisse.

Most recently, however, Mr. Imperatore's showplace restaurant, Arthur's Landing, in Weehawken, New Jersey benefited from his golden touch. Customers and critics alike had been at a loss for superlatives to describe the views of Manhattan, the delicate New American cuisine, and the pleasure of the experience, including Mr. Imperatore's trans-Hudson "Port Imperial" ferry service. However, "Mister Arthur" himself felt that one aspect of the restaurant did not pass muster: The sound system wasn't shipshape.

He called in MAS Audio, the audio design company that had installed a custom



A totally refurbished industrial building, Arthur's Landing has walls of concrete and glass. Sonex I sound-absorbing material was installed to improve acoustics.

system in his Bucks County, Pennsylvania, estate. Their job was to design a solution fit for an emperor's listening pleasure. And one that would accommodate the demands of the restaurant.

Previously a marine shipping terminal, the building's exposed slab and beam construction predominates the decor as well as functional considerations, like the installation of a sound system. Floor-to-ceiling windows on three sides offer broad views of the marina and New York City

across the river.

MAS began by conducting a two-day site survey. "The first day Michael and I went in with our wiring team so they could see the exposed I-beam construction," says Roger Williams, partner in MAS with Michael McCook. "After this, we were able to develop an accurate estimate and schedule for installation." The second day, an MAS architectural draftsman went along to do preliminary system drawings.

The restaurant has two bars and three dining areas on two floors. Downstairs there is one bar and one dining area; upstairs has a bar and two dining areas. "We decided to create five independent listening zones, based on the seating arrangements, with a great sound system in each one," Michael McCook says. "Our proposal featured digital remote volume control in each zone and separate EQ for each."

In addition the proposed system took into account:

- Chatter caused by reflective surfaces: stone floors, concrete ceilings and floor-to-ceiling windows.
- Need to accommodate live and preprogrammed material.
- Security.
- Aesthetics.
- Installation and switchover with minimal interruption of restaurant business or availability of music.

To improve acoustics by eliminating one reflective surface, 436 square feet of

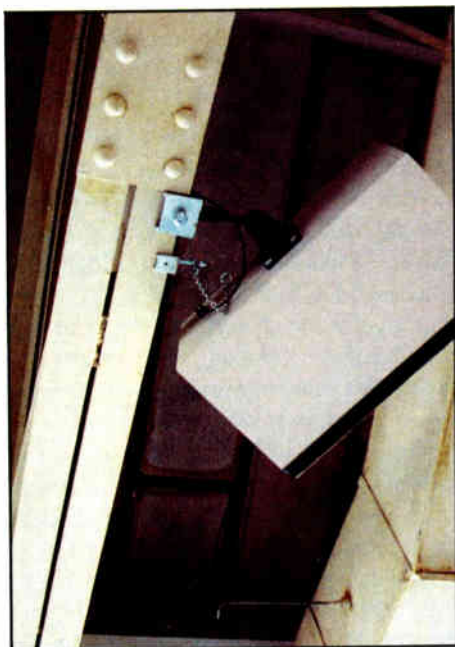
Art Steinmark is a business writer based in New Hope, Pennsylvania.

Sonex I sound absorbing material was installed on the ceiling of the first floor dining room but not the bar, which is intended to have a livelier atmosphere. "Just talking, we could hear the improvement the Sonex was making as we installed it," Williams remembers. "Eliminating one bounce cut out a lot of noise, really softened the sound."

Two models of MAS-designed full-range speakers are used, the MAS A8 and the B6.5. "We designed these specifically for use in distributed speaker systems,"



Arthur's Landing at night.



MAS-designed speakers allow for coordination of colors and materials with the existing decor. Omnimount hardware was customized by MAS.

McCook explains. "They're efficient, with excellent bass response. And we can match colors and materials to those of the room setting." Omnimount speaker mounts were interfaced with industrial I-beam clamps to install the system's 13 speakers. Secondary safety chains on flown speakers protect hardware and customers alike.

Wiring is dressed along the beams and otherwise unobtrusively fed back to the equipment rack in the manager's office. The system is powered by three stereo Hafler Pro 1200 amplifiers, with 60 watts



View of restaurant section just before completion.

rms per channel. "We're Hafler dealers because we love their sound," Williams said. "It's clean and transparent, which is what we set out to achieve for this installation." An added plus is that the amplifiers' MOS-FET technology at this power level doesn't require constant air flow for cooling, so there isn't fan noise in the office.

Individual EQ for each zone is achieved using three Ross Systems RX15S equalizers. MAS determined that a 15-band equalizer would provide adequate control to accommodate the characteristics of the zones. A BBE 401 sonic maximizer was included to provide the added dimension

that MAS considers a signature of their sound. McCook explains, "BBE puts a natural contour on the sound that agrees with our understanding of high fidelity."

Remote control from each listening zone is provided by three two-channel Oxmoor DCA-2 attenuators used in combination with five Oxmoor RC-16 remote controllers. "These are keyed remote controls so there isn't a chance of unauthorized tampering with the settings; at the same time this saves people on the floor a lot of trips to the office," says McCook. "This was an important feature in the design requirements."

The system will accept live and pre-pro-

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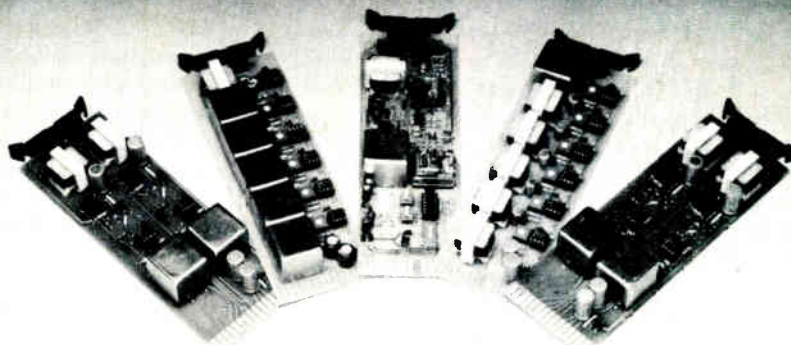
3 Hafler Pro 1200 Power Amplifiers
3 Ross Systems RX15S Equalizers
1 BBE 401 Sonic Maximizer
1 Oxmoor MDA-16 Distribution Amplifier
3 Oxmoor DCA-2 Attenuators
5 Oxmoor RC-16 Remote Controllers
1 EMS 2000 3T NAB Cartridge Player
1 MAS Program Switch/Power Panel
5 MAS B6.5 Full-Range Loudspeakers
8 MAS A8 Full-Range Loudspeakers
13 Omnimount 100 STX Speaker Mounts
1 MAS Custom Rack Harness
1 MAS Speaker/Control Harness
436 SF of Sonex I Sound Absorbing Material

grammed material. An Oxmoor MDA-16 distribution amplifier delivers six equal signals to the power amps. An MAS-designed program switch allows for switching between the live signal, usually a grand piano player, and an EMS 2000 NAB cartridge player. The EMS system offers digitally mastered continuous play tapes with a typical frequency bandwidth of 36 Hz to 15 kHz. With over 150 selections in various formats, management can choose appropriate programming based on dayparts or clientele. "We designed the power/program switch to accommodate this particular system configuration within one rack space," Williams said. "There just wasn't anything commercially available to do it." Full surge protection for the system is included in this component.

The five-day installation was carried out while the restaurant was operating. After powering up the system for an initial listening, each zone was spectrum analyzed and fine tuned. Based on an MAS listening level standard (85 dB), the MAS procedure is to flatten the room as heard by a strategically placed microphone. "The 15-band equalizer let us adjust for all hearable sound inconsistencies," McCook says. "Interestingly, the five zones all had similar response characteristics."

During the switchover from the old system to the new, there was a brief period without music. "The manager was very aware of the dead spot during the switchover," Williams remembers. "But since the system has been on line, everyone agrees it was a temporary inconvenience and permanent improvement." Even the Emperor of the West Bank. ■

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CONSULTANTS' CORNER

(continued from page 91)

business comes from referrals, past project work and reputation. They'll call you.

For larger projects, often you hear about the project, find out who the architect is or who the owner is and then you can approach them—that's direct marketing. I do more of that than advertising. It's the nature of the business that if you target a particular client or a particular project and go after it, you'll get better results than if you send a brochure out to every convention center and hope that they've got an acoustical or sound system problem.

