

SOUND COMMUNICATIONS

Volume 39 Number 5

May 28, 1993

CAMPUS KIOSKS

Video kiosks can function as complete information sources for universities. Graphics and full-motion video combined with PCs are networked and linked fiberoptically. Information provided ranges from sports scores to students grades. The access is universal as schools make use of information technology. **46**



THE CHISWICK WATER FORD

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t included making the
erience equal to the visual
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e communicated. **36**

THE ADA AT NSCA

One of the seminars at NSCA was hosted by Williams Sound and dealt with the implications of the Americans with Disabilities Act. Our reporters were there, and we present a precis of the seminar and a rundown on the Act. **16**

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"Educational Media" is the phrase being used as technology provides practical solutions to educational problems - and helps the economics of providing learning. **50**
- **Digital Delays, Part Two**
Looking at specific units to see what the specs are, how they match the manufacturers spec sheets and how they suit what you need. "It all gets down to choosing the unit that fits the job." **62**
- **Fiber Optics at NSCA**
Fiber Optics are practical right now as the NSCA seminar on the subject showed. Sound & Communications reports on Fiber Optics and the NSCA educational session hosted by West Penn Wire. **16**



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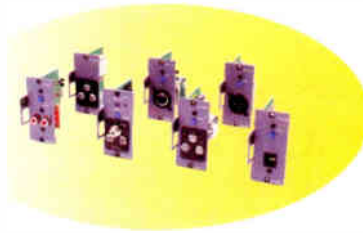
Mixers & Consoles



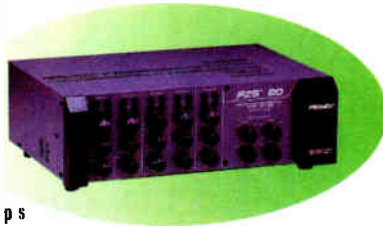
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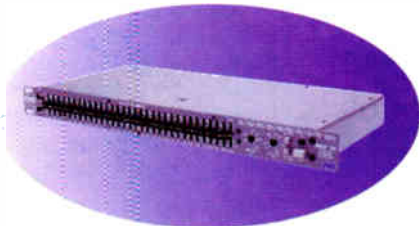
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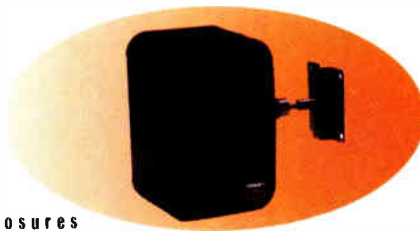
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SAMSON 1992

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Software Drives the Future in a Many-Media World

Will the real multimedia please stand up? We've just returned from the National Association of Broadcasters' show, which featured Multimedia World. And, as most of you remember, CES has and will continue to feature multimedia sections. And at NSCA we saw new entries from large screen and projector manufacturers. And then of course there was Infocomm.

But Multimedia World at NAB was a software extravaganza, with demonstrators speaking of "applications" and other adventures in computer speak. DEC, promised to be there, wasn't. But Silicon Graphics, Apple, Atari and IBM were there in some form or other — with their attendant software applicers and suppliers. It all was indicative of the continuing downsizing of cost and memory needs for video designs. And while the presentation software was there, and some attention was paid to the presentation market, there was little new in hardware in Multimedia World.

Let's face it, the world of our future is software driven. And while we say the sound business will be computer controlled, what we really mean is that new forms of software can more stringently control and design sound systems. The creative impulse is in software right now; the hardware accommodates it.

During NAB, the talk was of compression and formats rather than strictly of delivery. New formats included new product from the ADAT camp. Alesis showed its digital multitrack recorder (which works on S-VHS tape) with 16 units daisy chained. Fostex showed its ADAT-compatible product



with time code. (Alesis had a synchronizer designed by TimeLine.) Tascam showed its "affordable digital multitrack" using eight millimeter tape. Panasonic formally introduced the D-5 digital format, while Sony went all out with its Digital Betacam product introduction. (Don't hold your breath for sound contracting applications for these last two; they're obviously high end; but "affordable digital multitrack" may have applications in your line of work.) Sony also showed its MiniDisc changer for broadcasting applications, but obviously a changer is a changer and other applications are obvious.

There was lots more to see and here, and a roundup article is in preparation from some of our favorite acoustical consultants who were with us at NAB.

Meanwhile — we're home for awhile, and reading your cards and letters. Keep them coming. It's good to hear from you.

Best regards,

Judith Morrison, Editor in Chief

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CES-TV News • NAB-TV News • NAMM-TV News

NSCA-TV News • AES-TV News

Acoustics, Early Uses, and Fast Track Installs

WHEN A SHOW IS A MEETING

Neil Shaw's review of the 124th ASA New Orleans meeting in the February 25th Sound & Communications is excellent. And the comments on the "Commonality" of interest between the Audio Engineering Society and ASA are timely and appropriate. The ASA and its various technical committees have been discussing for some time now ways that the intercommunications process among professional societies of common interest might be improved. Your review of the New Orleans meeting is just one more of those good ways to do it. In any case, without suggesting "snobbery" of any kind, I'd have preferred that the magazine had listed the article under "Professional Meetings" rather than "Trade Shows."

Along the above lines, Sound & Communications might include ASA scheduled meetings in the Sound & Communications "Calendar of Upcoming Events."

THE ASA HAVE BEEN DISCUSSING WAYS THAT THE INTERCOMMUNICATIONS PROCESS AMONG PROFESSIONAL SOCIETIES OF COMMON INTEREST MIGHT BE IMPROVED.

Thanks again for a good plug for ASA and the "outstanding" New Orleans meetings. Come to think of it, judging from the diverse interest displayed at the New Orleans meeting, perhaps there should be a new ASA "technical interest group" on virtual

acoustical environments. This could possibly be a joint activity with the AES. Regard, and I'll see you in Ottawa in May at the ASA meeting. There should be some good sessions on auditorium acoustics measurements resulting from the Concert Hall Research Group activity to date which I am sure you are familiar.

**William Cavanaugh
Cavanaugh Tocci
Associates, Inc.
Sudbury, Massachusetts**

EARLY FERROFLUID APPLICATION

We read with interest Mike Klasco's very informative article on ferrofluids (January 28, 1993, Sound & Communications), and would like to offer a clarification of one point for your readers.

The article leaves the impression that ferrofluid is used largely in high-frequency components, and was only recently applied to low-frequency drivers and subwoofers. This is not accurate.

Our president, John Meyer, was arguably the first loudspeaker designer to apply ferrofluid to cool loudspeaker components. In 1978, John designed a recording monitor called the ACD System. Manufactured in Switzerland under a licensing agreement, this system employed ferrofluid in all of its low-frequency elements — including the 18-inch cone subwoofer.

In 1979, John founded Meyer Sound, and our first project was to develop subwoofers for 70mm houses showing Francis Ford Coppola's "Apocalypse Now." These subwoofers utilized an Electro-Voice 18-inch cone driver which was cooled with ferrofluid.

At that time, we began gathering data on ferrofluid's sensitivity to cer-

tain solvents and its effect on certain driver component materials. The Electro-Voice part, for example, used a Kapton coil former (a common former material at the time) that blistered and delaminated when exposed to Ferrofluid. As a result of our research, Meyer Sound pioneered a wealth of new materials, treatments and techniques for driver fabrication, all of which are reflected in the proprietary line of ferrofluid-cooled low-frequency drivers that have been used in our products since 1980.

Among these innovations, I would single out back venting of both the gap and the pole piece; a technique that Meyer Sound introduced in 1980 and that is now only being adopted by other driver manufacturers. We undertook this measure not only to improve cooling air flow, but also to solve the problem of fluid splashing out of the gap with long excursions of the cone.

In sum, we are convinced of the benefits of ferrofluid for cooling loudspeaker drivers in all frequency ranges. Users should be aware, however, that specific fabrication and handling techniques are required to use it successfully (as Mike correctly observes), and exposure even to trace residues of some solvents can cause the fluid to break down. Ferrofluidics can, I'm sure, provide more information for interested readers.

Thank you for the opportunity to correct the record.

**Ralph Jones
Vice President, Development
Meyer Sound Laboratories Inc.
Berkeley, California**

Dear Ralph,

*I enjoyed your note on John Meyer's early work with ferrofluids. Actually, I had forgotten about the modified EVM-
(Continued on page 12)*

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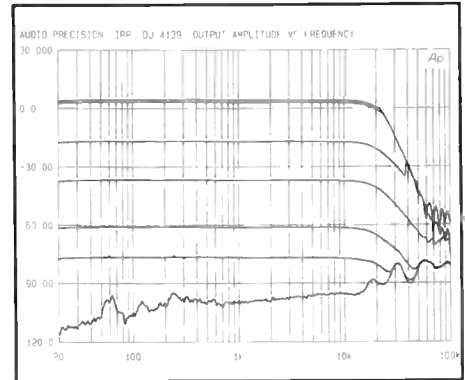
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FEATURES

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By Rob Baum

At the NSCA Todd Bergum of Williams Sound hosted a seminar on the Americans with Disabilities Act. The ADA is supposed to provide full accessibility for people with communications handicaps. At another seminar West Penn Wire spoke of fiberoptic termination.

46 KIOSKS ON CAMPUS

By Holly McArthur

Ball State University has installed video kiosks so that students and faculty can obtain pertinent information quickly. In partnership with AT&T Corp., Truevision, Inc., and other companies the school has come up with an interactive video kiosk system as a result of a \$10 million high-tech initiative.

50 EDUCATIONAL MEDIA SYSTEM

By Keith Clark

A new system at California Polytechnical University makes it possible for up to 250 students and a lecturer to teleconference with other university lecture halls thousands of miles away. Installed by Carrigan Enterprises, the system is an updated audio supplement to an existing videoconference system.

54 NOTRE DAME SECURITY

By Judith A. Marrazzo

Fighting crime has become an issue even on a relatively safe campus such as Notre Dame. In response to growing concern, administrators have been taking high tech steps to improve campus safety and security measures.

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By Neil Shaw

In this second part, we will look at some real signal delay units. A comparison of eight different ones are herein.

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COMBINE IT • \$249

A favorite of MIDI "power user" film scorers and session keyboardists, the MixerMixer (\$249*) effectively turns up to three 1604s in "one big mixer" without giving up channels through "cascading" or losing AUX sends. For example, three CR-1604s and a MixerMixer yield 48 line inputs (8 of which are mic inputs), 12 stereo AUX returns, 24 direct outs and three stereo/6 mono sub masters. All combining is done at unity gain, so no level or headroom is lost and no additional noise is introduced. Matching 100mm Remote Fader (\$75*) controls master level of all mixers plugged into the MixerMixer (existing master faders become submasters). Comes with its own 6-ft cable and can be bolted to the side of a CR-1604, handheld or attached to any surface. Not shown: The CordPack (\$69*); 39 high-quality cables that provide all the patchcords necessary to connect 3 CR-1604s to a MixerMixer.



FADE IT • \$75

100mm Remote Fader (\$75*) controls master level of all mixers plugged into the MixerMixer (existing master faders become submasters). Comes with its own 6-ft cable and can be bolted to the side of a CR-1604, handheld or attached to any surface. Not shown: The CordPack (\$69*); 39 high-quality cables that provide all the patchcords necessary to connect 3 CR-1604s to a MixerMixer.

EXPAND IT • \$199

Instead of 16 cheap, off-the-shelf integrated circuits, the CR-1604 has six totally discrete preamplifiers with four conjugate pair, large-emitter transistors. The result is ultra-low noise (-129dBm E.I.N. @150 ohms), low distortion (0.005%), astonishing headroom and extremely wide (300K) bandwidth that contributes to the preamps' transparent accuracy. At any gain level, you can handle everything from a close-miked kick drum to a flute with exceptional sonic fidelity and freedom from overload. This preamp design has made the CR-1604 legendary among pros who are used to \$150,000+ mega consoles (and, in dozens of documented cases on file, have enthusiastically stated that they actually prefer our preamp!). But what if you need more than six mic inputs? Simply add ten more of the same with our XLR10 Mic Preamplifier Expander (\$199*). It attaches in minutes to form an integrated, mechanical/electronic whole and includes its own +48V phantom power switch. Plus you can still use the line inputs on channels 7-16!



AUTOMATE IT • \$849

Save, recall and fine-tune mixes over and over with our OTTO-1604 MIDI Automation Retrofit System (\$849*). Consisting of an internal gain cell board and external MIDI control box, OTTO provides realtime fader and muting automation of CR-1604 channel inputs, AUX Returns 1-4, ALT 3/4 buses and master outputs. Works with any Macintosh, Atari or PC sequencing program which supports graphic faders. FREE OTTOmix™ Mac automation software that precisely duplicates CR-1604 controls is also included. OTTOmix™ allows simultaneous, unlimited subgroups over up to three CR-1604s, pre-programmed auto-fades/cross-fades, automatic archiving and a seamless interface with external fader boxes.



ROTATE IT • \$19

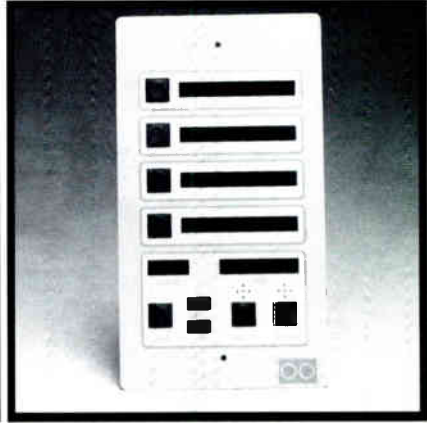
Yet another twist to the CR-1604's unique rotating pod! The RotoPod bracket set (\$19*) creates a 10-rack-space, jacks-to-top configuration with all inputs and outputs on the same surface as the mixer's controls. Special rack rails allow recessed or flush mounting.



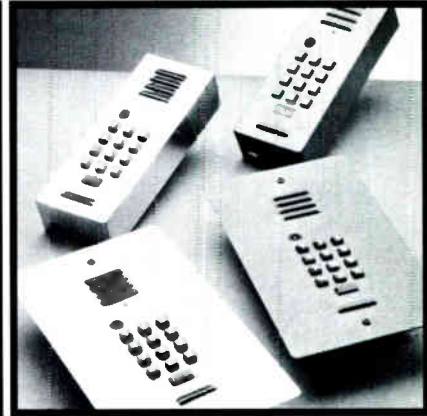
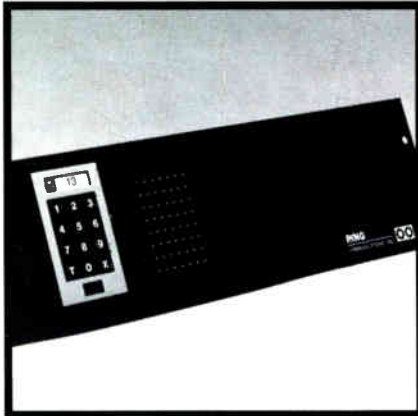
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NEWSLETTER

NEW PRESIDENT FOR BOGEN

Gerardo Sarmiento has joined Bogen Communications as president of the 60-year-old company. Prior to joining Bogen, Sarmiento was director of EDI and Electronic Messaging Software for AT&T. He was also director of voice and data products for V-Band Corporation. Sarmiento has indicated plans to strengthen the Bogen's international markets and move into the consumer arena.

HOME THEATER INDUSTRY ASSOCIATION FORMED

The Home Theater Industry Association held its first meeting in April, unanimously endorsing the goal of "promoting home theater to the widest possible audience through shows and education programs." According to John Kellogg of Dolby Laboratories, "The appeal of home theater crosses all boundaries and market segments." Ken Furst, formerly of Denon, has been named Acting Executive Director to bring together the details of the HTIA organization until its next meeting during Summer CES. The HTIA, primarily organized as an organization of manufacturers, will work with retailers through participating membership by existing dealer organizations.

JOINER NAMED PRINCIPAL OF PRAN

David Joiner has been appointed a principal of Pran, Inc., responsible for the overall sales and marketing activities of the corporation. Ed Wood, CEO of Pran, commented, "The merger of David's talents with our Design and Consulting groups adds many new dimensions to Pran. And our clients will benefit by having the best mix of Acoustical, Audio, Visual, and Videoconferencing expertise in the industry." Joiner served for 15 years as CEO of The Joiner Rose Group. More recently, he was managing director of Joiner & Co. Past projects include the Toronto Sky Dome, the new Comiskey Park, Camden Gardens, RJR Nabisco, Merrill Lynch, and AT&T Chicago headquarters. Joiner has a bachelors degree in mechanical engineering, a master's in business administration and has done advanced work in Physics.