Also, participation in technical societies other than your own can be helpful. I've given talks at the Stadium Managers' Convention; IAAM, the International Auditorium and Arena Managers; that kind of thing. Presenting technical papers at meetings within our industry is one thing, but you shouldn't overlook the value of presenting papers to groups of people who are potential clients.

Sound & Communications: Do you do regular mailings of any sort to your client list?

Lewitz: No, and that's because of the size of the firm. In a 25 person firm, then you have a marketing staff. The staff spends 100 percent of their time generating business. Right now I'm too busy to do much marketing.

Sound & Communications: What kind of support and follow-up work do you provide?

Lewitz: If it's a major facility, sooner or later, they're going to need upgrade or replacement. Maybe they couldn't afford the whole system initially. So you want to stay in touch with that. We also provide post-installation checkout services. The way we describe it to the facility owners is that they wouldn't want to go out and buy a car and drive it for three or four years and not ever get a tune-up. It's the same with their sound system, and they've invested a whole lot more in their sound system than they did in their car.

I mean, if we're talking about a big sound system — one, two, three hundred thousand, a half million dollar sound system or bigger, and a lot of times the install-

ing contractor may be capable of doing the job, although—and this is a key—a lot of these large systems have acoustical aspects that are important from the design on through the checkout and the follow up work.

The acoustical consultant who can coordinate and integrate the room acoustics with the electro-acoustics has an advantage over a contractor who will check an amplifier or do some electrical balancing. The acoustical measurements are what's important. One thing that's changed considerably in the 20 years I've been in the business is the level of expertise of the contractors. They've really come a long way in terms of design and testing.

Sound & Communications: To what do you attribute this increased level of expertise?

Lewitz: They've been hanging around a lot of good consultants, I guess. I would modestly say that some contractors have learned a lot from me.

Sound & Communications: Do you see imparting knowledge to the contractor as part of your job?

Lewitz: Oh yes, sure. Again, in a big firm, you also have to commit yourself to

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training. It's the only way you're going to build and keep your staff, and it's the only way to maintain the level of quality you want. If you extend that, and to me it's a logical extension, to the contractors and installers, if our goal is to get the best sound systems installed, well, there are four elements you must control: the design, the installation, the maintenance and the operation. So if you stumble on any of these, you've blown it.

If you've got a great sound system and it's installed perfectly, but no one knows how to operate it, it's not going to work. In fact, I'll add one more element, and that's the tuning and equalization, the checkout. If I think we'll have better installation because I've explained to a contractor a little bit about the room acoustics or why we're designing the system a certain way, of course I'll take the time to do it. I think that's better for the industry all around, and I'm certainly not worried about this contractor being a competitor and getting the next design.

Sound & Communications: Do you provide operator manuals for your systems?

Lewitz: It depends on the job. On some jobs we prepare the O&M, the operator and maintenance manual, and also we train the operators. We used to write into the specifications that it was the contractor's responsibility to train the owner upon completion of the installation, but we do a lot of that ourselves, partly because I enjoy doing it. And it also results in a better overall sound system.

I've had jobs where communities that have an audio technical staff have hired me as a consultant to run a one or two day seminar. But, again, just as I'm not in the plotting business, I'm not in the training business either, and there are people who do it better, like Don Davis.

Sound & Communications: Speaking of training, what do you look for in the people you hire?

Lewitz: You want someone who can think and who can communicate. It's one thing to have somebody who can sit in the office and do the design work, but this is a consulting firm and you have to be able to communicate information and you have to be able to deal with clients, transmit information verbally and in written form. So you want somebody with all of those skills. If you have somebody who's been doing sound system design work for five years, so much the better.

Sound & Communications: Describe a typical work day.

Lewitz: It's all on a computer, I've got a two month schedule on my computer. You have to be organized no matter how big a firm, or what kind of business you're in. Every morning, first thing, I take a half hour—no phone calls—sometimes at home, sometimes at the office. I sit with my laptop and my "to do" list and plan my day and look at the rest of the week and the month. Prioritize. Then I go to do those things, which fall into two categories: in the office and out of the office.

I'm out of the office a lot doing site visits and checkouts and measurements. Everything is so portable, an increasing amount of my time seems to be out of the office, maybe about 40 percent. I couldn't be gone that much without a great staff. We meet every Monday and plan the week. Plus, we often have lunchtime staff meetings on the boat. It takes three minutes to walk over there. We all genuinely like each other, so things run pretty smoothly. All the organization in the world won't help if your support staff is not good.

Sound & Communications: You're known as something of an expert in CAD.

Lewitz: Some people spell CAD "c-a-d" and some people spell it "c-a-d-d." CADD is *computer-aided design and drafting*. If you've got to draft it, CAD is useful, to be sure. But it's the design function of program that is most significant. There's no question that you can do a better job with computer aided design. One of the reasons is the power of the computer; it's so fast. It gives you the capability to run through dozens of theoretical design situations and test them without actually building the systems. You can say, "Well, how about this, and could this work, maybe this here, and so on." Of course, you have to know how to design the sound system in the first place. Where CADD becomes invaluable is in analysis. It allows you to take your design, which you came up with through your skill and knowledge, using lots of your other tools, including experience, and it confirms the performance characteristics.

In concert hall acoustics, for instance, before computer analysis, they had to build it first and keep their fingers crossed. Then if it didn't sound right they said, "Let's take these gigantic panels and move this and gee, I wish the walls were

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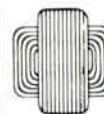
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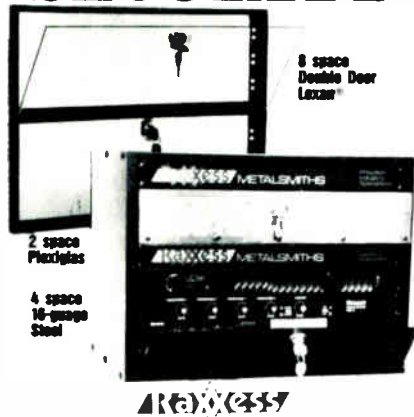
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tilted this way."

If you can model it on the computer, you don't have to try to make these major adjustments later. You still have to do a checkout of the sound system. The computer will find the gross anomalies. It never takes care of the fine tuning, so when you get out there, you may have to adjust the angle of the horn a little or do some time alignment. CADD programs mainly address analysis and expected performance of sound systems. There are other programs I have that do numerical calculations, that tell you how much privacy you're going to get in an open-plan office, say.

In open-plan office acoustics there are lots of variables that result in speech privacy—density, how far apart the people are, whether you've got a partial height screen, how high the screen is, what the voice level is, what the ceiling material is, what the background sound level is—you plug these all into the computer program. When someone says, "Show me why I need a masking system," you do the calculation and you can show them what the privacy is with and without a masking system. It's very clear. It can be done manually, but it's complicated and time consuming.

Sound & Communications: What specific programs are you using? Do you write your own?

Lewitz: Most consultants I know have programs that they develop themselves, mostly calculation programs. There are some consultants who are marketing their own programs. I have developed some of my own, plus I use others. One program just does decibel calculations. It adds decibels. I mean, somebody's got to do it. We used to do it on a slide rule. Because that's how you do logarithms. Then came HP 35, then a computer. There are programs to calculate reverberation time, to do HVAC noise analysis, to do tracking noise analysis, to do speech privacy analysis, to do STC & NIC calculations, to do barrier calculations. There's a lot of number crunching you have to do in environmental noise work, which we do a lot of, because environmental noise is based on energy averages. Pure number crunching. All kinds of programs. There's one to select the TAP values in an RF distribution system.

Lewitz: It's hard for me to believe that 20 years ago in our office at Bolt, Beranek & Newman, we had secretaries sitting at

IBM typewriters who had to type up 70-page specs, and then someone like me would come along and say, "Whoops, I didn't want this amplifier, I wanted the other amplifier." Computers make you more productive and more accurate. When you're using these tools properly, you can't beat it.

Sound & Communications: Are you a Mac person or an IBM person?

Lewitz: IBM. I honestly think it's whatever you got started with, that's what you end up using. It's hard to change over, although I know people who've done it. You can't tell anyone which is better; it's too personal a choice.

There is another aspect of computer technology that has revolutionized acoustics and that is the instrumentation. All of the instrumentation now is microprocessor controlled and you take it out in the field and you do your tuning and analysis. The way we used to do it was to go out and make a recording, take it back to the lab and analyze it with all this giant equipment. Now, everything is portable, so you can do real time analysis on site. Because of this,

IN OPEN-PLAN OFFICE ACOUSTICS THERE ARE LOTS OF VARIABLES THAT RESULT IN SPEECH PRIVACY.

my own personal computer, the one on my desk, is a Toshiba laptop. I take it out in the field, make all my notes on a job, come back, give the secretary the disk and the report is done. Also, a lot of the programs we talked about earlier are loaded into my laptop, so I do analysis right in the field. When I'm back at the office, I hook the laptop up to a regular monitor; it's easy to work with.

Having this technology in the field makes you so much more productive and you can do so much more. Ivie, Larson Davis, B&K and Techtron are good examples of microprocessor applications. There's stuff you could never analyze before. There's a tremendous revolution in what we can analyze, and that has improved the sound systems. Take a comb filter, say, maybe you could hear it, but there's something about seeing it. It

makes it easier to avoid it the next time. There are people who have better ears than any instrument, to be sure, but I'll take the instrument, too. This area is a very big application of computer technology.

Sound & Communications: What other advances do you see on the acoustical horizon?

Lewitz: All this stuff is going to get smaller, lighter and more powerful. And someday, there won't be any acoustic feedback. They'll figure out how to do it digitally with microprocessor chips.

Sound & Communications: What are some of your professional affiliations?

Lewitz: I'm a member of the Acoustical Society of America; the AES, NSCA. I'm on the NSCA Expo Committee; we plan the conventions. We're also members of the NCAC, the National Council of Acoustical Consultants. I think these technical societies and participation in their committees helps your business quite a bit. You go to these conventions and you don't meet your customers, you meet your competitors and colleagues. You get to talk to people and find out what's going on. I

think that supporting these societies is an important part of a consultant's business.

Sound & Communications: Do you have any heroes?

Lewitz: I'm too old to have heroes. There were people at Bolt, Beranek & Newman from whom I learned a lot — Dave Klepper is one, Pete Tappan, Jacek Figwer, David Kaye, Wilfred Malmund.

Sound & Communications: If you weren't an acoustical engineer, what do you think you might be?

Lewitz: I'm really happy doing this, but if I had to do something else, perhaps I would have been a teacher. During a checkout, for instance, although in some ways it's part of the job, I really enjoy explaining to the contractor or the owner's representative or whoever's there what's going on. And at NSCA, I'm pretty active in the education program.

This is the only job I've ever had. I became an acoustical consultant right out of graduate school and that was it. I don't really care to do anything else.

Sound & Communications: Who taught you the most about succeeding?

Lewitz: My father. At Michigan, I

learned how to think and analyze. But the way I was raised has taught me the most. If you're going to work with people, you've got to know how to treat them. If you can't work with people, you won't be successful as a consultant. Your interactions with clients, colleagues and staff are perhaps the most important element of your business. My father ran a successful [tire] business and I guess I learned by watching him.

To run a successful business, you must be able to manage people. Then you can go on to the technical and financial parts of your business. It's all important. I think the hard part for many technical people is the business part. But, talk about computer applications! Look at all the support for the business aspects there are now—spread sheets, word processing, spec sheets and written communication. You have to get yourself organized in terms of your business, and discipline yourself to make those details a priority.

If I had to sum up the elements of success, I guess they would be discipline, organization, knowledge and the ability to deal with people. ■

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EAST GERMAN DEALER GAMBLES ON COMMERCIAL SOUND

By Robert Angus

When the East German government teetered on the brink of collapse toward the end of 1989, one thing was certain: the technical institute in the town of Radeberg was going to shut down, throwing some 44 electronics engineers, instructors, technicians and other employees out of work.

Over the years, the technical institute had become little more than another of the communist regime's make-work projects. True, its faculty was qualified and respected, and its students really learned their trade. The problem: East Germany's failing electronics manufacturing sector simply had no room for them, and the stagnant economy couldn't put them to work.

Enter Wolf-Rudiger Ziegenbalg, a young entrepreneur who had learned the hard way just how difficult it could be to start his own electronics repair business, even through agencies. Ziegenbalg told the institute staff that he was going to take over their building and put everyone to work who wanted a job — selling, servicing and installing commercial sound equipment, satellite TV, car stereo gear, audio and video equipment for the home, cellular telephones and other consumer electronics products.

Ziegenbalg's troubles with the government started in 1976, shortly after he had graduated from technical school as an engineer and landed a repair job with



Wolf-Rudiger Ziegenbalg surveys the modern, comprehensive commercial sound electronics business that he started.

Robotron Electronics, a government-owned firm that made television and computer equipment. "Shortly after I was there, I was asked to join the Communist Party. For a variety of reasons, I didn't want to, and I was told that my job was finished," he told an interviewer recently. "That was okay with me. A friend and I thought we'd like to open our own automotive repair shop, but I was told I'd have to wait a year to get the license to do business. Fortunately for me, my mother owned a pub and I earned a living managing it until I could get the license."

By that time his friend had been drafted and Ziegenbalg had decided to try electronics servicing instead of automotive repairs. "It took me two years to get the license to do TV repairs, and I found myself working until 1 AM to keep up with the business," he reports. "Under the old regime, you were licensed to serve only

a certain territory, so that you didn't compete with the state shops or some other existing dealer. One of the dealers whose territory bordered on mine complained to the government that I was taking his customers, so I had trouble getting a license to sell equipment." Eventually, he got permission to sell black and white TVs; the complaint from his competitor caused a request to sell color sets to be denied until 1988.

Ziegenbalg, an avid soccer fan, had spent considerable time hanging around the clubhouse of FC Dynamo, Dresden's entry in the international soccer league. Working his way up through the ranks of management, he travelled with the club when it went abroad to play and get to know team members well (today, he's president of the club). So it wasn't surprising that when he began repairing TV sets, the athletes brought their equipment to him. One reason: the average life expectancy of a color picture tube made in East Germany was three to five years. Most service stations took a minimum of three months to do even the most simple repair jobs.

"Finally, one day, a government official who was also a sports fan asked me to repair his TV set. I told him I couldn't because of the restrictions on my license and the complaint from the other dealer. Before I knew it, I not only had the license I needed, but I also had permission to sell color TV sets.

By the time the Berlin Wall came down in November 1989, Ziegenbalg had six employees, and he was ready to expand. "Nobody would buy products made in East Germany, so I knew that I had to get products from the West." The first ones he chose were satellite receivers and antennas made by a company in Bavaria.



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“My daughter had met the daughter of a director of that company at a demonstration against the government in Dresden, and we worked out a deal. Unfortunately, the company didn't make a full line of the products I wanted to carry, so I'd have to drive to Hanover or West Berlin, where I found dealers who would sell me the products I needed.”

Cash flow is an enormous problem in East Germany, where the credit card is virtually unknown, and consumers are used to saving for years to buy cars and major appliances for cash. Dealers pay cash for their stock, then use the profit from each sale to finance the next stock purchase. In Ziegenbalg's case, that meant driving overnight three times a week to his suppliers in Hanover and Berlin to keep his shelves full. He'd leave with his van after closing the shop at night and be back with a load of merchandise in time to open the following morning. “One exception is Telefunken,” he confesses. That company provides three of everything to shops like Media Center on consignment — one for the window, one for demonstration on the sales floor, and one to go. As the dealer pays for each unit he sells, the company ships a replacement unit.

Is it a risk? “Enormous,” says Michel Grell, Telefunken's Leipzig regional manager. “There is no guarantee that these businesses won't fail, or that the economy will develop fast enough to support a business like Wolf-Rudiger's.” Some estimates put the expected failure rate among the new entrepreneurs at greater than 50 per cent, but Ziegenbalg isn't worried. “We made the commitment and we're going to make it happen.”

“I got into commercial sound through my soccer contacts,” he explains. He has done work at the Dynames' clubhouse and stadium, and has installed commercial systems in the businesses of other club

directors. At the moment, he's putting audio/video systems into the homes of team members, a business he expects to expand as the residents of Radeberg become more prosperous. By East German standards, athletes were comparatively well paid; and because they had the opportunity to travel, they could bring back videocassette recorders, large-screen TV, satellite equipment and audio gear. “Now they want to put all that into a single system. That's where Media Center comes in. We have the staff not only to design a proper system, but the trained installers to do the job and service technicians to make sure it all works. We also have the largest selection of audiovisual

DEALERS PAY CASH FOR THEIR STOCK, THEN USE THE PROFIT FROM EACH SALE TO FINANCE THE NEXT STOCK PURCHASE.