DYNASCAN CHANGES NAME

Dynascan Corporation has changed its name to Cobra Electronics Corporation. The company's ticker symbol on the NASDAQ National Market System has changed to COBR from DYNA. Jerry Kalov, president and chief executive officer, said, "We believe that this name change . . . will improve investor awareness of our stock." Dynascan, now Cobra, is the parent company not only of Cobra electronic products, but of Lloyd's and the Marantz professional line.

HARMAN ACQUISITION COMPLETED

Harman International Industries has announced the completion of the acquisition of Lexicon, Inc. Lexicon joins JBL Professional, DOD, Soundcraft and Harman Advanced Technologies as a member of the Harman Professional group of companies within Harman International. At the same time, Harman announced the appointment of Laurie Fincham as Senior Vice President, Engineering at its Infinity Systems, Inc. division. Cary Christie, founder and former president of Infinity, is now corporate vice president marketing of Harman International.

GENTNER INTRODUCES LINE OF ASSISTIVE LISTENING SYSTEMS

Gentner Communications Corporation has introduced a new line of FM Assistive Listening Systems, including digitally tunable FM transmitters, tunable receivers, receiver rechargers, and several systems of earphones. Gentner's products are designed with "multi-proc audio processing" and the Aphex Aural Exciter, according to the company.

UNIVERSITY LAUNCHES NEW BRAND NAME

University Sound has launched a new brand name — USI Audio to "distinguish new, high-technology professional audio products from the more traditional and widely distributed commercial sound brand of University audio products." Two product lines have been introduced.

NEWSLETTER

EIA, NAB ANNOUNCE INITIATIVE

The Electronic Industries Association's Consumer Electronics Group and the National Association of Broadcasters have jointly announced a national initiative to develop a new broadcasting service for dissemination of high speed data based information services to the public. The EIA and the NAB will form a National Data Broadcasting Committee to develop a voluntary technical standard for high speed data broadcasting for NTSC television stations. A data receiver could be implemented as a new feature for television receivers or as a new class of electronic products called data receivers with outputs to fax machines, computers, or televisions.

QSCONTROL CHOOSES BETA SITE

Hollywood Sound Systems has become a beta test site for QSControl, QSC Audio's MediaLink-based computer control system for professional audio. After testing the entire system in-house, Les Harrison, president of Hollywood Sound systems, is enthusiastic, according to QSC. The first field trial is at Walt Disney Pictures Studios; Harrison plans to use QSControl when integrating EX Series amplifiers by QSC and the Apogee 3X3, AE5 and AE3 loudspeaker systems as well as the SSM. The system will also be used for the eight week run of the musical From the Top featuring Carol Burnett. Harrison said, "Now that we've seen QSControl in action in the shop, we are eager to take it into a continual program application like this where it is left on night after night for an eight week period. We intend to leave the system on 24 hours a day."

INTELIX AND LONE WOLF AGREE

Intelix Corporation has announced that it intends to develop software applications for the Lone Wolf VNOS operating system. Intelix will offer application development services to manufacturers of professional media products who wish to create products compatible with Lone Wolf's MediaLink and VNOS technology. Additionally, both parties have begun preliminary discussions regarding the development of applications and tools for networked media systems. Intelix will continue to offer its Mind-Net and Object-View networking products for use by professional media manufacturers.

In other news, Intelix has announced an agreement with Crown International to become a licensed IQ System Software developer. Intelix will offer application design services to manufacturers who wish to create Crown IQ System compatible products and to contractors requiring end user application assistance.

COFFEEN FRICKE OPENS ATLANTA OFFICE

Coffeen Fricke & Associates, Inc. of Lenexa, Kansas, has opened an office in Atlanta. Jacob Friesen heads the Atlanta office, which is named Coffeen Fricke Friesen & Associates. The new office specializes in performing arts facilities. Friesen has worked with CFA in the past and most recently held a position at Sprint. He is a graduate of the Kansas State University School of Architecture and Bethel College, North Newton, Kansas. CFA is a 28-year-old company which has participated in over 4,000 projects, according to the company, with special interests in semidistributed loudspeaker clusters, live announce record/reproduce systems for airport terminals, computer control for sound systems, and video delay for large audience video boards. The Atlanta office's phone number is (404) 872-4700.

SIGMET CORPORATION APPOINTS NEW REPS

Sigmat Corporation has announced the appointment of two new sales representatives to its team of Field Sales Personnel. John Cardone of Floral Park, New York has primary responsibilities in coordinating sales, marketing and product/project systems integration for Sigmet dealers in the metro New York/New Jersey market area. Kelly Ireton of Abingdon, Maryland, primarily coordinates the musical instrument dealer sales for Sigmet in the Mid-Atlantic region. Sigmet Corporation, the professional audio manufacturer's representative firm, is located in Valley Forge, Pennsylvania and Freehold, New Jersey, with branch offices in northern New Jersey, Long Island, and Maryland.



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



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



Full Parametric EQ Section.



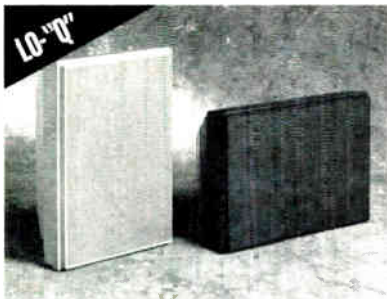
As a pure Compressor/Limiter, the LA-22, along with the LA-10 single channel and LA-12 dual channel models, offers unparalleled performance and seamless transition, employing proprietary Smart-Slope™ compression ratios. All three models feature transformer isolated output stages, optimized by a patented active circuit to assure the elimination of distortion and saturation frequently associated with transformers. Active Balanced Bridging Inputs easily handle amplitudes in excess of +24 dB and both input and output connections can be achieved by your choice of XLR-type, 1/4 inch phone or Barrier Strip connectors. Exceptional signal integrity, low distortion and superb dynamic range is common to all models.

All three LA Series models are housed in a compact 1U rack space and are designed to deliver years of reliable service, in the studio or on the road. Whether your application is sound reinforcement, recording, broadcast or for permanent install, you'll find LA Series to be a trustworthy and hardworking addition to any system. From the people who set the standard, UREI.

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(Continued from page 5)

18 woofers used for *Apocalypse Now*, but I can definitely confirm their existence and that this (and John's ACD monitor) was truly the first pro sound application of ferrofluids for woofers. At the time, I was visiting FM Sound (Bill Graham's old touring sound company) in the Bay Area and had a first-hand look at the equipment being prepared for the opening of the movie.

By the way, it is not the Kapton polyimide that reacted with the ferrofluid and blistered, but the adhesive coating applied by the bobbin manufacturer. Remember, E-V did not design this woofer to be compatible with ferrofluids, as Meyer was experimenting with ferrofluids as a retrofit. In the last ten years, adhesive coatings now tolerate much higher temperatures and are less vulnerable to these problems. I am

**IN THE LAST TEN
YEARS, ADHESIVE
COATINGS NOW
TOLERATE MUCH
HIGHER
TEMPERATURES
AND ARE LESS
VULNERABLE TO
THESE PROBLEMS.**

afraid the venting of the backplate precedes John Meyer, as it was described in numerous reference texts over twenty five years ago as a technique to relieve cavity pressure, achieve maximally flat response as well as cooling. But, John should get credit for realizing very early on that this venting technique is an ideal solution for stable operation of ferrofluid-cooled long-throw woofers.

To insure that speakers utilizing ferrofluids are compatible and stay out of trouble, Ferrofluidics Corporation has a partnering arrangement (their "FerroSound program") where candidate speakers are evaluated, tested

and optimized for use with ferrofluids. Aside from speaker manufacturers, most adhesive and material suppliers participate in this program. If this project is of interest, readers can contact Carol Bousquet at Ferrofluidics for more information (603-883-9800).

—Mike Klasco

FAST TRACK LOW VOLTAGE

I have read, with much appreciation, Keith Clark's article on the Michigan Tech Ice Arena sound system (February 25, 1993, Sound & Communications). Clark's understanding and explanation of the system was quite clear and enjoyable to read. Certainly, these types of computer control systems are becoming less esoteric and more mainstream to our industry.

Mr. Clark makes reference to the Seattle King Dome sound system that uses Crown I.Q. and TOA SAORI systems in a very similar manner to the Michigan State Ice Arena. Mr. Clark is correct that ProShow USA was responsible for the King Dome project. Brian Phraner of ProShow was the system designer and a pioneer in the marriage of Crown I.Q. and SAORI.

What Mr. Clark may not be aware of is that Dimensional Communications, Inc. of Mount Vernon, Washington performed the majority of the actual on-site low voltage installation of the King Dome sound system. The King Dome project was very fast track, requiring much of the system fabrication to be performed at the job site. Product was delivered, literally, from the shipper directly to the equipment room, into the hands of waiting Dimensional installation technicians.

ProShow recognized the need for quality assistance in meeting a strident King Dome installation deadline and Dimensional is proud to have been part of the team on this most successful, high profile project.

**Steve Olszewski
Vice President**

**Dimensional Communications
Mount Vernon, Washington**

THE ANSWERMAN

Missing Books; Cracked Surround

Dear Answerman,

I am interested in obtaining two books. Perhaps you can help: "Room Acoustics" by Heinrich Kuttruff (reviewed by Neil Shaw in your February 1992 issue); "Principles and Application of Room Acoustics" by Cremer and Muller 1982, translated by Ted Schultz (reviewed by Steven Orfield in your October 1988 issue).

I had found a source here in Canada for this book. However, it was going to cost over \$400 (\$Canadian) for this two book set. I was hoping I could find it a lot cheaper than that! Thanks for your help.

**Dave Wettlaufer
Horizon Audio Services
Ontario, Canada**

Dear Dave,

Neil Shaw suggests that you try Op Amp Tech Books (213-464-4322), or if you feel lucky, maybe Tollier's Books has a used copy (310-838-9213).

Dear Answerman,

My speakers contain an 8-inch mid/bass driver with a center horn. The

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only problem is that the speaker's rubber surround has cracked. Can you recommend a suitable replacement or someone who can repair them? I tried to have them reconed, but two separate places said they could not do it. I hope you can offer me advice.

**Mark Orlosky
Grumman Data Systems**

Dear Mark,

Ozone, infrared sunlight, and certain fungi can cause most foam rubber surrounds to eventually disintegrate. Reconing is the best solution, but since this may not be an option, you could try coating the surround with some reinforcement. C.P. Moyon and other industry suppliers offer specialized treatments, but you could try a thin coating of rubber cement, brushed evenly over the entire surround. But maybe it's time for new speakers.

ANSWERMAN

Dear Answerman,

Your magazine is getting better and better with each issue! But that is not why I ...n writing.

I wanted to add one software package that was omitted from your listing of programs in Mike Klasco's response to Ms. Mercuri's letter in the December issue. The program we distribute, "dBRay," is a ray tracing program for interior acoustics. Produced by RTA Technology, developers of "Environmental Noise Model" and "dBBox", it is highly regarded and sold worldwide. Any readers may call (301-495-7738) for further info.

**Richard Peppin
Scantek, Inc.**

Dear Richard,

Thanks for the info. By the way, Mike intends to review this software, as well as other software intended for acoustical design, later this year. ■

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NEED SOME "Q" ...
SOMETIMES YOU DON'T.**



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CH-2



PHONES
CH-2



TRACKING
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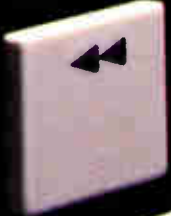
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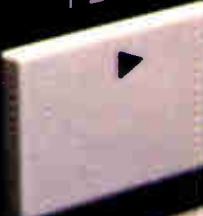
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Heard at NSCA

Americans With Disabilities Act

BY ROBERT L. BAUM

During NSCA, two of the better seminars dealt with the ADA and fiber optics, respectively. Here is our recap of both presentations, beginning with the ADA.

At one of the seminars at NSCA '93, Todd Bergum of Williams Sound spoke about the hearing impaired and the Americans with Disabilities Act (ADA). The ADA is supposed to provide full accessibility for people with communications handicaps, among other things. The ADA, signed into law by President Bush in 1990, the ADA affects over 20 million hearing impaired Americans and has already become effective for firms with 25 or more employees. In July 1994, ADA will be extended to employers with 15 or more employees.

The ADA applies to many of the places people gather. It requires that "reasonable accommodations" be made for people with hearing impairments. This includes purchase of equipment such as assistive listening devices ("ALD"s in ADA-speak) or using visual cues (like flashing lights for fire alarms or text for messages). An ALD is a receiver of audio signals for the hearing impaired, typically conveyed by infrared (IR), FM radio, or

induction loop (IL) techniques. ALD's must be made available to patrons free of charge. The ADA is a gold mine for sound contractors who learn how to get a piece of the action.

THE RULES

The first step is to learn the rules: where ADA applies and what is required. For ADA to apply, an assembly area must accommodate at least 50

The ADA is a gold mine for sound contractors who learn how to get a piece of the action.

people or have an audio amplification system, and have fixed seating. If so, this area must have a permanently installed assistive listening system. For other assembly areas, portable is okay. Penalties for non-compliance can go as high as \$50,000 for a first offense!

Todd's interesting talk first went over the five parts, or "Titles" of the ADA. They deal with (I) employment, (II) public services, (III) public accommodations and services operated by private entities, (IV) telecommunications, and (V) miscellaneous provisions.

"Public accommodations and ser-

VICES operated by private entities" may be a mouthful, but it is worth it. Title III means that many of the places contractors put sound systems — theaters, concert halls, stadiums, convention centers, hotels, shopping centers, meeting/lecture rooms, auditoriums, theme parks, and so on — must provide assistive listening devices. The minimum proportion of receivers that must be provided is four percent of seating capacity, with a minimum number of two.

Under Title IV, phone companies must provide things like amplified phones and ringers. This applies everywhere, including hotel rooms, offices and courtesy phones. There are a lot of phones in the US — so there is a lot of business out there for contractors. ADA applies to new construction as well as major renovations.

EXCEPTIONS TO THE RULES

There are a few exclusions from ADA. Agencies operated by federal, state, or local governments are covered by the Rehabilitation Act of 1973, which does not really enforce compliance. (Must be nice to live above the law). Private clubs and other facilities not open to the public are excluded. Also excluded are residential accommodations, like apartments or small owner-resided inns. Religious organi-

Robert L. Baum is currently working with Aura Systems and Menlo Scientific Associates.

zations are excluded, although the state of Minnesota's Human Rights Act was amended to include some ADA provisions, and does not exempt religious organizations. Todd Bergum's source for this was a study performed by the law firm Felhaber, Larson, Fenlon & Vogt of St. Paul, Minnesota.

TAX CREDITS

To soften the blow of having to buy equipment, the ADA offers a 50 percent tax credit for small businesses (annual gross under \$1 million or fewer than 30 full-time employees). To qualify for the tax credit, the amount spent can not exceed \$10,500. This money may be spent on, for example, equipment for the hearing impaired. The credit does not, however, apply to new construction.

This is how it would work: An eligible movie theater owner buys a four channel system for his four movie screens. If the theater owner pays \$4,000, he can take a \$2,000 tax credit. The theater can still depreciate the full

The minimum proportion of receivers that must be provided is four percent of seating capacity.

\$4,000, lowering the effective price. Depreciation is a charge against profits during a period that represents the wearing out of equipment (also property or plant) during that period.

COMMON QUESTIONS

The seminar ended with questions about the ADA. Todd addressed the concern that the receivers distributed to the public would be stolen, and suggested holding a driver's license or credit card as collateral. Regarding maintenance of the receivers, Todd suggested that earphone pads of cloth or foam be periodically replaced when they become dirty. Replacement parts, incidentally, could be a very profitable item to supply. Hard headphone pieces will have to be cleaned, perhaps with alcohol. Some multi-screen cinema operators have put in a single portable system that gets moved among theaters to accommodate demand. This is probably not permitted by ADA. It is possible, however, to buy a few receiv-

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The Americans with Disabilities Act was signed into law by President George Bush on July 26, 1990.

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ers and rent more to accommodate peak demand. Naturally, the facility operator must be able to accurately predict audience size, to meet ADA's 4 percent minimum requirement.

THE TECHNOLOGY

There are three common technologies used to send audio signals to receivers worn by patrons. As mentioned previously, these are infrared (IR), FM radio (FM) and induction loop (IL). Hardwiring receivers is also possible, but involves too many compromises for most situations. The best technology for a specific job really depends on the application.

Infrared systems transmit the audio signal using infrared light from broadcast panels (arrays of IR LEDs) hung high on the walls. The audio signal is received by an IR detector on the device worn by patrons. Signal content is transmitted by varying the amount of time (the pulse width) the IR emitting LEDs are switched on during each LED's cycle (the cycle frequency is 95 kHz for mono). There are no separate channels, as there are in FM systems. But since IR radiation does not go through opaque materials, the IR information is usually confined to the room, which is a plus for security. Note that windows and open doors are not opaque.

FM systems work like low power radio stations, complete with antennas and transmission on a variety of frequencies. The transmission is in the 72-76 MHz band, and does not require any license. Just like commercial stations, FM radio penetrates walls.

Since one FM antenna can cover a large area, FM systems are cheaper than IR for big auditoriums. FM can also function in direct sunlight, which IR has trouble with. And finally, FM antennas are less visually intrusive than large numbers of flat IR transmitter panels.

Induction loop systems work by putting an audio modulated current through a loop of wire, which gener-

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higher data speeds (higher bandwidths) or greater distances (so fewer repeaters are needed). Either kind of source can carry high bandwidth signals. At the other end of the optical fiber are light detectors. Detectors include PIN and avalanche (APD) photodiodes or integrated detectors/pre-amplifiers.

KINDS OF CABLE

Getting back to the West Penn Wire seminar, Mr. Baker discussed specific kinds of fiberoptic cable: "loose tube" and West Penn's "Micro-Link." Loose tube fiber typically has up to 12 strands of optical fiber in a unitized construction or bundle, along with a central strength element. The central strength element prevents kinking, which causes additional signal loss. There may be from four to 12 of these bundles, giving a fiber count of 48 to 144. These elements are sealed within an inner polyester barrier and an outer jacket. The outer jacket protects against the elements, including ultraviolet, ozone, etc., depending on the application, which can range from direct burial to aerial stringing.

As the cable moves from outdoors to indoors, the safety code standards tighten and the cable must be flame retardant. Typically, the contractor must switch cables, since outdoor cables are often not flame retardant. Since West Penn Wire expects US standards for flame resistance to effectively tighten to Canadian standards, the company feels contractors should plan to use wire that meets those standards (CSA) soon.

JOINING FIBERS WITH BREAKOUT KITS

So how exactly do we make the transition from indoor to outdoor cable? Instead of reaching for the trusty wire wrapper, contractors will have to grab their "breakout kits." A breakout kit has four parts: "furcation tubes" to protect the fibers (a small tube slid over the fiberoptic strand itself for mechani-

cal protection); strain relief; something to enclose the splice, such as a plastic tube that goes over the cable jacket (or even heat shrink tubing); and a moisture seal.

Transitioning between two fiberoptic cables requires a relatively small space for the amount of data they carry. Transitioning has five steps: separation and identification of the fibers; the tedious threading of fibers into the furcation tubes; attaching strain relief; moisture sealing and enclosing; and the attachment of the connectors (see below).

JOINING FIBERS WITH SPLICES

Fiberoptic cable can be joined mechanically (using v-grooves and pressure) or by fusing the ends of the two fibers together. This gives a better splice in terms of signal loss and does not require furcation tubing. Fusing, however, requires skill and a tool that costs about \$6,000. Other methods for splicing fibers include welding or chemical bonding.

TERMINATED CONNECTORS

With cable splices as well as fiberoptic connectors (FOCs), the keys to preventing loss of optical power are the physical alignment of one fiber core to another and the quality of the end termination. There are two fiberoptic connectors that are well suited for audio use. The SC type (for Square Connector, developed by NTT) has a square cross section. It is more compact and has less signal loss than other connectors, and is simply pushed on and pulled off. The ST type (for Straight Through, developed by AT&T Bell Labs) has a circular cross section. It uses a spring loaded twist-lock bayonet coupling. The ST is popular due to its performance and compatibility among vendors. (For more details, see "Fiber Optic Connector Considerations for Professional Audio", by R. Ajemian, *Journal of the Audio Engineering Society*, 6/92 and "Fiber

Optics", by R. Ajemian & A. Grundy, *JAES*, 3/90)

MICRO-LINK CABLE

West Penn Wire has introduced its "Micro-Link" cable with only a few fibers. Users such as contractors typically do not need the high fiber count that phone companies require in loose tube cables. Micro-Link cables consist of an optical fiber surrounded by a 900 micron gel-filled loose buffer. This in turn is surrounded by high strength aramid elements to form a 2.5 mm diameter sub-unit. Several of these are packaged in a flame resistant polyethylene outer jacket.

The gel surrounding the fiber offers moisture protection. When water seeps into a cable and freezes, it expands against the fibers. The result is "micro-bending," which causes bumps in the core/cladding interface, increasing signal losses. The Micro-Link breakout style construction is easily terminated, similar to a tight buffer design. The flame resistant jacket means the cable can be brought into the building. For up to a 24 fiber count, the Micro-Link is at a slight price premium over traditional loose tube outdoor cable.

FIBEROPTIC APPLICATIONS

Fiber applications include long runs of audio or video data, without the need for repeaters (unlike coax). Fibers should last 25 to 40 years, and can accommodate the increasing bandwidth of future electronic equipment. Examples that contractors might encounter include building-to-building intercoms. One conductor can carry 40 audio channels. If the application requires visuals (perhaps for security reasons), fewer audio channels could be carried along with video images.

FIBER TYPES: SINGLE VS. MULTI MODE

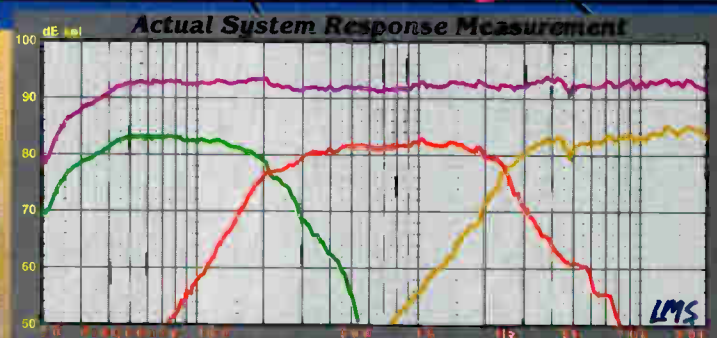
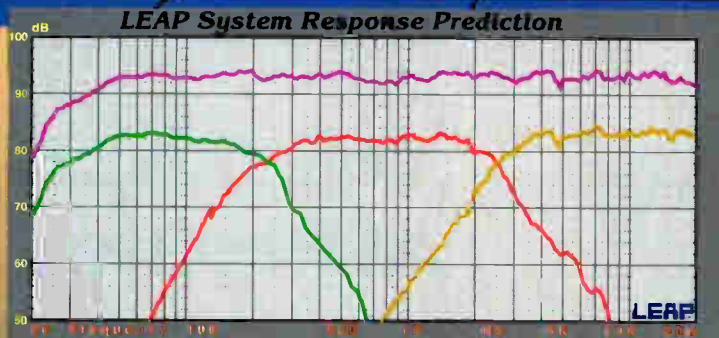
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(Continued on page 88)

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| 2 | 16 | 30 | 47 | 64 |
| 3 | 17 | 31 | 48 | 65 |
| 4 | 18 | 32 | 49 | 66 |
| 5 | 19 | 33 | 50 | 67 |
| 6 | 20 | 34 | 51 | 68 |
| 7 | 21 | 35 | 52 | 69 |
| 8 | 22 | 36 | 53 | 70 |
| 9 | 23 | 37 | 54 | 71 |
| 10 | 24 | 38 | 55 | 72 |
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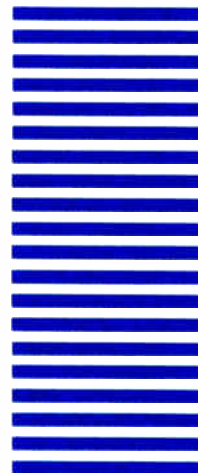
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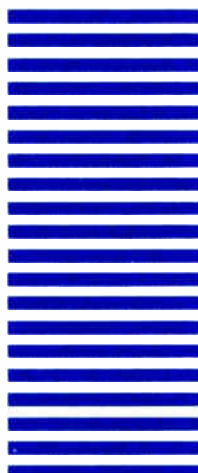
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FIRST PERSON

AUDIO IN ASIA, PART 4 — CHINA AND THE PHILIPPINES

By Mike Klasco

This month I will continue my saga of Asia with a glimpse of audio in China and the Philippines.

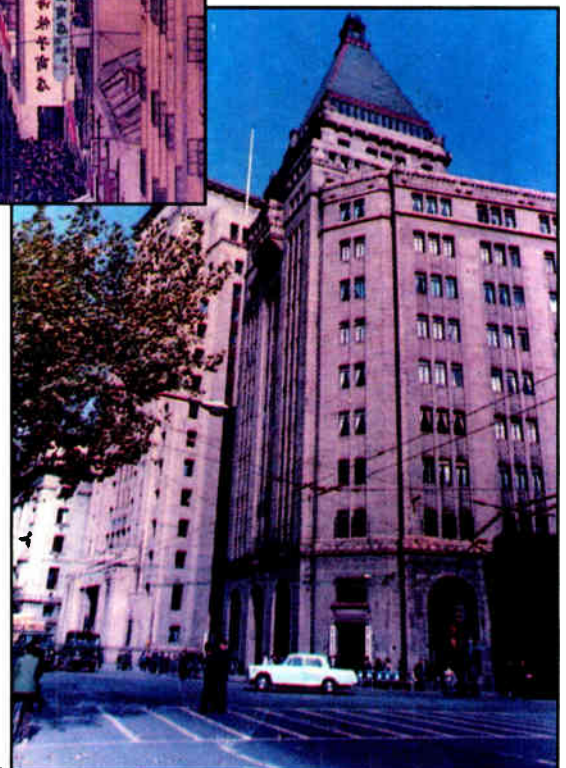
Although I have been to Korea, Taiwan, and Japan many times, I visited the Philippines for the first time last October. Most foreigners are met at the airport by representatives of the hotel they are staying at. Crime is a serious problem here and street taxis supposedly cannot be trusted (I've been told they take you to a deserted spot and rob you at gunpoint. And I thought New York taxi drivers were bad.) The hotels have high levels of security also. I stayed at the Nikko Hotel, which searched everyone at the front door and had a security person on each hotel floor to track and record comings and goings. Restaurants posted "no guns allowed" signs the way beach hotels post "no shoes — no service" signs. All this can get you a little paranoid!

The standard of living in the Philippines is not so good. In fact it is quite a bit worse than Korea was ten years ago. The infrastructure is weak, with a general lack of trains, roads, poor housing, inadequate phone service and severe problems with electrical power. Power outages occur daily, and taking the elevator in the hotel is a bit like Russian Roulette.

Discos are popular, and U.S. made products are popular. My client in the



Shanghai's Nanjing Road.



The Peace Hotel in Shanghai.

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

required. I loved it! The food I ate outside the hotel was generally very good, and the only rats I saw were running around and not on my plate.

Most of the discos and cabarets in Shanghai are located in the hotels, and frequented by both locals and foreigners. International hotels typically used U.S. brands, presumably installed by U.S. contractors. I saw a lot of E-V,



Shanghai Stadium. China has a tremendous need for sound reinforcement because of many venues such as this one.

I asked our dealer
**“How do we
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“Your best bet is the Jumbo Mount from Peerless,” he told me.

Now that we’ve got it installed, I see what he meant. We really like the Jumbo’s innovative features. Its unique “arm in arm” design gives it plenty of strength, even for our 35” monitor. This also provides extra rigidity and prevents excessive tilt.

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The optional patented security package is also important to us. It makes our installation theft-resistant.

But the biggest challenge we threw at our dealer was getting the job completed in one week. He said he could do it. “The Jumbo® Mount is American made and Peerless will ship within 48 hours,” he told us.

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Cerwin-Vega, and Peavey stuff, but in generally uninspired layouts. The relatively high hotel prices tend to make a visit to these clubs a special event. Hotel prices are low by U.S. standards; the Sheraton I was in was close to the airport and I paid \$70 for a deluxe room (by anybody’s standards). A few blocks away the Olympic Hotel was only \$30, and the hotel was definitely decent, better than a U.S. Holiday Inn. Downtown hotels are priced a bit more expensively, but the government is able to control pricing by occasionally

**KEEP IN MIND THAT I
 WAS GOING TO BE
 VISITING SPEAKER
 FACTORIES, AND
 THESE ARE USUALLY
 NOT NEAR RESORT
 AREAS OR TOURIST
 HOTELS!**

massacring its students, which helps moderate both excessive tourism and foreign trade. But you must put hotel costs into the perspective of the wages paid to workers in China. A secretary with a college degree might make \$30 per month, the chief engineer of a large speaker factory less than \$100 per month.

Overall, my visit to Shanghai was painless, not at all what I expected — at least from my one week’s stay and travels about 200 miles from the city

Night View
of the city.



Shanghai is known for
its shopping. Shown here
is the Flowers and Birds
Shop.

center. The population is well fed, well clothed, no beggars, and the well-stocked stores and restaurants are filled with locals buying goods. Everyone owns a bike, and the streets are filled with buses, taxis, and cars. Almost every car is a Volkswagen Jetta,

built by the joint venture Shanghai Volkswagen. The inside is a bit Spartan and they leave out the seat belts, but otherwise this is a world class automobile. This year Volvo, Ford, and Peugeot will be building in China (some people see millions of cars, but

I see two or four loudspeakers per car). The roads, where I traveled, are paved, with the last of the few rickety bridges in the process of being replaced with modern structures. On two lane roads bikes travel on the edges with both vehicles in both directions positioned in head-on alignment toward the center. Very exciting!

The first speaker factory I worked with was about two hours outside Shanghai and specialized in small, inexpensive speakers, typically for TV, portable stereo, telephones, and low

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INSTALLATION PROFILE

NEW SPEAKERS FOR TRANSFORMED THEATER

By Mark Mayfield

A successful sound system delivers the best possible quality of sound. But in the real world of professional sound installation, a large part of the job is in meeting the expectations of other people.

The client, the architect, interior designers, and a whole range of other participants — each with their own jobs to do and unique points of view — all have to judge the sound installation a success.

Steve Welch, of Audio Associates, faced just such a challenge at the Chiswick Park Theatre in Sudbury, Massachusetts. Originally opening as the Nickerson Theatre West, the enterprise had collapsed after its first season. Ted and Eileen Pasquarello (owners of the Chiswick Trading Company and the Chiswick Office Park, where the theater is located) had been landlords, uninvolved in the management of the theater. Left with the facility on their property, however, and encouraged by friends and the community, they decided to reopen. But in doing so, they chose to take the theater in a different direction. While the Nickerson had housed mostly small-scale plays, the Chiswick would mount a wide range of productions, including full-scale musicals. Welch was charged



The Chiswick has three Bose 502A Controlled Arrays mounted on the proscenium that allows for stereo music and sound effects program material as well as center localization for actor's voices.

with installing a first-class sound system in a theater that had never been designed for live music.