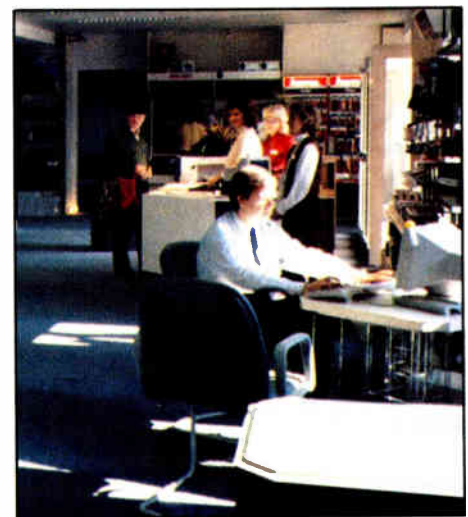
equipment in the area.”

Altogether, Ziegenbalg's investment in Media Center amounts to just short of \$1 million, an enormous risk for a company whose future is by no means sure. Ziegenbalg can't even be sure that someone else won't claim the building he took over from the technical school, after he and his workers put countless hours and thousands of marks into renovating it. “A former owner from the West could show up and claim it at any time,” he notes.

One of the youthful entrepreneur's biggest problems is a lack of initiative among his employees, a characteristic he blames on 40 years of Marxist rule. “These are professional people in every sense of the word,” he tells an interviewer. “They are highly skilled at what they do, but they lack motivation. They can't get used to the idea that they're working for themselves; that extra effort will be rewarded.” He claims that service technicians, when they finished a job, will sit around until they're told what to do next; that engineers designing a commercial sound installation ask approval for virtually every decision they make.

What was the worst thing about doing business in the German Democratic Republic?

“The regulation of practically everything you did. They told you how many employees you could have and how much you could pay them. Employees of a private business couldn't make as much as those working for a state shop. They told me what I could and couldn't repair, and for whom I could and could not make repairs. There was a limit on profit — if you made



Clients discuss commercial sound and home custom system needs with sales representatives in a relaxed atmosphere.

too much, the excess was taxed. The result was that nobody worked any harder than they had to — there was no point.

Looking forward, Ziegenbalg doesn't expect commercial sound and custom home audio-video installation to become the major part of his business, although he dominates the field in his part of Saxony now and expects it to increase as businesses modernize and expand. He's counting on the same thing from his auto-sound installation bays, his computer showroom, audio/video department, satellite TV section service department and the snack stand in the parking lot. “I expect each of these areas to be a profit center and to expand as the economy expands.” He already has plans to advertise — on a railroad bridge just outside his showroom, on local television and in the local newspaper — just as soon as it's possible to do so. ■

PEOPLE

Appointments at Burle and Audio Precision

Sales at Burle

Robert R. Drob has been promoted to the position of Manager, Sales for the Security Products Division. Drob, who previously held the position of Product Manager at Burle is now responsible for Burle security products sales in North America, Latin America and Asia. He is also working closely with Burle's network of manufacturer's representatives.



Drob

Jones at Audio Precision

Wayne Jones, founder and former President of Canadian audio test equipment



Jones

manufacturer Amber Electro Design has joined Audio Precision, Inc. Jones sold Amber in late 1989 and left the company in 1990.

Andison and Anderson at Mark IV

Neil Andison has been named national sales manager for Mark IV Canada. Andison is responsible for the management and coordination of all sales and marketing activities for Mark IV Audio products in Canada. He previously served as western regional sales manager for Mark IV Canada.



Andison

for Mark IV Audio Canada, Inc. is Tom Anderson. Anderson is responsible for marketing and sales efforts for Mark IV Audio products in western Canada. Previously, he served as western sales representative for Cooper Industries, Belden Division.

Appointments at Gentner

Gentner Electronics Corporation has announced the appointment of David C. Finley as Director of Marketing and Sales, and Daniel P. Marchetto as Teleconferencing National Sales Manager.

As Director of Marketing and Sales, Finley is responsible for directing the world marketing and sales efforts of the company's Broadcast, Professional Audio and Teleconferencing product lines.

As Teleconferencing National Sales Manager, Marchetto is responsible for all domestic sales in the Teleconferencing group.

EDS Board Nominees

Two new manufacturer nominees; Ronald Rezel, vice president and general manager, Eaton/Cutler-Hammer; and Arnold Rosenblum, president, Cole-Flex; and one new distributor, Wesley Sagawa, president of Capstone Electronics



Rezel

have been designated for election to the Board of Directors of the Electronic Industry Show Corporation, managers of the Electronic Distribution Show and Conference.

Another manufacturer, Blair Haas, President of Bud East, has been slated for re-election, as has manufacturers' representative Glenn Alverson of Hilltronics.



Rosenblum

Mowrer at Norman

Joseph Mowrer has been named national sales manager for Norman Laboratories Speaker Company of Norman Oklahoma. Formerly southern regional sales manager with JVC Corporation, home entertainment division, Mowrer most recently worked as a sales representative with the consumer products division of Sony Corporation of America.



Mowrer

Mowrer is responsible for Norman Lab's overall sales and marketing efforts in the United States. He is building a national network of manufacturer's representatives.

Filius at Brand-Rex

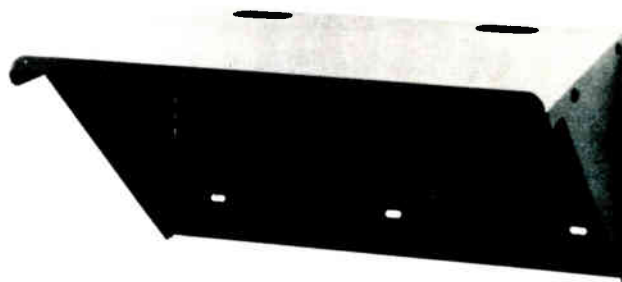
Brand-Rex Company has announced that company president Ronald H. Filius has been elected to a two-year term as Chairman of the National Electrical Manufacturers Association (NEMA) High Performance Wire and Cable Section during its annual meeting.



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NEWS FROM AROUND THE INDUSTRY

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Williams Sound Celebrates

Williams Sound Corp. is celebrating its 15th anniversary as a manufacturer of wireless hearing assistance systems. Founded in 1976 by Jerry Williams, the firm now employs over 50 people. The anniversary is being celebrated with an open house in the company's new Eden Prairie MN facility. Paul Ingebrigtsen, vp of marketing, said, "We would like to thank our customers for helping us reach this milestone."