The challenge was to make the audio experience equal to the visual experience — without detracting from the latter. Architect Don Lonergan, of DRL & Associates, Inc., says one of his main goals was to “create a dramatic entrance, presenting the stage immediately as one transitions through the doors from the lobby.” As you enter the theater proper and walk down to your seat, strong, warm colors and clean lines draw your eyes to the stage. The view of the stage is excellent from every position in the house. Artistic Director Michael Allosso says that the most important criterion for the sound system was to ensure that

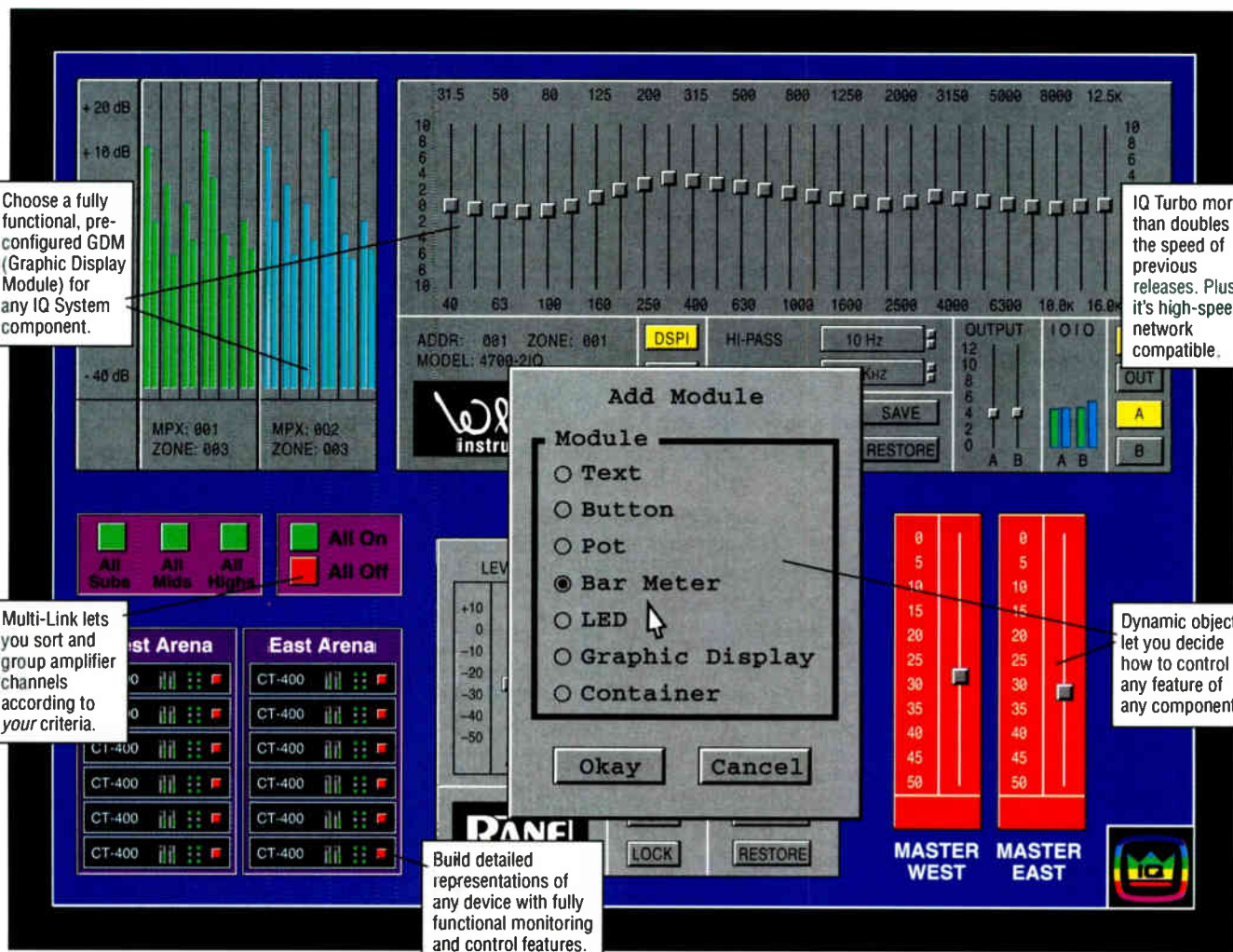
every seat in the house was offered excellent sound.

“Some of my most wonderful moments in life,” says Allosso, “have been

WELCH WAS CHARGED WITH INSTALLING A FIRST-CLASS SOUND SYSTEM IN A THEATER THAT HAD NEVER BEEN DESIGNED FOR LIVE MUSIC.

when sitting in a darkened theater listening to beautiful music and just letting it take me up, above my daily cares and all the multitude of things in life today that conspire to keep us

Mark Mayfield is Marketing Communications Manager for Bose Professional Products in Framingham, Massachusetts.



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down. I want to provide that uplifting experience to my audiences. I want them to walk out of the Chiswick feeling better about themselves.”

One problem was that the theater had no place to put an orchestra. As the Nickerson, the theater had relied on a Kurzweil keyboard, pumping the sound across the house from two 2-foot-square speakers hung from the wings with aircraft cable. That wouldn't do for the Pasquarellos and Allosso: They knew from being in

ONE PROBLEM WAS THAT THE THEATER HAD NO PLACE TO PUT AN ORCHESTRA.

the audience that there were holes in the sound coverage, and Eileen Pasquarello, who directed the renovation of the Chiswick Park Theatre, knew that obtrusive speakers weren't going to fit in to her aesthetic vision and the quality and comfort she wanted to provide for her patrons.

Welch had often used Bose loudspeaker systems. “We did a university chapel whose interior was constructed entirely of rich mahogany. The architect and minister didn't want to ruin it with speakers everywhere. Using Bose 402s, we were able to hide them or blend them into the architecture. The music sounds like it's coming from on-high.”

Discussing the challenge of the job with Michael Malizola, product manager with Bose's Professional Products division, Welch learned that there was a Bose loudspeaker system under development called Panaray. Malizola, who was at the time seeking a real-world test site for Panaray, thought he might have a mutually beneficial solution. Panaray, he suggested, would be unobtrusive while providing high-quality sound and broad consistent coverage across the 498-seat theater. Most of the audience, Malizola assured Welch, would probably never even be



The first floor lobby with Bose's FreeSpace business music system to provide pre-show music for patrons.

aware it was there. For those who did notice it, Panaray would add to rather than detract from the room's aesthetics, since it would be architecturally compatible with the proscenium.

Panaray is a compact loudspeaker array, which houses five prepositioned

WORKING FROM ARCHITECT LONERGAN'S BLUEPRINTS, THEY CREATED A TO-SCALE MODEL OF THE THEATER ON THE COMPUTER, TRYING ARRAYS IN VARIOUS LOCATIONS.

4-1/2-inch speakers. A single array provides wide horizontal sound dispersion across the same audience area as would be covered by two or more conventional loudspeakers. The system also includes a Bose Acoustimass bass enclosure. The patented Acoustimass design filters out any frequencies above the bass operating range that

might be generated during operation by electronics preceding the bass enclosure. The Bose 502C systems controller provides active equalization.

“It's a very flexible and easy to install system,” says Welch. “You can configure just the number of arrays and bass enclosures you need, and you can position them almost anywhere. It's also a very forgiving system. Because Panaray is less directional than traditional horn clusters, you don't have to worry about precise positioning and aiming. That's important for theaters,” he notes, “because a lot of them are in renovated buildings that were never designed as performance spaces or they were designed for performances of a different era. If for architectural reasons I have to move the speaker position a few inches in some direction, it's okay; it's not going to affect the sound coverage drastically.” According to Welch, Panaray has relatively narrow vertical coverage compared to the horizontal, which helps to contain the sound to the audience and keep it off the stage, increasing gain before feedback.

Welch collaborated with Malizola and his Bose team to plan the in-

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The FreeSpace music system provides intermission music in the second floor lobby.

stallation using the Bose Modeler program. Working from architect Lonergan's blueprints, they created a to-scale model of the theater on the computer, trying arrays in various locations and analyzing coverage, frequency response, and speech intelligibility.

The installation itself was made easier by Bose's custom-designed accessories for both the loudspeaker system and the bass enclosure. [Accessories include brackets, a stand adaptor, and a 150-watt constant voltage transformer.] Welch says, "The fact that we could install the system rapidly was appreciated by the theater, since they had a full schedule of rehearsals — the show must go on."

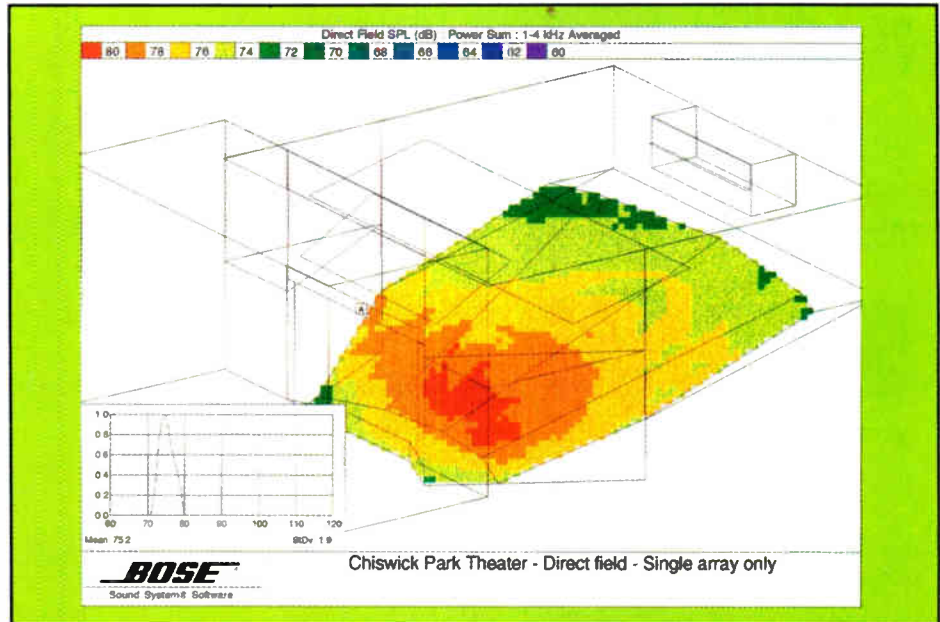
It turned out that a single array

MIXa Amps. Pure QSC.



mounted at the center of the proscenium could easily cover the entire 498-seat audience area. Nevertheless, the decision was made to install three: at center, left, and right on the proscenium. "Three arrays gives them a lot of flexibility to accommodate a variety of different types of performances," explains Malizola. "They can put sound effects, such as doors slamming or train whistles, at stage right or stage left. They can play recorded music tracks in stereo, and they can use all three speakers for higher SPL if they're having a concert."

The three-speaker arrangement also provided a solution to the problem of where to put the orchestra. The orchestra is now perched on a platform above and to the right of the audience. The music is mixed in stereo and fed



This SPL coverage map depicts the direct field generated by a single center array.

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*The 502A controlled
array is mounted on the
proscenium in the center.*

through the left and right arrays, enabling the technician to maintain balanced sound across the room. The on-stage vocals are fed through the center array only.

After working with Modeler and performing preliminary in-house testing, Welch and Malizola were quite confident that the system would deliver the necessary coverage and sound pressure levels. The Chiswick staff wasn't sure what to expect. "We'd gotten used to seeing the big black boxes,"

**THEY CAN PUT SOUND
EFFECTS, SUCH AS
DOORS SLAMMING OR
TRAIN WHISTLES, AT
STAGE RIGHT OR
STAGE LEFT.**

remembers Production Manager Suzanne Lowell. "We couldn't quite believe that these small little speakers were going to be able to do the job.

When we sat down and the music came on, we just looked at each other and grinned."

Lonergan, who had been concerned that trying to accommodate live music

**THE ORCHESTRA IS
NOW PERCHED ON A
PLATFORM ABOVE
AND TO THE RIGHT OF
THE AUDIENCE.**

might lead to compromising the spatial and aesthetic qualities of the theater, was pleased. "In fact, the new system is a vast improvement," he points out.

Lowell believes that all of the things that go into creating the illusion of theater should be subliminal. "We invested a lot of money," she points out, "in upgrading the lighting and in doubling the number of rigging line sets on stage so that we could support complex stagings and smooth, seamless

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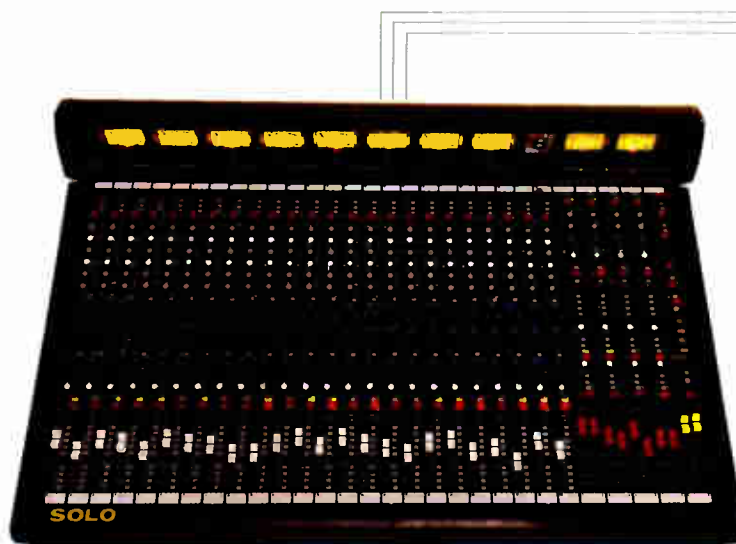
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changes. If we had to turn the lights out and have somebody clunk on stage with scenery, it would jar the audience out of the world we're making for them. The same thing is true if the lighting is obvious or awkward, or if

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BUSINESS, OF GIVING
PEOPLE AN
ENJOYABLE EVENING.
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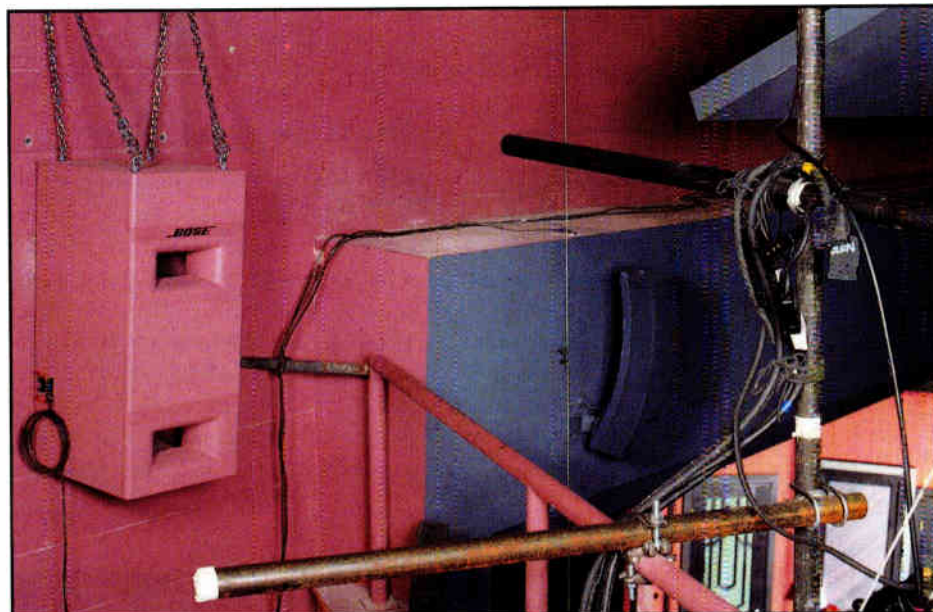
the sound seems artificial or to be coming from the wrong place."

Ted Pasquarello takes the point further. "Everything we do contributes to the audience's receptivity and feeling about the play. Probably only 50 percent of their reaction is a direct result of what happens on stage; the other 50 percent is affected by everything else they see, feel — and hear — from the moment they walk into the lobby to the moment they walk out. We're in the business," he explains, "of giv-

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ing people an enjoyable evening. That's the total product we're providing."

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The 502B Acoustimass bass enclosure is installed above and to the left of the stage, and painted to blend with the wall surface.

sound affordable — an important point for the Pasquarellos, who have always clearly understood that theirs is a business endeavor as well as an artistic one. "There is no reason" says Ted, "why we can't bring cultural enrichment to our community and still operate as a profitable business. In fact, if we're going to achieve our goal of becoming one of the leading regional theaters, we have to."

The theater's future, of course, depends on whether their audience enjoys and values the product they are providing. The first test came last summer as the theater mounted a series of free cabaret performances for the thousands of subscribers who had been left out in the cold when the Nickerson folded. Many of these people were quite angry with the former owners, but the Pasquarellos urged them to come, meet the new management team, and see and hear for themselves what the Chiswick Park Theatre could offer.

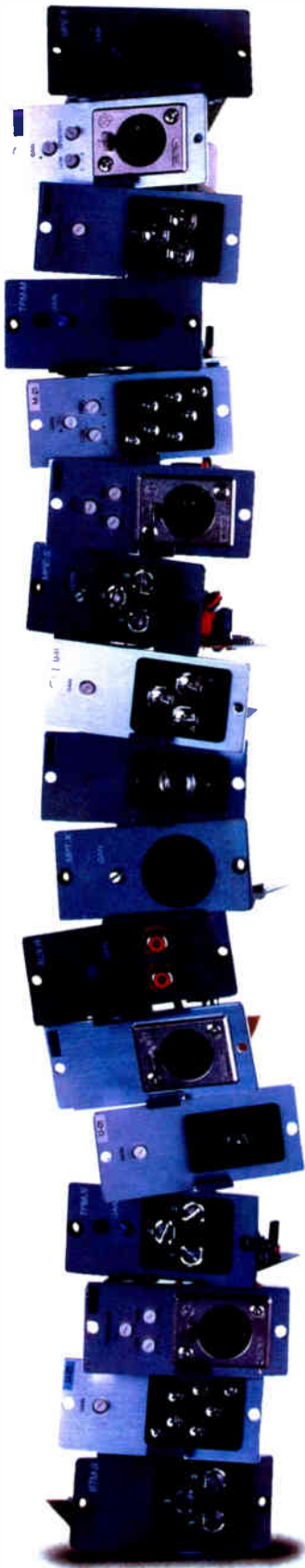
They did, in scores, and after the performance many went directly downstairs and renewed their subscriptions. In fact, the theater now has over 6,200 subscribers. The successful first

season, which began with "La Cage au Folles," also includes Arthur Miller's drama "All My Sons," "Oliver," a world

**THE THEATER'S
FUTURE DEPENDS
ON WHETHER
THEIR AUDIENCE
ENJOYS AND VALUES
THE PRODUCT
THEY
ARE PROVIDING.**

premiere musical by Michael Leeds, "Mating Habits of the Urban Mammal," the farce called "Lend Me a Tenor," and the Boston premiere of Craig Lucas' "Prelude to a Kiss."