Altec Installs

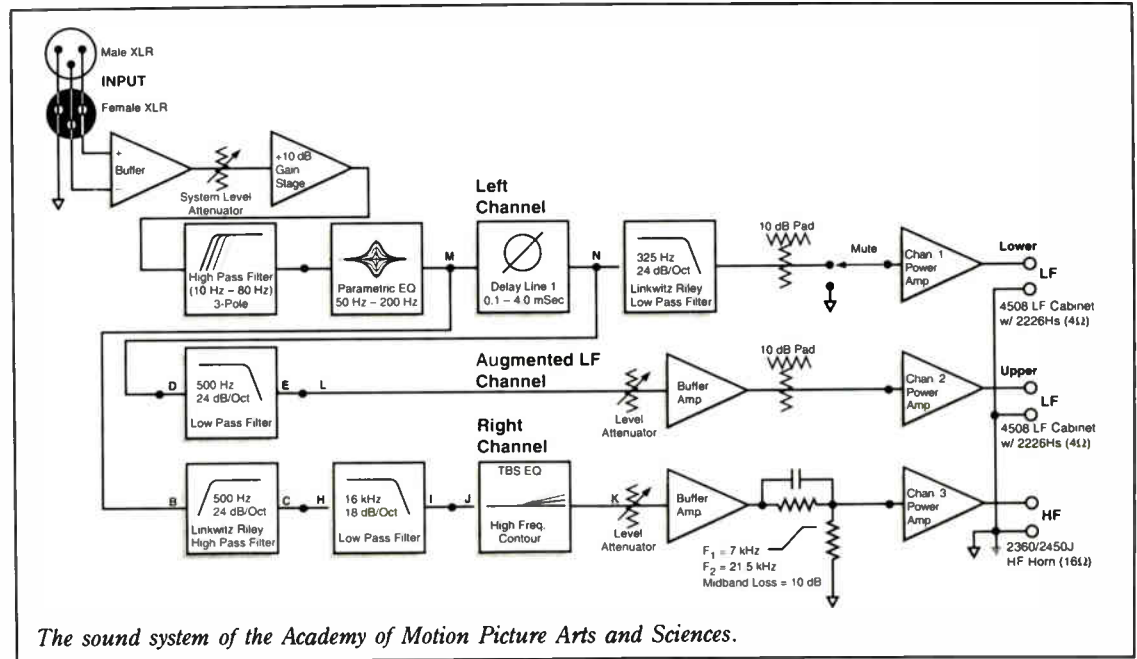
Altec Lansing has announced several new installations around the world using Altec A700 products. Advance Sound Company of Bayshore, New York, installed an Altec A700 system in the Harricks High School (Harricks, Illinois) 1,000 seat auditorium. Catur Mitra Adhikara pt installed a system at the Nusa Indah Convention and Exhibition Hotel in Nusa Dua, Bali, Indonesia. Vada Communications Systems in Rehoboth MA installed two systems in Our Lady of Mt. Carmel Church; and installed two other systems in St. Pius the Xth Parish Hall on Cape Cod. The Pavilion of New Zealand in Auckland received 12 systems installed by Bartons Sound Systems. And also in New Zealand, an A700 system was installed in Old St. Paul's Cathedral by Oakpark Productions. Back home, in Alexandria, Virginia, American Amplifier and TV furnished the Washington Hilton Hotel with six each Altec A700s and A700XLFs as portable systems on casters.

DAT in Africa

Sony has passed the word that the Sony TCD-D10 Pro DAT recorder was used to tape Masai tribe members during the filming of National Geographic's "Serengeti-tidiary" television special. The filming was done near Ngorogoro Crater in Tanzania. Kenneth Love did the recording. Love has won an Emmy Award for Individual Achievement in Outstanding Sound Recording.

JC Penney Breaks Ground

JC Penney has broken ground for its 1.5 million square foot corporate headquarters in Plano, Texas. Included in the headquarters are more than 25,000 square feet of broadcast production spaces. Design of the broadcast production facility was the



The sound system of the Academy of Motion Picture Arts and Sciences.

responsibility of Dallas based Russ Berger Design Group along with architect HKS Inc. HCB is the general contractor. The new technical facilities are expected to be operational by November 1992.

excited about the growth Multiplex Technology can bring to our company. They are aggressive and have grown over 40 percent per year for the last five years."

According to BGW, the impetus for the change came from Klaus Wiedemann of The Burbank Studios, John Bonner of Hollywood Warner Studios, and Doc Goldstein of Universal Studios.

Equity Position in Multiplex

Valley Forge Corporation has acquired a majority interest in Multiplex Technology, Inc. of Brea, California. Dave Brining, president of Valley Forge, said, "We are

BGW at Academy Theater

The theater of the Academy of Motion Picture Arts and Sciences has been fitted with a new sound system using BGW SPA-3 Signal Processing Amplifiers. Ac-

QMI Appoints Alacronics

QMI, the sole North American distribution company for Drawmer Electronics and Genelec loudspeakers, has announced the appointment of Alacronics, Inc. of Wellesley, Massachusetts as the exclusive, authorized national warranty repair center for Drawmer and Genelec products in the United States. Alacronics, currently an authorized warranty repair center for companies such as Tascam, Yamaha and Akai, is also known for their acoustical design, engineering and technical support.

EV at Olympics

EV Sentry 500 monitors have been installed in the A/V control room of the Palais des Sports arena to be used for several events during the 1992 Winter Olympics in Grenoble, France. The installation was performed by ATEC of France. Other recent installations of EV equipment include the football stadium and three baseball facilities at Cal State - Fullerton University in Fullerton, California. GMS Sound of Orange, California was the installing contractor.



Masai tribesmen recorded on DAT.



Audio-Technica's Rep of the Year Randy Fuchs of Crescendo Associates accepts award. Left to right: A-T national sales manager Garry Elliott, A-T president Jon Kelly, Fuchs, A-T national marketing manager Buzz Goodwin.

REP NEWS

Audio-Technica Rep Awards

Audio-Technica has presented 13 of its regional marketing representatives with awards for excellence in exceeding projected 1990 sales quotas. Leading the list, and recipient of Audio-Technica's Representative of the Year award, was three-time winner Randy Fuchs and Crescendo Associates of Hollywood, Florida. Other reps receiving Quota Busters Awards included David H. Brothers Company, Cambridge Marketing, On the Road Marketing, Signal Marketing, CM Sales, Hanoud Associates, Northshore Marketing, Tenicki & Daniels, New West Audio, Ludwig Marketing, Jamm Distributing, MN, and Jamm Distributing, IN/KY.

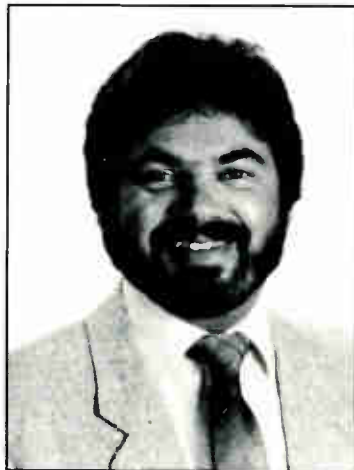
ARX Reps

ARX Systems USA has made three new rep appointments: Progressions Associates (Mike Ramirez), Hollywood, Florida, for Florida and Puerto Rico; SC Music (Marshall L. Berenson), Cambridge, Massachusetts for the New England states, New York state and northern New Jersey; and Quad-Tech Inc. (Bill Daniels), Shawnee Mission, Kansas for Kansas, Nebraska, Missouri and Iowa.

BGW Makes Appointments

BGW Systems has announced the appointment of three rep firms. Innovative Sales & Marketing of Irvine, California

covers California, Nevada and Hawaii. Bi-State Marketers of Fairfield, New Jersey covers metropolitan New York and northern New Jersey. White Radio Limited is the exclusive Canadian representative for BGW Systems.

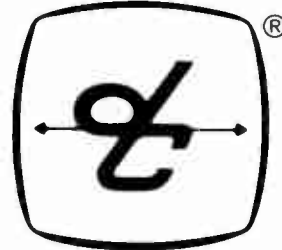


Chuck DiModica

Promotion at Tunk Sales

Chuck DiModica has been promoted to vice president in charge of the pro audio division of Ron Tunks Sales, Inc. in Fort Lauderdale, Florida. The promotion coincided with DiModica's tenth anniversary with the company. The announcement was made by Ron Tunks, who said, "Four years ago I asked Chuck to concentrate on the pro audio/contractor market, and the results have been so rewarding that he will now run his own division."

THE STANDARD OF QUALITY



in Noise-Attenuating Headsets and Communication Systems.

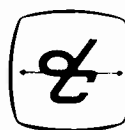
For over 30 years, David Clark Company has been the leader in the development of innovative ideas in NOISE-ATTENUATING (Reducing) HEADSETS for use in high noise areas.

When these headsets are combined with one of our OFF-THE-SHELF systems, your communication problems are solved.

Choice of Systems:

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Write or call for Catalog and name of nearest local dealer.



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B.E.S.T. Names Reps

B.E.S.T. International Corp. has appointed Consolidated Marketing Representatives as its manufacturer's representative in Florida. In addition, DRV Public Address Consultants of Cornwall, England has been appointed exclusive distributor for the United Kingdom. And Elab di Bini Graziella in Rome has been appointed exclusive distributor for Italy.

Symetrix Reps

Pro Tech Market of Midvale, Utah has been named the manufacturer's representative for Symetrix in the Rocky Mountain region. In Europe, ASC Audio Systems Consultants in Brussels has been named Belgian distributor for the Symetrix line.

LMS Marketing Expands

LMS Marketing has expanded its business line to include commercial sound products. The company, headed by Mick Mandabach, has served 10 years representing lines in the areas of CCTV, security, card access and video. The company is based in Columbus, Ohio.