So far the performances and the sound system have received rave reviews. Boston Globe critic Anthony Tommasini, writing about "La Cage," praised the theater's "artistic vision" and the "dash and spunk" of the production, then noted that "the Chiswick's new sound system is as unobtrusive as any I've ever heard." ■



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World Radio History

Kiosks on Campus

How Ball State Students Stay In Touch

BY HOLLY McARTHUR

They approach the kiosk a few minutes apart, each seeking information. A new student on the campus seeks a list of student organizations. A lost visitor needs directions to her daughter's dorm. A professor wants the score of last night's game.

They each use the kiosk in the sports arena, although others are scattered about the university. The big red box resembles a video game or an automated teller for a very collegiate bank. Each user simply touches its color monitor screen two or three times. The exact, requested information pours out — as text, narration, color images, full-motion video, or some combination of them all.

Welcome to Ball State University, "the campus of the future" set down in the rural midwest, some 2,300 miles from Silicon Valley.

"Who would believe it would be here?" says David B. Pickens, CDP, CSP, a graduate assistant at the University's Center for Information and Communication Sciences (CICS) and responsible for leading the kiosk project this year under faculty member Robert E. Yadon, Ph.D. "It's amazing."

CICS and its interactive video kiosk system are among the results of a \$10 million high-tech initiative launched in



A Video Kiosk at Ball State University.

1985 by the State of Indiana. Once built, CICS formed partnerships with AT&T Corp., Truevision, Inc., and other companies to equip the labs and turn them into hardware and software testbeds.

Beyond the labs, CICS initiated a project called TEMCOF, the Teaching Environment Model of the Campus of the Future. With AT&T as the primary corporate sponsor, BSU installed a new communications infrastructure consisting of 750 miles of copper and fiber links. This ties the 19,000-student

university together, integrating voice, data and video communications. More than 300 sites, for example, are linked to a central audio-visual system controlled by instructors from the classroom. (Time magazine has cited BSU among American schools "attempting to seize the future in strikingly independent ways.")

"We take an existing technology, and find ways to use that to solve communications problems," Pickens says.

More than 300 sites, for example, are linked to a central audio-visual system controlled by instructors from the classroom.

"We've turned the entire campus into a research unit."

The same is true of the University's interactive video kiosk system, developed by CICS. The system was modeled on the interactive video technology at EPCOT Center at Disney World in Orlando, Fla. BSU put its first kiosk in operation in 1991, and six of the big red boxes are now located at high-traffic locations across the campus. There are current plans to install two more this year.

Holly McArthur is a freelance writer in Chicago, Illinois.

"We've taken what was developed by AT&T for EPCOT, and gone three generations beyond that," says Pickens.

The EPCOT system was built around a VAX cluster, but Ball State improved on that with a PC-based kiosk system. The PCs and laser-disk players for all kiosks rest in equipment racks in CICS' back room "Skunk Works." These PCs are all DOS-based, AT&T 386 25 MHz machines with 100-megabyte hard drives. Each is equipped with a Truevision TARGA 16 graphics engine, which displays the high-resolution still graphics and the full-motion color video, along with graphic overlays of the video. TARGA boards were also used in developing these graphics.

The kiosks system's main and



Each user touches its color monitor screen two or three times to retrieve the requested information.

backup servers are 386 33 MHz PCs running UNIX. The system also includes an authoring station and a monitoring station. The PCs are connected via a Starlan/10 network, and tied to the kiosks via fiberoptic links. This allows the content and the images on the kiosks to be changed and updated quickly and easily from a central locations. The kiosks themselves are extremely simple, and therefore easily maintained. Each red box (adorned with a cardinal, the BSU mascot) consists of a color video monitor with an infrared touch screen, plus a printer, fiber modem and magnetic card reader. Pickens calls each BSU kiosk a "24-hour point of information center for students and visitors to campus."

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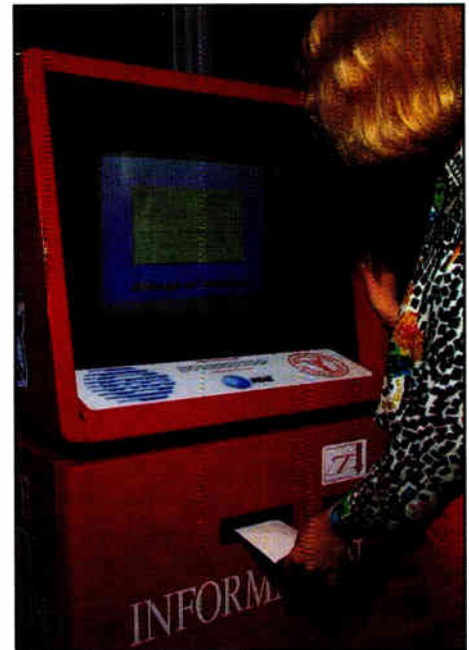
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Each kiosk scrolls alternately through video images stored on a laser disk and still images from its hard disk until someone touches the screen. This brings up a main menu of on-screen "buttons."

Touching the main menu brings up buttons for Campus Maps, Calendar, Academics, Student Services, This Building, About the Kiosk, Sports, Student Organizations, and About CICS. The user works through these selections to arrive at the desired information or video. Data that must be updated — such as sports schedules or scores from last week's games — are retrieved as text from the hard disk. More lasting information — such as a sports highlights from the previous year — are retrieved from the laser



The card reader allows students and faculty the ability to access grades, vote in student elections, or use a credit card to buy concert tickets.



Greater access to records is achieved through the card reader and printer.

disk, giving the user a multisensory experience. New laser disks are pressed about once a year.

The kiosk system is currently completing the second of three phases. In the final phase, the card reader and printer will allow students and faculty far greater access to campus information and records. Inserting a university ID into the card reader, for example, will allow a student to check his or her grades. Or vote in a student election. Or look up course schedules. Addi-

Eventually, a user might merely touch a person's name on the building's directory to be connected automatically by telephone.

tional research is being conducted into allowing students to check electronic and voice mail messages. By using a credit card instead of an ID, the student will use the system as a point-of-sale kiosk for buying sports or concert tickets.

Pickens says that this technology

allows users to move through deeper layers of the touch-screen maps — starting at the Indiana map, for example, and progressing all the way down to a particular campus building, and even to its floor plan. Eventually, a user might merely touch a person's name on the building's directory to be connected automatically by telephone. CICS graduate students also have experimented with voice-activated, two-way transmissions. This would allow physically challenged users simply to speak to the kiosks to access menus and data.

For now, the kiosks is already a BMOC (big machine on campus). On a typical day, the kiosk in the business school building was touched more than 1,500 times — representing hundreds of users. None of this is lost on current or prospective BSU partner companies such as AT&T and Truevision.

"The speed and efficiency in moving information to people in this fashion," says Pickens, "has already captured the imagination of a number of Fortune 100 firms with similar campus environments." ■

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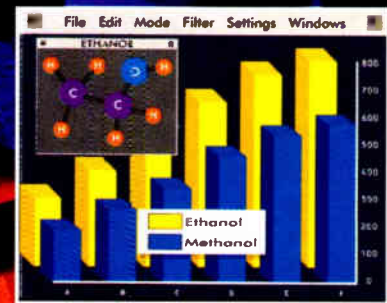
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Educational Media System

Teleconference System at California Polytechnical Gets Six Mic Zones

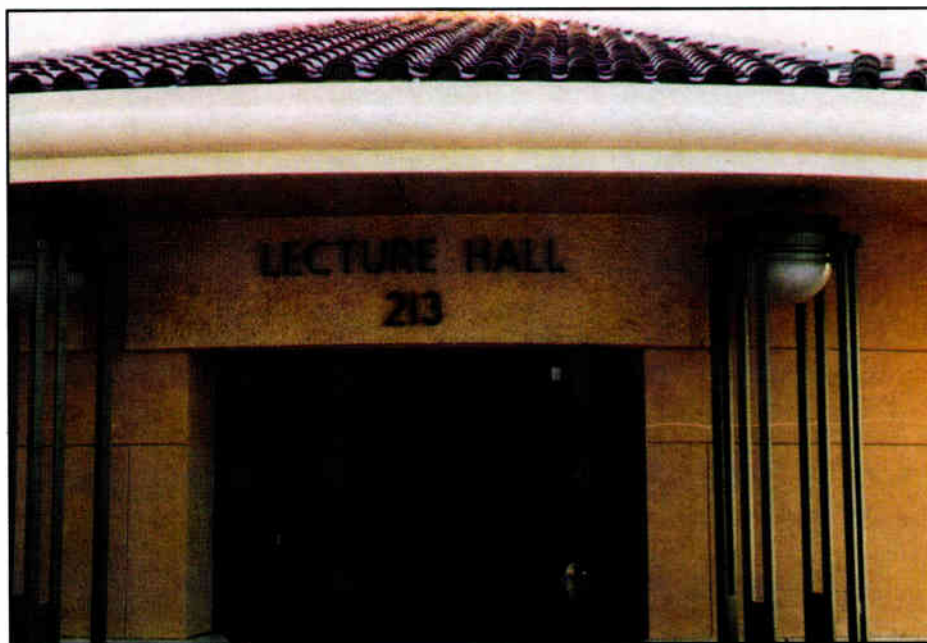
BY KEITH CLARK

The growing trend for using the latest in audio/video technology in the classroom continues at an astonishing rate. And in fact, this trend has even fostered an accurate and descriptive term: Educational Media.

Students, growing up in a high-technology era, can learn faster and more effectively through the wise employment of multimedia. Realizing this, educators continually strive to apply the latest technological marvels within the classroom. And audio/video professionals are providing the practical solutions that allow many of these advances to be used as educational media.

One of these systems was recently installed by C.J. Carrigan Enterprises, Inc., of Walnut, California. The system is an updated audio supplement to an existing video teleconference system at California Polytechnical University's San Luis Obispo campus. The video side of the system was designed and installed by university technicians under the direction of Media Specialist Pete Woodworth.

The new system makes it possible



The Lecture Hall at California Polytechnical.

for up to 250 students and a lecturer in Cal-Poly Lecture Hall 213 to teleconference with other university lecture halls thousands of miles away.

Carrigan Enterprises regularly works with institutions of higher learning to provide custom audio/video solutions. Recent projects include a computer graphic projection and sound system at the University of Southern California in Los Angeles,

specialized video projection systems at the Claremont Colleges and at Estrella Mountain Community College, and an electric theater screen design and installation at California State University/San Bernardino.

The Cal-Poly teleconference system allows for the exchange of information in a lively format where everyone — students, faculty and guest lecturers — gets to participate. A previous tele-

Keith Clark is President of Priority Communications in South Bend, Indiana.



Installation crew installing the mics and baffles.



Installation crew in action.

conference system in Lecture Hall 213 provided limited capability; it wasn't gatable and could only accommodate a few people, each with their own microphone.

At the heart of the new system is the Crown SMX-6 intelligent multiplexer, which can be likened to a 6 x 2 stereo mixer with computer-controlled input mixing and routing capabilities.

Tim Carrigan, multimedia systems engineer for Carrigan Enterprises, needed efficient microphone gating for a large lecture hall with very live acoustics and high levels of ambient noise. In fact, ambient noise levels of the room, when empty, reach more than -18 dB. This level increases even more with noise created by students (talking, paper rustling, etc.), and the addition of rumble from the the HVAC unit. The hall has some sound absorbent materials to enhance its acoustics, but noise levels remain less than ideal.

"The aesthetics of the room just couldn't be altered significantly to provide better acoustics, and the university didn't want to install a lot of obtrusive equipment," Carrigan says. "In other words, we couldn't install 250 individual microphones for teleconferencing."

The concept of this system is similar to "normal," smaller-scale telecon-

ferencing situations set up in standard conference rooms to accommodate five or six people. "This system accommodates 500 people rather than five, but we utilized the same principles," he says.

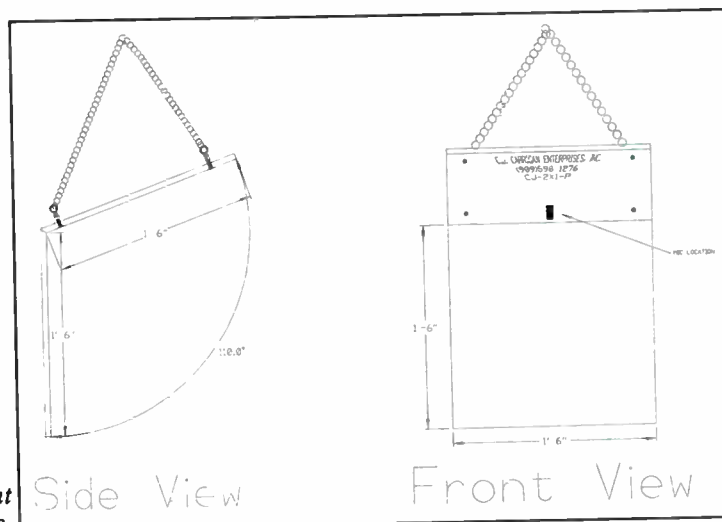
Six specific microphone zones were mapped out within the room. Each zone would be served by a single Crown PZM-30D Pressure Zone Microphone, mounted in the apex of custom boundaries. Two microphones were suspended about 10 feet overhead, while two mics were attached to each side wall. All of the mics feed the SMX-6.

Carrigan explains, "We only have a range of about five dB for gating a mic

on or off. The SMX provides a gate-level setting low enough to effectively capture and gate individual voices in this noisy environment."

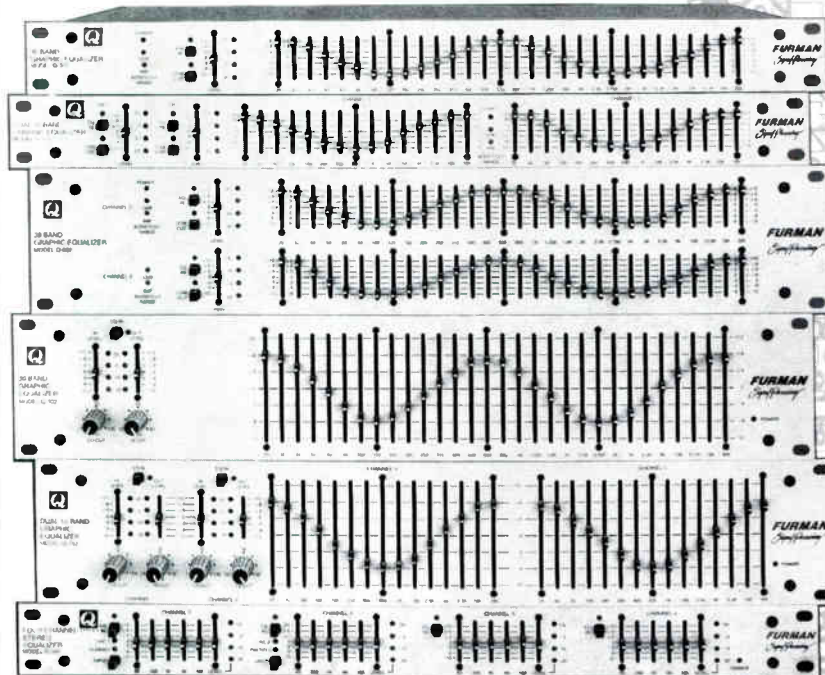
The custom clear Plexiglas boundaries were designed specifically to enhance the ability of the PZM microphones to capture the human voice, while still being as unobtrusive as possible. The overhead baffles have a single PZM-30D mounted at the apex of a 110-degree "V." The more open 110-degree angle provides a wider coverage range than a 90-degree angle common in baffles of this type.

The four side-wall baffles also offer a 110-degree "V," but Carrigan added a third side to create a pyramid shape.



Side and front view of the baffles.

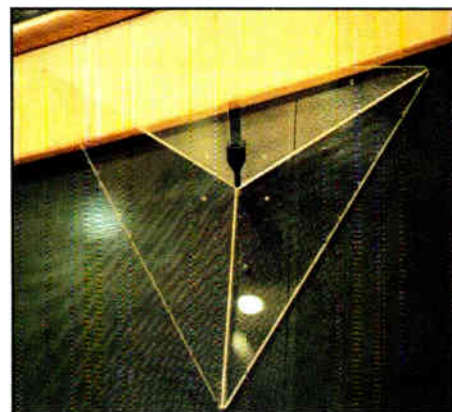
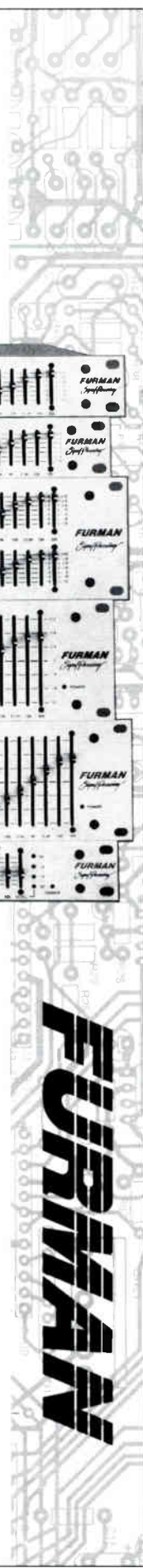
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Close up of the PZM and baffle unit.

"The third side made these baffles more directional. When combined with the extra reflection we get from the flat wall surface, the sound is very directional and clear," Carrigan says.

The SMX was also used to tailor the sensitivity of each microphone. The side-wall mics, picking up the additional reflected sound, proved to be much more sensitive than the two ceiling mics. With the SMX, wall mic sensitivity was subtly reduced while ceiling mic sensitivity was increased.

"We needed to be able to alter sensitivity. Someone located closer to the center of the room should be keying the center mic for maximum sound quality and intelligibility," he explains.

Carrigan continues, "When a gate is on, the unit automatically adjusts a voice to the level where it is most intelligible and rides that level during the duration of someone speaking, ensuring that the voice isn't distorted or too soft."

Two cameras, yet to be installed, will furnish outgoing video. One camera will focus on the stage, following the lecturer(s), while the other camera, positioned at the front of the room, will focus on the crowd and single out the person speaking. For the incoming video feed, Carrigan supplied NEC units that project on a large screen mounted at the front of the room.

In the future, Carrigan would like to add another SMX-6. "All six channels of the unit are currently occupied. Adding another SMX-6 would permit six lecturers to use the system at once. These other channels would also be available for many other uses." ■

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Security at Notre Dame

University Chooses to Fight Crime

BY JUDITH A. MARRAZZO

Crime. It's fast becoming one of the most critically important issues on college campuses today. Students, parents and faculty are making campus security and safety a high priority when selecting a college or university.

Concern for personal safety on school grounds was heightened following the nationally covered Lehigh University and Gainesville Florida homicides. In response to this growing concern, college and university administrators are taking additional high tech steps to improve campus safety and security measures.

The University of Notre Dame, in South Bend Indiana, is not immune to incidents of crime and other emergency situations. Although its campus crime rate is dramatically lower than found in other parts of the country, safety is an important concern of Notre Dame officials. Students and faculty are a continually mobile population that keep predictable schedules. This makes them easy targets and ideal potential crime victims. Automobile traffic is limited on the Notre Dame grounds so most of the University's population travels on foot or by bi-



The Ring Master CB901 Central Control System at Notre Dame University.

cycle. With over 100 campus buildings, 1,250 acres and many picturesque, but deserted, walkways campus security becomes more like protecting a series of small villages and parks than a metropolitan university.

The challenge was how could Notre Dame University's already impressive security program be expanded to increase its effectiveness and confidence level. After much research and investigation, the University decided upon implementing a high tech emergency call box system installed throughout the campus. University Officials developed specific criteria for which the emergency call box system had to meet.

Reliability was the most important issue. For what good was a system that did not always work? This brought up issues of a system functioning despite the harsh weather conditions and the possibility of vandalism. Ease of use also became a requirement, as well as the clarity of voice communication. In addition a request for a computerized interface was made to help security track and monitor transmissions.

After an intensive selection process, the University hired Baker Audio, a contracting firm with extensive experience in the security and communication systems.

Notre Dame's administration and

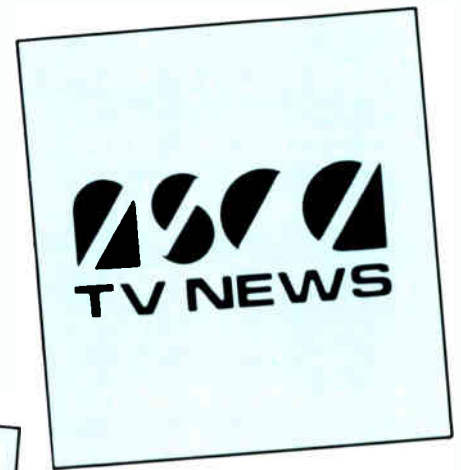
Judith A. Marrazzo is with marketing firm Paul Jann Advertising in Hempstead, New York.

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security personnel worked closely with the contractors and representatives from Ring Communications to develop an emergency call box system that would integrate with and dramatically enhance their existing security program. The fact that Ring Communications and Baker Audio actually flew technical people down to the Indiana campus impressed University Officials, and showed that both companies were serious and committed to the complete success of the project.

The results were equally impressive. The University installed a Ring Master CB901 Central Control Security/Communication System with 18 tamper proof and nearly indestructible emergency call box stations strategically located throughout the campus. The Ring Master CB901 Central Control Unit and its master back-up control is located in the University's security office, with the system's central exchange centrally located in the University's Hesburgh Library.

The Ring Master CB901 is micro-processor controlled and is capable of handling multiple simultaneous calls and allows for future expansion in both

size and features. The Control Unit automatically and continually monitors the entire system 80 times per second to detect calls, faults on the line, power failures, and line or box tampering to assure its operation. Notre Dame's Ring Master system has also been linked to campus security's two way radio system.

A call box's emergency signal is sent out the moment its door is opened so no verbal request for emergency assistance is necessary. This particular feature has already proved itself. A lost and confused senior citizen from a local nursing home wandered onto campus. The individual opened the box but was unable to say anything. Within minutes he was found and returned safe and sound to the nursing home. In addition many coeds, feeling uncomfortable traveling across campus at night, have used the call boxes for requesting security escorts. The call boxes have performed in all weather conditions.

University Officials are presently thinking of expanding the system to include additional features, possibly including Ring Communications products. ■

Reach The Entire Audience

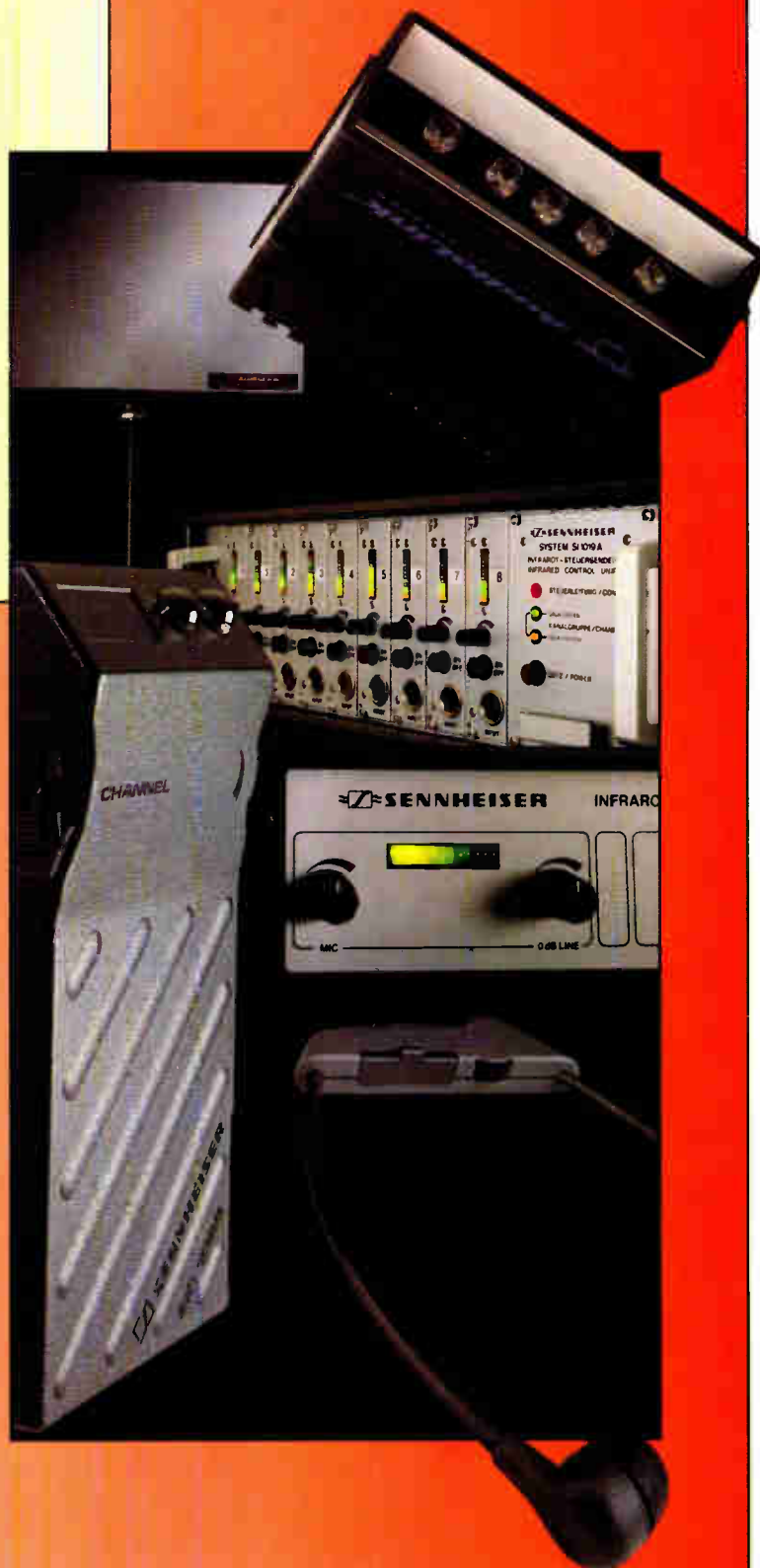
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PREPARING A WORKSHOP ON COMPUTER-AIDED- WORKSTATIONS

By Mike Klasco

My first article for Sound & Communications was written in the winter of 1985. The topic was Computer-Audio-Workstations.

My article speculated that someday there would be a personal computer "platform" that would integrate design of speakers, sound systems, and room acoustics, as well as test and optimize the completed and installed results of those efforts.

Eight years later, it is obvious that design and test tools for sound system engineering have come a long way. Sadly, I read today that Wilfred Malmund, one of the pioneers of speaker aiming techniques has recently passed away. In 1962, while at Bolt, Beranek and Newman, he devised an optical method for optimizing loudspeaker clusters. Almost twenty years passed before Community commercialized John Prohs' Cluster Computer, a clear plastic sphere that extended Malmund's original concept.

Progressively more and more of the functionality of Malmund's optical device were transposed into computer graphics by other programs, albeit with a significant loss of intuitive feel to the sound system designer. Only now are the sound system design programs finally reaching and perhaps surpassing Malmund's optical device. It is not that computer graphics are more intuitive than the optical scheme, but the promise of auralization — the ability to hear what the results will be before even the building is built!

So now I find myself preparing a Syn-Aud-Con Workshop on Computer-

Audio-Workstations, specifically on "Audio Measurements and Instrumentation." The workshop will concentrate on discussions, demonstrations, and hands-on work in analysis of speakers, audio components, sound systems, acoustics, and auralization. During this three-day seminar we will explore comprehensive characterization of devices and systems under test — frequency and time response, three dimensional analysis as well as distortion characteristics including harmonic, intermodulation, and spectral contamination. How these measures relate to what we hear will be discussed. So will practical stuff, like selection of optimum measurement parameters and avoidance of prevalent measurement errors.

The instrumentation platform will be the Bell Laboratories SYSid (for "system identification") and Signalogic Hypersignal Acoustic software. Both these test systems run on the Ariel DSP-16 card on IBM compatible computers. For all the fancy names, all this stuff is actually not so expensive — about \$3,000 for the Ariel board and SYSid software. Hypersignal Acoustic can be added for \$1,500. Once you have all this together, then with one of the new releases of the popular sound system programs, such as CADP II, EASE, or AcoustaCADD, then you will also have auralization capabilities. Auralization is the ability to preview how a room that may exist only in a CAD program will "sound" from specific listening positions.

SYSid is a dual-channel analysis tool



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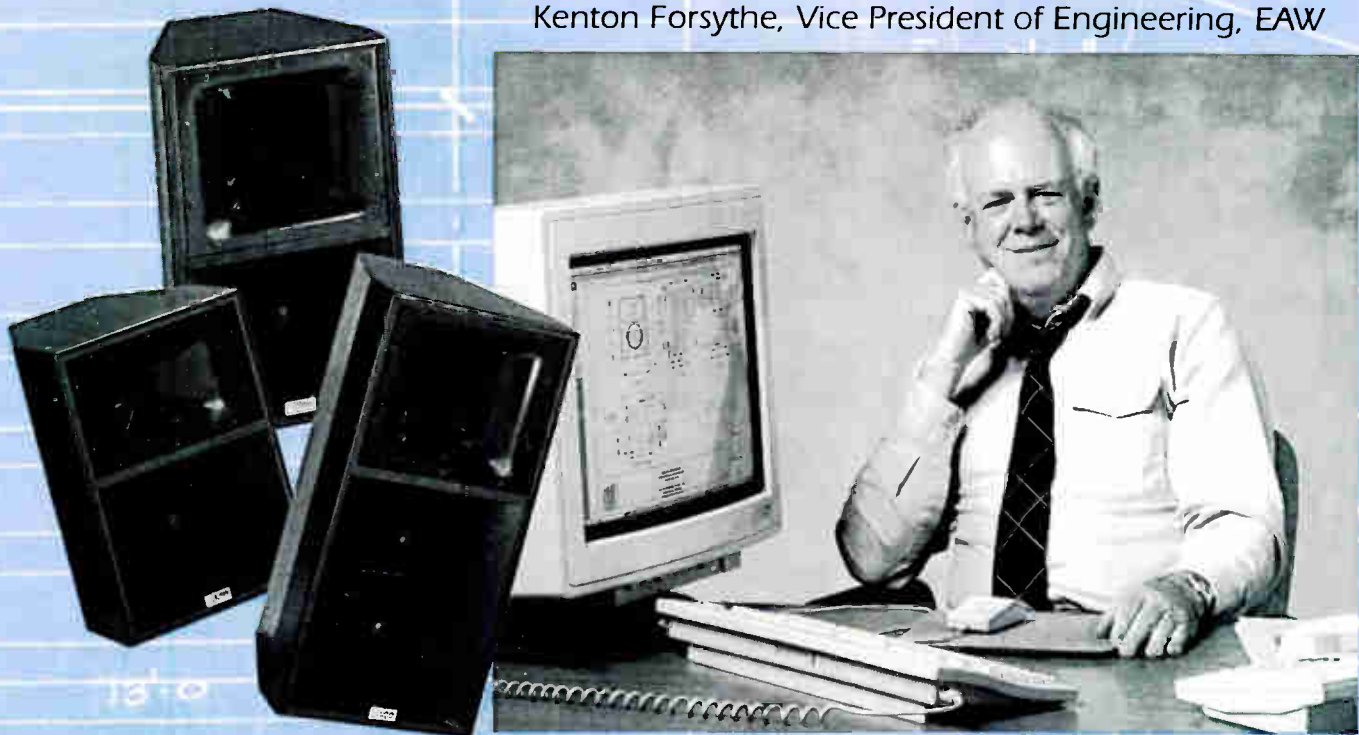
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Mike Klasco is the Technical Editor of Sound & Communications magazine.

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using swept sine wave, MLS, impulses, or user-defined test signals combined with a comprehensive distortion analyzer. SYSid has an impressive cult following of industry "heavies", even though Ariel and Bell Labs tend to be low profile companies as far as product promotion.

In conjunction with Hypersignal-Acoustic, the system can provide

Auralization for a number of sound system design programs. Other capabilities include dual-channel realtime spectrum analyzer, scope, 3D waterfalls, color spectrograms, arbitrary wave form generation, waveform editing, filter design, and source-independent response equalization.

Many sound contractors have been reading about high performance

sound system engineering tools for years in Sound & Communications. This workshop will be a good opportunity for hands-on use of a powerful, but relatively straight forward, test system.

Jont Allen from Bell Laboratories, will discuss SYSid's operational concepts and recent experimental measurements in hall acoustics. Sunil Puria, a protege of Dr. Allen, is responsible for continuing the development of SYSid. Sunil will demonstrate SYSid's operation and discuss ongoing enhancements. Sunil is now at MIT's Research Laboratory of Electronics, where SYSid is being used for acoustics research. Application to speaker design, loudspeaker power compression testing, sound system optimization, distortion testing of audio components, characterization of signal processing devices, and more will also be demonstrated by myself and other

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audio engineers who will be attending.