Lexicon Names Reps

Lexicon has named Essential Marketing of St. Joseph, Missouri manufacturer's representative for its professional audio product line in Nebraska, Iowa, Missouri and Kansas, as well as southern Illinois. Essential Marketing is headed by Erich Uhlhorn, president.

Lexicon has also named Tandem Marketing its rep for consumer audio

products in Illinois, Indiana, Kentucky and Wisconsin.

IRP Signs Reps

Four rep firms have been added to the IRP Professional Sound Products network as announced by marketing manager Roger Carroll. AV West now covers Arizona, New Mexico and west Texas. Pappas Consulting handles northern California and northern Nevada, Chuck Olson and Associates covers Washington, Oregon, western Idaho, western Montana and Alaska. Kaltec Communications handles British Columbia, Alberta, Saskatchewan and Manitoba.

Allen and Heath Rep of the Year

Allen and Heath USA has named their rep of the year GMI New England, headed by George Markunas with sales support from Steve Forrest. Markunas has the longest relationship with Allen and Heath of any U.S. rep firm.

Dealer of the Year was Audio Video Research of Watertown MA, directed by Octavio Brito.

Awards have also been presented to Starin Marketing (Jim Starin, Joe Stopka, Neil Weber and John Borman) and Loppnow and Associates (Jim Loppnow, Will Lewis and Kerri Moeller).

Bird Electronic Reps

Bird Electronic Corporation has appointed Data Marketing Associates of Dallas as its representative for sales to OEMs, industrial and calibration laboratories, and the federal government in Texas, Oklahoma, Louisiana and Arkansas. Microwave Measurements, Inc. of Pleasanton, California has been named representative for northern California. Saber Associates covers Alabama, Florida, Georgia, Mississippi, North and South Carolina and Tennessee. Tritex, Inc. covers new England.

Adams Appointed

Clarity has added Adams and Associates, Inc. as the company's manufacturer's representative covering North Carolina, South Carolina, Georgia, Alabama, Tennessee and Mississippi.

CALENDAR

Upcoming Events

JUNE

Consumer Electronics Show: Chicago, IL: Contact: (202) 457-8700. June 1-4.

Expo Comm: Moscow, USSR: Contact: (301) 986-7800. June 5-10.

Nepton East: Boston, MA: Contact: (708) 299-9311. June 11-13.

New Music Seminar: New York, NY: Contact: (212) 473-4343. June 13-18.

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

JULY

Nomda/Southeast: New Orleans, LA: Contact: (800) 228-9772. July 17-20.

Communication Networks West: San Francisco, CA: Contact: (508) 879-6700. July 15-18.

Video Expo: Chicago, IL: Contact: (914) 328-9157. July 29-August 2.

AUGUST

NESDA/ISCET (Nat'l Electronics Sales & Service Dealers Assoc./Int'l Society of Certified Electronic Technicians): Reno, NV: Contact: (817) 921-9061. August 5-11.

Surface Mount: San Jose, CA: Contact: (800) 223-7126. August 27-29.

ISC East (International Security Conference): New York, NY: Contact: (708) 299-9311. August 28-30.

SEPTEMBER

Midcon: Rosemont, IL: Contact: (213) 772-2965. September 10-12.

Design Technical Conferences: Miami, FL: Contact: (212) 705-7740. September 22-25.

Video Expo: New York, NY: Contact: (914) 328-9157. September 23-27.

Freeform

Bite?

This bit is no pussycat!

FREEFORM FLEXBIT
Ask For It.

Check Our Prices!

35 ft. Stainless Steel Carpet Snake Available.

NEW! TRY THIS!!
New High Speed Steel Product with Hole in Bit End!

Call or write for additional information
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Circle 284 on Reader Response Card

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See cutting-edge technology from around the world demonstrated on the 200,000 sq ft exhibit floor.

Meet colleagues from across the country and around the world.

And...with your Full Conference pass...attend the full range of professional workshops. Regularly \$30.00 each, with a Full Conference pass your savings add up fast.

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THEME PARKS • TELEVISION • FILM**



NOVEMBER 22, 23, AND 24, 1991

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| b <input type="checkbox"/> manufacturer | b <input type="checkbox"/> sound | b <input type="checkbox"/> concerts |
| c <input type="checkbox"/> dealer | c <input type="checkbox"/> production | c <input type="checkbox"/> film |
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| e <input type="checkbox"/> club owner | h <input type="checkbox"/> other _____ | e <input type="checkbox"/> theatre |
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SAVE \$ 20.00

Order before July 31st to qualify for last year's rate.

YES, register me now for a Full Conference pass to LD191 in Reno at only \$175.00. I understand this rate saves me a full \$20.00 off the regular registration fee of \$195.00.

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A215

PRODUCTS

Tannoy Knows P.A.; QSC Adds Amps

P.A. Speakers

Tannoy has introduced its CPA Series (Contractor Public Address) loudspeakers in its first effort to enter the P.A. market. Included in the line is the CPA 5 with a five-inch dual concentric driver based on Tannoy's ICT technology. The CPA 5 can be mounted on walls or ceilings for various P.A. applications. They can also be used for home, office and studio applications. Other speakers in the line are the CPA 12, CPA 15, CPA 15FM (Floor Mount) and the CPA 15.2 bass bin.

Circle 1 on Reader Response Card



Amps Aplenty

QSC Audio Products has introduced the EX series of professional power amplifiers. The four new models have been added to the already introduced flagship model EX 4000. The EX 2500 fits into three rack spaces and delivers 720 watts per channel at 8 ohms. The other models in the line, the EX 1600, 1250 and 800, fit into two rack spaces and deliver 400, 275 and 175 watts per side, respectively.

All of the products in the EX series incorporate Open Input Architecture, a feature that allows for interfacing with control systems as they develop including a new generation of signal processing devices that QSC is currently designing.

Circle 2 on Reader Response Card



Multisystem VCR

The Audio Video Systems Group of the Panasonic Communications & Systems Company is offering the AG-2600E multi-system VCR for worldwide system capability.

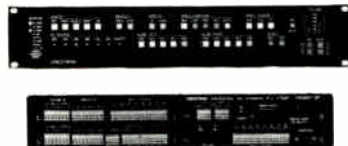
The unit is designed for American executives who, in the past, would have to make tape conversions from the PAL, SECAM, MESECAM and PAL-M broadcasting systems to the American NTSC format and for those who would need to "play back tapes acquired during a European or Asian business trip or record TV broadcasts in NTSC — PAL D, B/G & I — SECAM D/K & B/G," according to Robert Mahon, marketing manager of PCSC.

Circle 3 on Reader Response Card

Control System

Creston's Cresnet IIP is a control system designed for medium to small installations. The complete turnkey single priced system includes a master computer with SIMPL programming language, 25 watt power supply, 16 isolated contact closures, eight solid state switch outputs, eight inputs with over-voltage protection; six serial outputs for infrared, RS-232 or serial interface; two channel volume control; and a communication port for one and two-way RF and IR.

Circle 4 on Reader Response Card



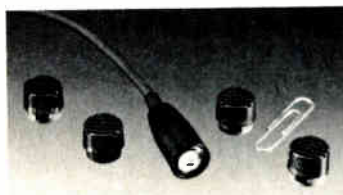
Interchangeable Elements

Audio-Technica has made available interchangeable elements for its UniPoint microphones. The elements are available in a variety of polar patterns for the AT853 miniature condenser and AT857 goose-neck condenser microphones including: Omnidirectional (O-ELE); Hypercardioid (H-ELE); and Subcardioid (SC-ELE).



Both the suspendable AT853 choir microphone and the AT857 podium microphone are supplied by the manufacturer with cardioid (C-ELE) elements.

Circle 5 on Reader Response Card



Moderately-Priced Color

The Javelin CVM13D 13-inch color monitor contains 400 TV lines of color resolution at a "moderate price." The unit features a 1 watt audio amplifier and speaker for use when audio monitoring.

The unit is compatible with NTSC and Y/C (S-VHS) signals for use in video and computer applications. A rack mount is available as an option.

Circle 6 on Reader Response Card

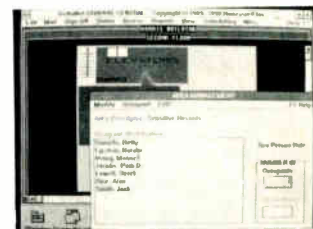


Access Control System

Honeywell has introduced its DeltaNet access control system, which provides facility-wide management, control and reporting of personnel movement. DeltaNet graphically displays user-selected areas which allow operators to respond to alarms, investigate occurrences and manage reporting requirements.