The third day of the workshop will be dedicated to Signalogic's Hypersignal-Acoustic. Eugene Patronis, Phd, physics professor at Georgia Tech, and Sam Berkow of SIA Consulting, will argue over who is making the best use of this powerful analysis tool in audio engineering applications. Aside from the DSP-16 digital signal processing hardware, an Ariel "super-DSP-board" will demonstrate realtime auralization using Signalogic's "Real-Time Convolver," a separate program compatible with EASE. Performing the auralization function with a program

(continued on page 88)



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Whether it's for a portable or fixed installation, using the YST system is just plain smart. So before you go to your room, call 1-800-937-7171 extension 90A. That's the only thing you'll need to remember.

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World Radio History

Digital Delays, Part Two

Testing Specific Product for Specific Uses

BY NEIL SHAW

In the first part of this series we looked at a brief description of what a signal delay unit is and some of the various applications in which signal delay units can be used. The characteristics that are used to describe the performance of a two-port electronic device were described. A two-port device, as we all know, is a device that has an input and an output, as opposed to a one-port device, an example of which is a CD player. The performance of an ideal signal delay unit was then described. The ideal characteristics for a signal delay unit that were described included the frequency response, the residual noise floor, the deviation from linear phase and distortion.

In this second part, we will look at some real signal delay units.

SELECTION OF UNITS TO TEST

This project began as an undertaking for consulting purposes. The "Sound & Communications Blue Book" was used to find manufacturers who were listed as suppliers of signal delay units. Letters were sent to these manufacturers, on the consultant's company letterhead, requesting units for evaluation and testing. (I am now a Principal with Menlo Scientific

Acoustics). There were about 20 manufacturers listed in the Blue Book used. Of the manufacturers canvassed, seven responded and sent units for testing. The manufacturers whose products were measured for this article were (in alphabetical order): Brooke Siren Systems (BSS); Industrial Research Products (IRP); JBL Professional (JBL); Panasonic/Ramsa; TOA; T. C. Electronics (TC); and Yamaha.

PRODUCT DESCRIPTIONS

For each of the following, the description is based upon a visual inspection of the unit, manufacturer's description in product literature and/or operation manual and telephone conversations with the manufacturer. All units tested, except as noted, are current models.

Brooke Siren Systems TCS-803 and TCS-804 Multitap Time Correctors

The BSS TCS-803 and TCS-804 are one standard EIA rack unit in height. The TCS-803 is a one-input, three-output unit. The TCS-804 is a two-input, four-output unit. The unit may be set up in either a one-input, four-output configuration or a two-input, two-output configuration. The manufacturer states that the frequency response of the units is 20 Hz to 20 kHz, +0.5/-0.5

dB. The TCS-803 and the TCS-804 both use 18-bit A/D conversion. The smallest delay step increment is 10 microseconds. The maximum delay time available for the TCS-803 is 650 milliseconds, with 1.3 seconds optional, and the maximum delay time available for the TCS-804 is 650 milliseconds in stereo mode, with 1.3 seconds optional, and 1.3 seconds in mono mode, with 2.6 seconds optional.

Input and output level adjustment is made using potentiometers in the TCS-803 while in the TCS-804 digital attenuation is used.

Delay can be set using time or distance (metric or English) units. Propagation delay is 20 Hz to 20 kHz. Group delay linearity is +7 microseconds, 20 Hz to 20 kHz. Input and output level adjustment is made using potentiometers in the TCS-803 while in the TCS-804 digital attenuation is used. Input and output connections are XLR-type connectors. Inputs and outputs are electronic active balanced. Both units have 12 memory presets. The units use front panel push buttons or, in the case of the TCS-804, an FSK remote

Neil Shaw is a partner at Menlo Scientific Acoustics in El Segundo, California.

control, for preset selection. In addition, the TCS-804 unit has a MIDI control option, RS-422 and FSK remote control option, plus an automatic temperature compensation option.

The units use front panel push buttons or, in the case of the TCS-804, an FSK remote control, for preset selection.

**Industrial Research Products
DJ-4139 Precision Delay**

The IRP DJ-4139 is supplied as a proprietary card cage module. For these tests the DJ-4139 Precision Delay was mounted in an IRP DJ-4150

four-space mainframe. The DJ-4139 has one-input and one-output. The manufacturer states that the frequency response is 20 Hz to 20 kHz, +0/-3.0 dB. The DJ-4139 uses a proprietary conversion scheme similar to Sigma-Delta, and is sampled at 2.048 MHz. IRP states that this is an equivalent bit stream to 18-bit PCM A/D conversion sampled at greater than 100 kHz. The smallest delay step increment is 3.9 microseconds. The maximum delay time available in the base unit is 256 milliseconds. Additional delay time is available using DJ-4134 expanded delay modules. Delay is set using time units. Propagation delay is 24 microseconds, 20 Hz to 20 kHz. Group delay linearity is not stated. Input and output level adjustment is made using analog potentiometers. Input and out-

put connections are via barrier strip. Input and output are active balanced. There is no memory (other than the one setting). The unit has no external control options.

Input and output level adjustment is made using analog potentiometers. Input and output connections are via barrier strip.

**JBL Professional 7944
Audio Delay**

The JBL 7944 Audio Delay is one standard EIA rack unit in height. The 7944 is a two-input, four-output unit.

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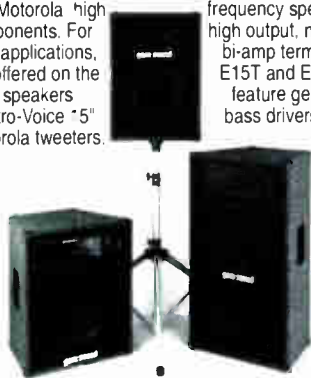
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Table 1.

Frequency response measurements. Parameter — Input level. Delay time set to 90 micro-seconds except for IRP at 89.8 and Yamaha at 80 microsecs. Units set for unity gain at 0 dBv.

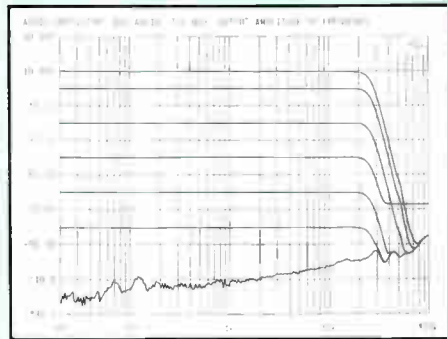


Figure 1: BSS Audio TCS-803 Multitap Time Corrector

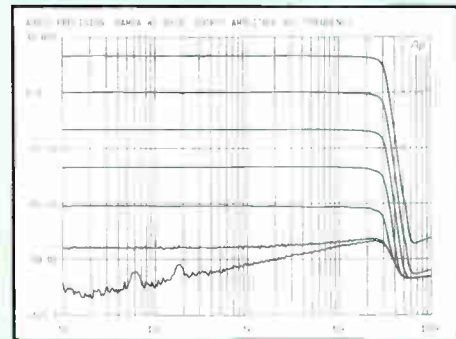


Figure 5: Ramsa WZ-9375 Digital Delay

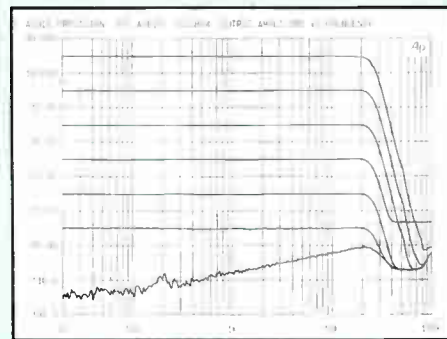


Figure 2: BSS Audio TCS-804 Multitap Time Corrector

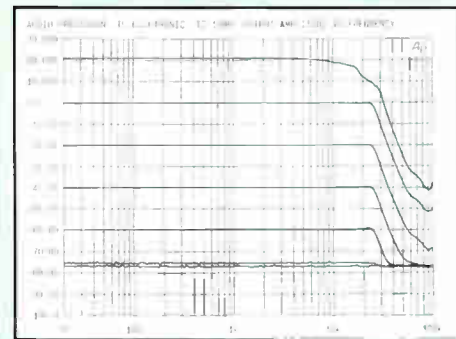


Figure 6: TC Electronic TC-1380 Multitap Digital Audio Delay

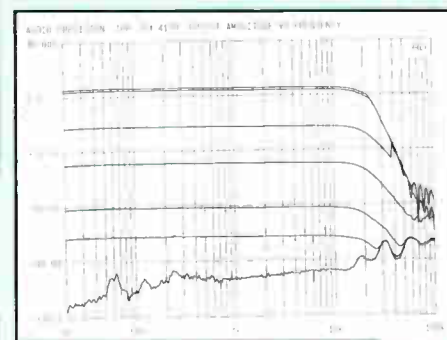


Figure 3: IRP DJ-4139 Precision Delay (in IRP DJ-4150A Mainframe)

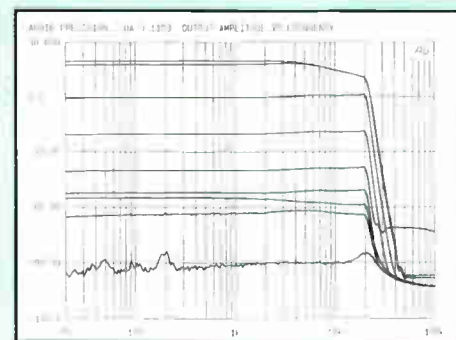


Figure 7: TOA D-1103 Digital Signal Delay

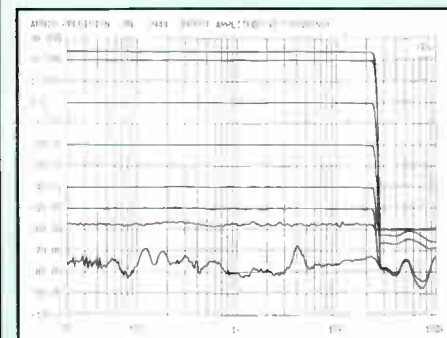


Figure 4: JBL 7944 (Unreleased Prototype Delay)

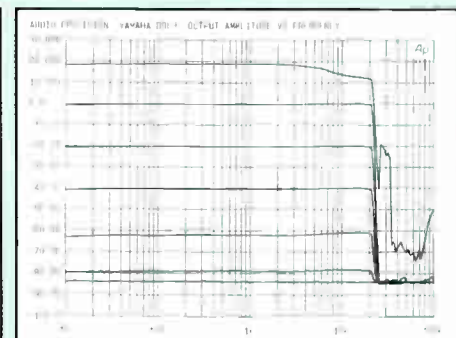


Figure 8: Yamaha D1030 Digital Delay Line (Formerly DDL3)

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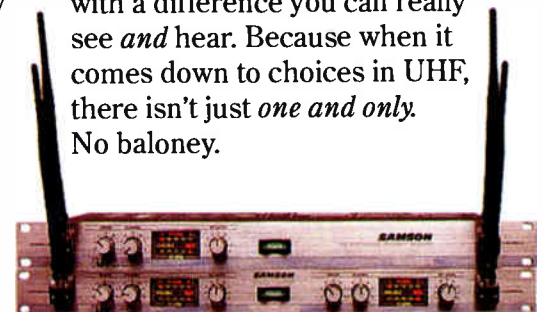
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The unit may be set up in either a one-input, four-output configuration or a two-input, two-output configuration.

The production unit, when released, will probably differ from the tested prototype unit.

The manufacturer states that the frequency response of the unit is 20 Hz to 20 kHz. The 7944 uses 18-bit A/D conversion. The smallest delay step increment is 10 microseconds. The maximum delay time available is more than 2.0 seconds. Delay is set using either time or distance (metric or English) units. Propagation delay is not stated. Group delay linearity is +25

degrees, 20 Hz to 20 kHz. Input and output level adjustment is made using 0.1 dB step digital attenuation. Input and output connections are via barrier strip. The outputs are transformer isolated. There is no memory (other than the one setting). The unit has PA-422 interface capability and AES EBU outputs. Note: The unit tested is a prototype; production has not begun. The production unit, when released, will probably differ from the tested prototype unit.

Panasonic/Ramsa WZ-9375 Digital Delay

The Ramsa WZ-9375 Digital Delay is two standard EIA rack units in height. The WZ-9375 is a two-input, four-output unit. The unit may be set up in either a one-input, four-output configuration or a two-input, two-output configuration. The unit features either 50 kHz sampling rate mode or a 100 kHz sampling rate mode. The manufacturer states that the frequency response is 20 Hz to 20 kHz, +0.5/-2 dB, 100 kHz sample rate mode, and 20 Hz to 20 kHz, +0.5/-3 dB, 50 kHz sample rate mode. The WZ-9375 uses 16-bit A/D conversion. The smallest delay step increment is 10 microseconds in the 100 kHz sample rate mode and 20 microseconds in the

The unit has a memory control interface that uses dry contact switch closures for memory selection.

50 kHz sample mode. The maximum delay time available is 654 milliseconds in the 100 kHz sample rate mode and 1.308 seconds in the 50 kHz sample rate mode. Delay is set using either time or distance (metric) units. Propagation delay is not stated. Group delay linearity is +3 microseconds



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at 20 kHz. Input level adjustment is made using analog potentiometers. Input and output connections are XLR-

The unit also accommodates one input and up to three output transformers, which are internally mounted without soldering.

type connectors. Inputs and outputs are electronic active balanced. The unit has 16 memories. The unit has a memory control interface that uses dry contact switch closures for memory selection.

TOA D-1103 Digital Sound Delay

The TOA D-1103 Digital Sound Delay is one standard EIA rack unit in height. The D-1103 is a one-input, three-output unit. The manufacturer states that the frequency response is 20 Hz to 20 kHz, +1 dB. The D-1103 uses 16-bit A/D conversion at a 100 kHz conversion rate. The smallest delay step increment is 10 microseconds. The maximum delay time available is more than 655 milliseconds. Delay is set using time units. Propagation delay is not stated. Group delay linearity is not stated. Input and output level adjustment is made using analog attenuators. Input and output connections are via barrier strip. The input and outputs are electronically balanced. The unit has four memories. The unit has a memory control interface that uses dry contact switch closures

for memory selection. The unit also accommodates one input and up to three output transformers, which are internally

Additional delay time is available using memory expansion chips for a total delay of 5.000 seconds.

mounted without soldering. The unit also features three levels of security.

T. C. Electronic TC-1380 Multitap Digital Audio Delay

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Table 2.
Deviation from linear phase measurements.
Parameter — Delay time.
Delay times set to 90 microseconds and 1.0 millisecond
except for IRP at 89.9 and 1 and Yamaha at 80 and 1.
Units set for unity gain at 0 dBv.