The system also uses a spreadsheet function to establish and change the database for card holders and access parameters. In addition, it offers scheduling options for doors, elevators and other areas.

Circle 7 on Reader Response Card



Modular Consoles

Hill Audio has introduced the Datum Mixing Console. The Datum is a series of "mid priced" modular consoles consisting of a line of four and eight buss consoles available for sound reinforcement, studio recording and stage monitoring applications. There are four frame sizes in each configuration.

Circle 8 on Reader Response Card



Display Intercom

Ring Communications has introduced a display intercom designed for those who need an economical system that will work with present day telephone systems.

Each station has an LCD that identifies station number, announces the identity of the calling party and will display or store message information.

Circle 9 on Reader Response Card





We'd been working
hard in the studio
for 14 years.
It was time we got
out for a night.

Spending years on end cooped up in small, dark rooms with a bunch of engineers takes certain special qualities. Durability, for one. We've always been known for that. Of course, clear, uncolored sound quality doesn't hurt, either. Or hand-assembled components, with gap precision to plus or minus one-millionth of an inch.

These features got TAD speakers into studios like Record Plant, NOMIS and Masterfonics. And the same features are now getting us out of them.

See, we had this funny idea that if TAD could make music sound terrific in a small room, we could make music sound terrific in a huge arena. And every outing we've had with Maryland Sound has proved us right.

Not that we won't still work our woofers off in studios from L.A. to London all day. But, at night, we'd like to get out and jam more often.

TAD Technical
Audio Devices

Ⓜ Pioneer Professional Products Division

Mobile Club Monitors

Numark has added a speaker line, the Mobile Club Monitor Speaker, which consists of the D25C and M212C two-way, carpet covered speaker enclosures.

The D25C features an eight-inch woofer and high-compression horn tweeter. Continuous power handling is 100 watts. The M212C, like the D25C, is a tuned-port, two-way system but features a 12-inch woofer and high frequency compression horn driver.

Circle 10 on Reader Response Card



Bass Reinforcement

Nexo has introduced its LSub line designed to provide high power servo-controlled low and very low frequencies to augment new or existing systems for extended bass response.

With the dedicated LSub TDC controller, LSubs can be used to reinforce bass and sub-bass, for operation with any system requiring a dedicated bass channel below 100 Hz and as a dedicated special effects channel operating independently from the main house system.

Circle 11 on Reader Response Card



The Nexo LS2000 Sub Bass system.

DAT with Time Code

JVC Professional Products Company has introduced the DS-DT900N digital audio tape deck with the ability to read and write SMPTE time code.

The unit also includes a built-in sync generator which allows the deck to function as a master to control other equipment or be controlled as a slave by the host.

Circle 12 on Reader Response Card

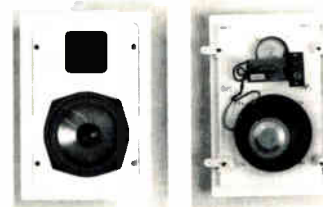


In-Wall Satellite and Sub

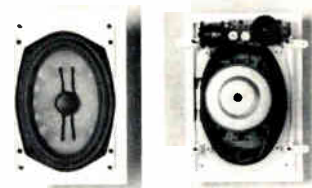
AES (Audio Electronics Systems) has announced two models. The AES-5 is a compact two-way in-wall system designed for applications where budget is a consideration. The AES-5 contains a 5.35 inch polypropylene woofer and 2.25 inch ferrofluid-cooled tweeter.

The AES-4 dual voice coil subwoofer employs a 6 x 9 inch polypropylene cone and is sold in single units, is designed to complement the AES-3 subwoofer, which is sold in pairs.

Circle 13 on Reader Response Card



The AES-5 (above) and the AES-4.



Circle 14 on Reader Response Card

A/V Controller

TSI (Tamco Systems Inc.) is now offering its professional AVPS-6 audio/video controller for home installations. It had been previously available for corporate/business environments.

The AVPS-6 is an audio/video controller with dubbing capabilities. The built-in audio/video distribution amplifier is meant for interfacing between any of the connected machines.

Circle 15 on Reader Response Card

Antenna for Wireless

RF Technology Inc. has announced the 14 dBi omni antenna for wireless cable/MMDS applications. The antenna has a power handling capability of 50 watts as standard and weighs less than 10 pounds.

Circle 16 on Reader Response Card

Wireless Paging

The "Silent Server" is an infrared wireless paging system from FSR, Inc. A complete system includes transmitter, annunciator, sensor, power supply and hook-up cable. It is designed so that a guest or catering manager can signal the catering staff.

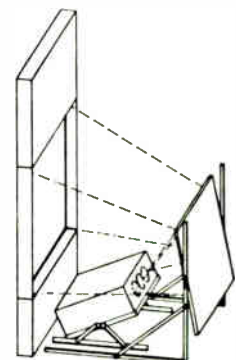
Circle 17 on Reader Response Card



Home Theater Kit

Uni-Screen has introduced its line of home theater products including the Uni-Theatre, a prefabricated, self-contained rear projection home theater kit. The Uni-Theatre comes in four diagonal sizes: 72 inches, 84 inches, 100 inches and 120 inches. Custom sizes are also available.

Circle 18 on Reader Response Card



THE RIGHT CONNECTION

High quality, high reliability, great prices. Connectors, bulk wire, interfaces, snakes and cable assemblies.



Circle 287 on Reader Response Card

Rear Projection System

American Video Communications, Inc. (AVC) has added its Thru-the-wall rear projection system to its Trooper product line. Troopers are self-contained mobile rear projection enclosures in 50- and 60-inch elevating models along with a 67-inch model that is available in both a knock-down and roll-around version.

The system is designed for those who need to project large images in a limited space, with screens that come in 67-, 72-, 84-, 100- and 120-inch sizes.

Circle 19 on Reader Response Card

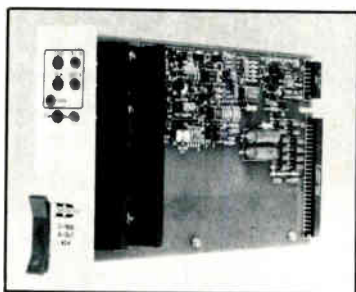


Distribution Amp

Datatek has introduced the D-850, a single-channel audio distribution amplifier designed for use with Datatek's D-800 series 10 x 1 switching modules that provides six resistive split outputs from a balanced or unbalanced bridging input.

The output level is +28 dBm into a 600 ohm load and +34 dBm in a 150 ohm load, or 26 dBm into 600 ohm terminations. Noise level is 105 dB below maximum output. Gain is continuously adjustable from -12 dB to +12 dB.

Circle 22 on Reader Response Card



Loop Assistive Listening

Oval Window Audio has introduced a small, transportable induction loop assistive listening system for the hearing impaired known as the Microloop. The Microloop is compatible with all telecoil ("T" Switch) equipped hearing aids/induction receivers and is designed for small meetings and television/radio listening.

The unit consists of an amplifier, microphone, ac power adaptor, loop wire, loop wire clips and carrying/storage case.

Circle 24 on Reader Response Card



Home Automation System

Group Three Technologies, Inc. has introduced the Samantha (Security and Management Through Home Automation) system which provides remote control to the essential functions of a home without retrofitting or hardwiring. Samantha monitors home communications, lighting, appliances, security devices, temperature, etc.

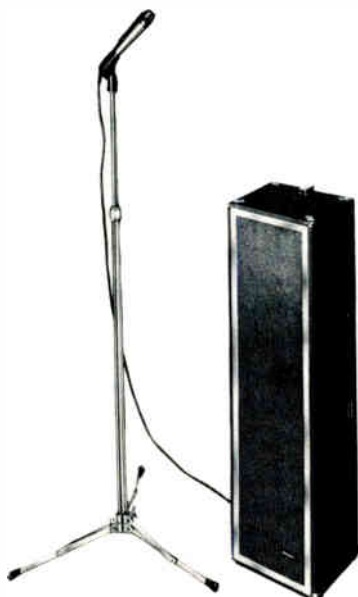
The system is a microprocessor based home automation system that utilizes keyboards/keypads, touchtone phones and remote sensory inputs.

Circle 25 on Reader Response Card

New Voice Director

Argos has introduced its Voice Director II with new features, including expanded room to house a folding microphone stand, the Argos SDA-1006D, which is available as an optional accessory. The unit is designed for convenience as the take-along stand will store inside the sound system.

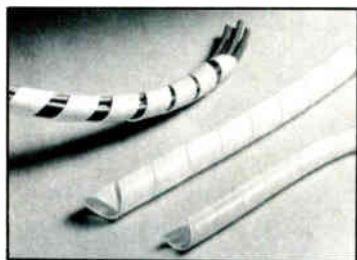
Circle 23 on Reader Response Card



Spiral Wire Wrapping

Panduit Corp. has announced Teflon spiral wrapping in 3/4-inch and one-inch O.D. sizes. The spiral wrapping is designed to provide a protective sheath to bundle, identify, harness or insulate wire, cable and tubing.

Circle 20 on Reader Response Card



Tall and Really Tall

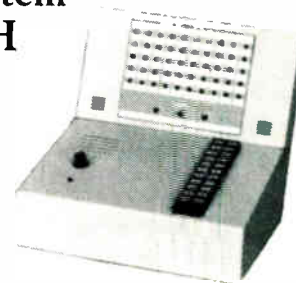
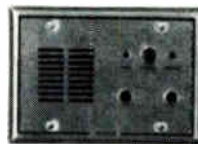
Black Audio Devices has introduced the Tall Mic Stand and the Really Tall Mic Stand. The Tall Mic Stand has an adjustable height from eight to 10 1/2 feet, and features a folding tripod base and sandbag.

The Really Tall Mic Stand can elevate a mic to 27 feet. It has a wide folding tripod base for extra stability.

Circle 21 on Reader Response Card

NO HOME RUN WIRING

Introducing the
5000 Audio/Visual
Nurse Call System
By MEHLICH
("Maylick")



The master and all remote stations (up to 100 plus 10 door monitors) can be connected to a 16 conductor cable.

- Fewer cable requirements
- Fewer & simpler connections
- Simple system design
- Easy future expansion
- No wire labeling necessary

See the 5000 system at the NSCA convention
Booth #821 / May 20-22 - Cincinnati, Ohio

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Circle 277 on Reader Response Card

Tool Kit Case

Jensen's tool kit, the JTK-17, is available in a military-style case. The JTK-17R is designed to withstand the use and abuse encountered in military or industrial environments. The tools and optional test equipment are designed for maintenance of electronic equipment, computers and office equipment.

Circle 26 on Reader Response Card



Combination Matrices

TE Products, Inc. has announced the VAS-1000 line of 10 input by one output configurable video and dual audio combination matrices. The units are built to be held in 1 RU.

The VAS-1000 line includes multiple operating options. Standard operation, local or remote is from an ANSI compatible dumb terminal via the RS-232C port. Alternately, external operation can be provided through the RS-422 port.

Circle 27 on Reader Response Card

Differential Probes

Test Probes, Inc. has introduced the M12DF differential probe set. The probes allow matching of oscilloscope channels for differential measurement of two signals.

According to Hal Wardein, TPI Vice President, "The M12DF set is a pair of 250 MHz adjustable passive probes, one of which has fine attenuation adjustment at dc and low frequencies."

Circle 28 on Reader Response Card



Access Control Software

MultiLink has made available a new version of its Interactive Services software for the company's line of audio teleconferencing systems. Interactive Services provides MultiLink customers with user-controlled teleconferencing.

Included in the program are procedures for meet-me and originator dial-out conferences, plus new methods for blastup, lockout and call termination.

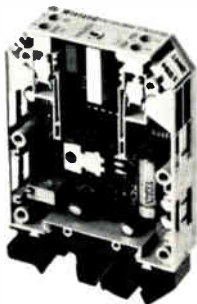
Circle 29 on Reader Response Card

Conditioning Module

A signal conditioning module designed to function as a constant precision voltage and current source has been introduced by Wieland, Inc. It may be used to drive stepping motors or linearize potentiometers.

The KSQ module is especially designed for analog signal development from linear sensors. Its reference voltage is 10V at plus or minus five percent and reference current is 20 mA at plus or minus five percent.

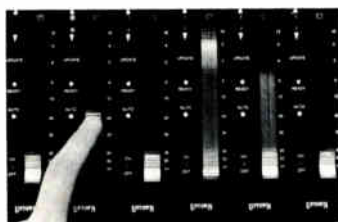
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Automated EQ Switching

Audiomation Systems is offering automated EQ switching and automated insertion switching for any console fitted with the company's Uptown Automation. The design was accomplished in order to facilitate quarter frame accurate drop-ins of the console EQ and insert point, while the latter will also automate the switching of outboard effects devices, reverb and pitching.

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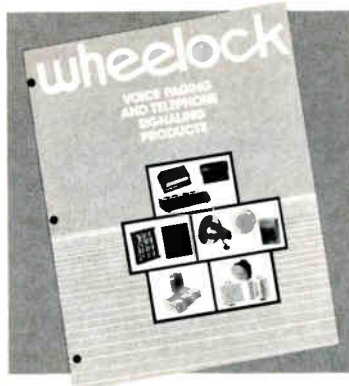
LITERATURE

Wheelock and Plitron Brochures

Voice Paging and Telephone Signaling

Wheelock is now offering its Voice Paging and Telephone Signaling Products catalog. The catalog contains specifications and illustrations of its lines of centralized voice paging products, amplified speaker voice paging products and its complete line of telephone signaling products.

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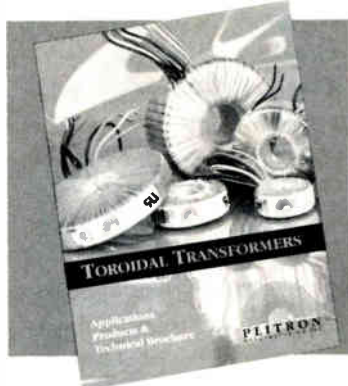


Toroidal Transformers

Plitron is offering a 12-page "Applications, Products and Technical" brochure on toroidal transformers. Designed as an engineering reference as well as a product guide the brochure contains product information, including a standard line power transformer section, as well as the OEM line, audio output transformers and a line of commercial and medical isolation tools.

The brochure also includes a section on specifying custom toroidal transformers.

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Products, Training and Support

Entek Scientific Corporation has released a corporate/product brochure. This color collateral piece bears the name "Complete Solutions for Predictive Main-

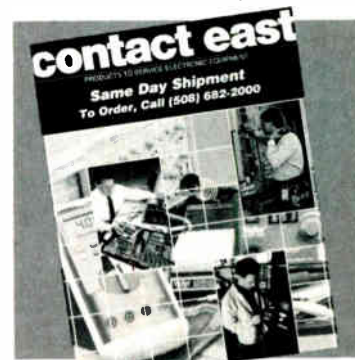
tenance." It contains an overview of Entek, its products, training and support services.

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Equipment Servicing

Contact East has introduced a 48-page reference guide featuring products to service electronic equipment. Designed for service engineers, managers, installers, technicians and maintenance directors the catalog contains portable oscilloscopes, tool kits, all-in-one telephone tools, butt-in test sets, clamp meters, sound level meters, adhesives, EPROM programmers, soldering/desoldering equipment, ozone safe cleaners, workbenches, shipping containers, etc.

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Lockouts, Tags and Signs

A line of lockout/tagout products designed to facilitate compliance with OSHA "Lockout/Tagout" rules is described in a full-color bulletin available from Panduit. The rulings require that each repair or maintenance worker lock or tag equipment he or she is working on to ensure personal safety.

The line includes laminated steel padlocks, vinyl coated plated steel lockouts, safety tags, photo tags, safety signs and marking pens and equipment.

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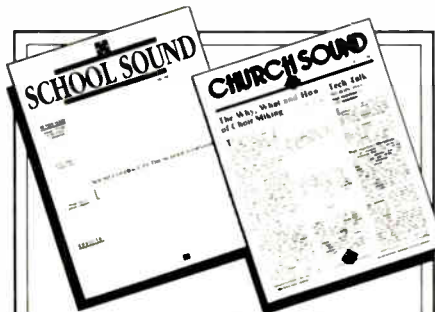
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Bose
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Technics
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JVC/Zenith*
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* indicates tie

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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