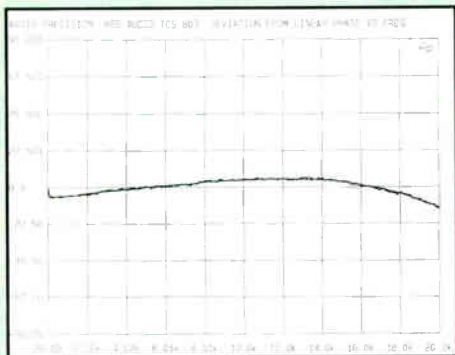


Figure 9: BSS Audio TCS 803 Multitap Time Corrector

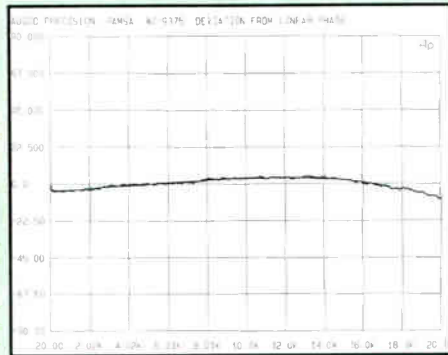


Figure 13: Ramsa WZ-9375 Digital Delay

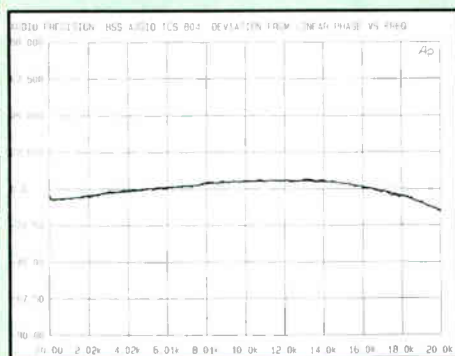


Figure 10: BSS Audio TCS 804 Multitap Time Corrector

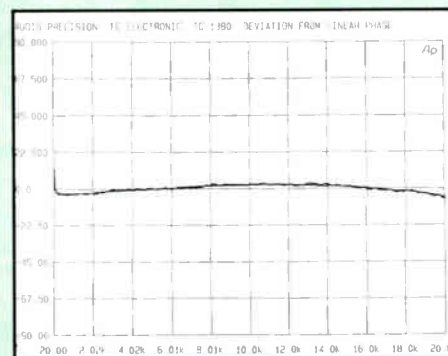


Figure 14: TC Electronic TC-1380 Multitap Digital Audio Delay

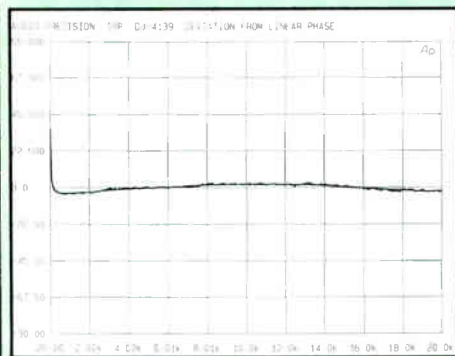


Figure 11: IRP DJ-4139 Precision Delay (in IRP DJ-4150A Mainframe)

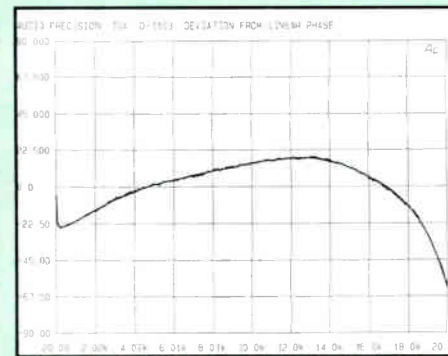


Figure 15: TOA D-1103 Digital Signal Delay

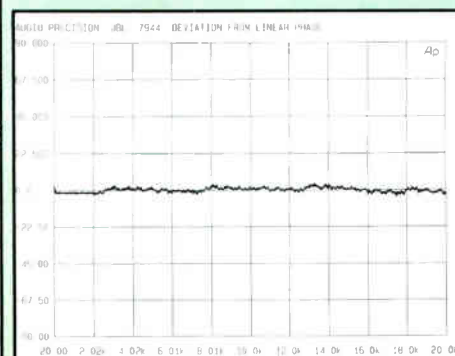


Figure 12: JBL 7944 (Unreleased Prototype Delay)

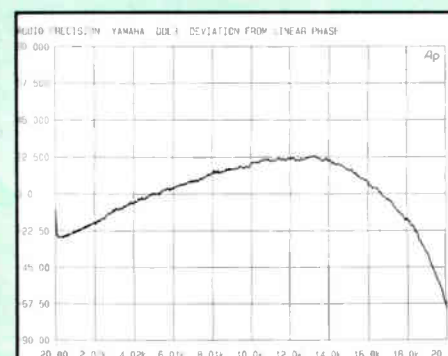


Figure 16: Yamaha D1030 Digital Delay Line (Formerly DDL3)

standard EIA rack unit in height. The TC-1380 is a one-input, three-output unit. The manufacturer states that the frequency response is 20 Hz to 20 kHz, +0/-0.5 dB. The TC-1103 uses 1-bit A/D conversion. The smallest delay step increment is 5 microseconds. The maximum delay time available is 1250 milliseconds. Additional delay time is available using memory expansion chips for a total delay of 5,000 seconds, and a memory option PC board and memory chips allow for a total of 20 seconds of delay. Delay is set using either time or distance (metric or English) units. Propagation delay is less than 30 microseconds, 20 Hz to 20 kHz. Group delay linearity is +5 microseconds, 20 Hz to 20 kHz. Input and output level adjustment is made using potentiometers. Input and output connections are XLR-type connectors. Input and outputs are electronically balanced. The unit has 4 presets available. The preset function uses a resistive switching scheme.

Yamaha D1030 Digital Delay Line

The Yamaha D1030 Digital Delay Line is one standard EIA rack unit in

The frequency response was obtained by first adjusting the output of the signal delay unit under test to be equal to the input to the delay unit.

height. The D1030 is a one-input, three-output unit. The manufacturer states that the frequency response is 20 Hz to 20 kHz, +1 dB. The D1030 uses 18-bit A/D conversion. The smallest delay step increment is 20 microseconds. The maximum delay time available is 1.3 seconds. Delay is set using either time or distance (metric or English) units. Propagation delay is

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 8 Maintenance/Service
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less than 900 microseconds, 20 Hz to 20 kHz. Group delay linearity is not stated. Input level adjustment is made using an analog potentiometer. Input and output connections

The preset option uses a resistive switching scheme for selecting presets.

are XLR-type connectors. Input and outputs are +4 dB balanced. The unit has 15 programmable memories available. The preset option uses a resistive switching scheme for selecting presets. Note: The D1030 was formerly known as the DDL3.

TESTS AND RESULTS

For each of the units tested, the frequency response and distortion for various input levels was measured and the deviation from linear phase at two delay settings was calculated from the phase response. The Audio Precision System One Dual Domain measurement system was used to make the measurements presented here.

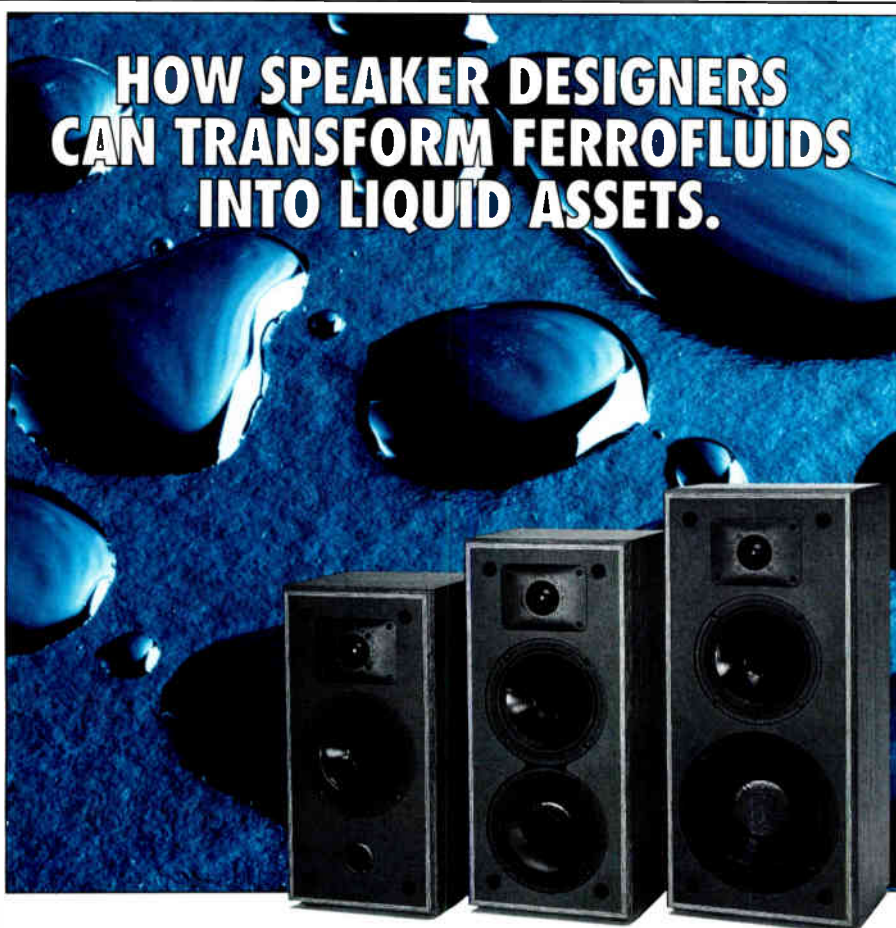
The frequency response was obtained by first adjusting the output of the signal delay unit under test to be equal to the input to the delay unit, with the input signal set at 0 dBv, so that the unit was at unity gain. Note 0 dBv is defined as 0.775 Volts. The frequency response was then obtained for a family of input levels that vary from an input signal that is as high as possible without clipping at 1000 Hz and

then at successively lower levels, until the input signal is off or the output level descends into the noise floor.

For the deviation from linear phase measurements, again using the signal

Some devices may behave better over a larger dynamic range.

delay units under test set for unity gain, the phase response for an input signal of 0 dBv was first obtained. The phase response measured for each unit was then linearized between 20 Hz and 20 kHz to obtain the deviation from linear phase for this 20 Hz to 20 kHz pass-band.



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For the distortion measurements, again using the units under test adjusted for unity gain, the distortion at full rated output (as determined from

Note that some devices may behave better over a larger dynamic range, but this may or may not be useful for you.

the frequency response measurements) and for several output levels below this, were measured.

The frequency response measurements are presented in Figure 1 through Figure 8. When looking at these measurements, note the smooth-

ness (or flatness or linearity) of the responses in the pass-band. There should not be any bumps, dropoffs or other "non-linearities." Also look at the response at the extremes of, and outside of, the pass-band. Do the various responses for a device behave similarly, or, does the response vary with level? Note that some devices may behave better over a larger dynamic range, but this may or may not be useful for you. For example, if you only have 30 to 40 dB of range between the loudest level you need and the background noise level, much more dynamic range in the unit may cost you more without being able to use it. More on this in Part three of this series.

The deviation from linear phase measurements are presented in Figure 9 to Figure 16. When looking at these measurements, look to see if the deviation from linear phase measurements is the same for the two delay settings. All the units tested performed well in this regard. When you want to use a delay where the deviation from linear phase is important, as in "time-aligning" a multiway loudspeaker system, or in steering a columnar array,

When looking at these measurements, look to see if the deviation from linear phase measurements is the same for the two delay settings.

or "phased" array, the less deviation from linear phase the better. For uses where the deviation from linear phase is not that important, such as for the narthex of a church, why pay for something you can't use and don't need? But remember that deviations from linear phase are additive. All devices in

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the signal chain contribute to this, so minimizing where you can be helpful. Again, more of this in Part three.

The distortion measurements are presented in Figure 17 to Figure 24.

Keep in mind that all of these units are being used every day in various ways by various contractors and consultants.

In looking at these measurements, look to see if the distortion is appreciable at the higher output levels. This is the best you're going to get and it

only gets worse from there. Again, do you need low distortion for the application that you want to use this signal delay unit? On digital devices, certain types of distortion are not level dependent. Therefore, at lower levels, these types of distortion are appreciably apparent. Once again, more on this in Part three.

WARNINGS

Remember that the measurements presented here are for one unit and should not be considered "typical" measurements. The actual signal delay unit you get could be better or worse. The units tested all appear to meet the manufacturers specifications, but remember that the manufacturers specification may only refer to one curve in the ensemble of curves pre-

sented for any of the measurements done.

Also keep in mind that all of these units are being used every day in various ways by various contractors and

All digital devices can color the sound, just the way analog devices do.

consultants. Not all are being used properly. A unit may be appropriate for one use, but inappropriate for other uses. A unit may be overkill in some application, and just barely adequate in another. It all gets down to choosing the unit that fits the job.

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Table 3.
Distortion measurements. Parameter — Input level.
Delay time set to 90 microseconds except for IRP at 89.8
and Yamaha at 80. Units set for unity gain at 0 dBv.

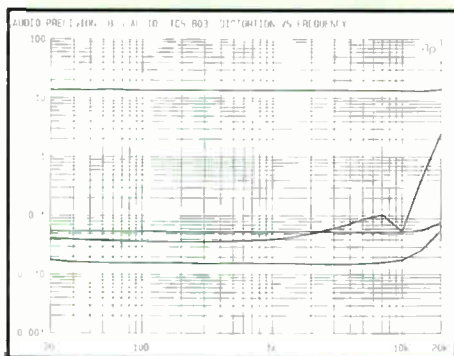


Figure 17: BSS Audio TCS 803 Multitap Time Corrector

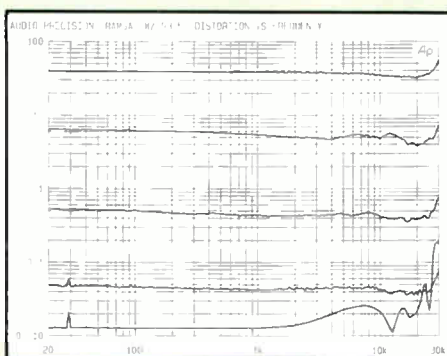


Figure 21: Ramsa WZ-9375 Digital Delay

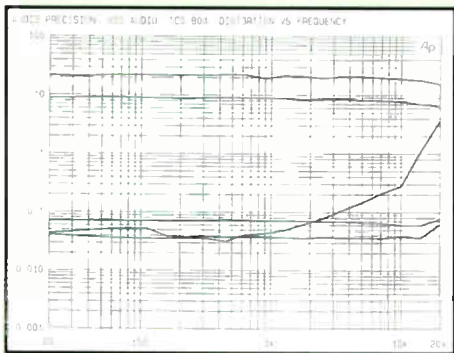


Figure 18: BSS Audio TCS 804 Multitap Time Corrector

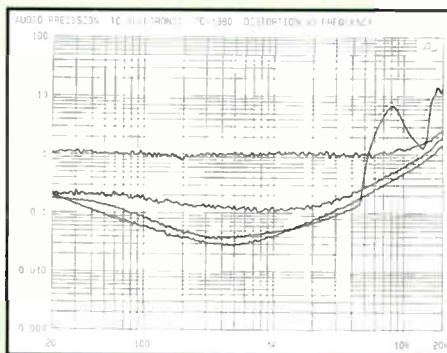


Figure 22: TC Electronic TC-1380 Multitap Digital Audio Delay

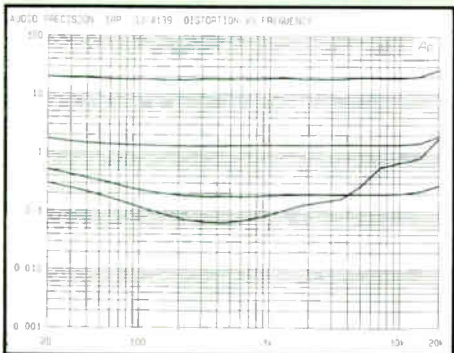


Figure 19: IRP DJ-4139 Precision Delay (in IRP DJ-4150A Mainframe)

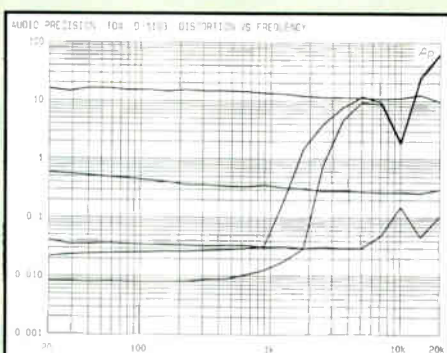


Figure 23: TOA D-1103 Digital Signal Delay

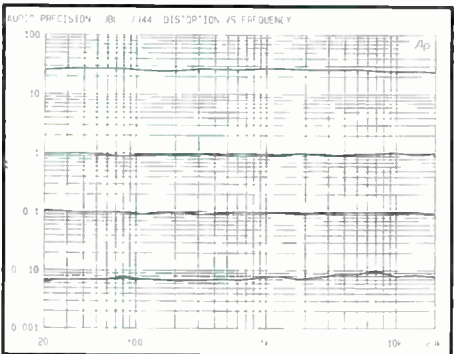


Figure 20: JBL 7944 (Unreleased Prototype Delay)

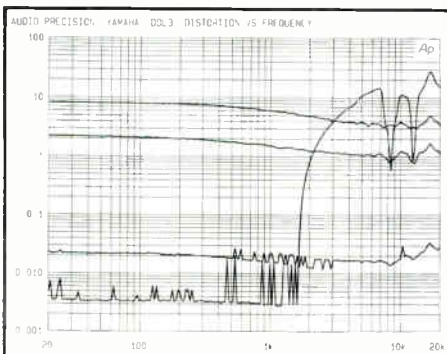


Figure 24: Yamaha D1030 Digital Delay Line (Formerly DDL3)

Lastly, listen to how the signal delay unit sounds. A unit may be presented with seemingly great specifications, but you, and, worse, the client, may not like the way it sounds. All

Listen to how the signal delay unit sounds.

digital devices can color the sound, just the way analog devices do.

In Part three, we'll look at the various uses for delay units in sound reinforcement systems, the parameters that are paramount for successful design, and how signal delay units like those presented here would be used. ■

Delay Unit Test Notes

1. All units set for unity gain, i.e., 0 dBv input gives 0 dBv output, using the owner's manual, when available.
2. Audio Precision System One Generator set for 50 Ohm source impedance.
3. Audio Precision System One Analyzer set for 100 kOhm load impedance.

Acknowledgments

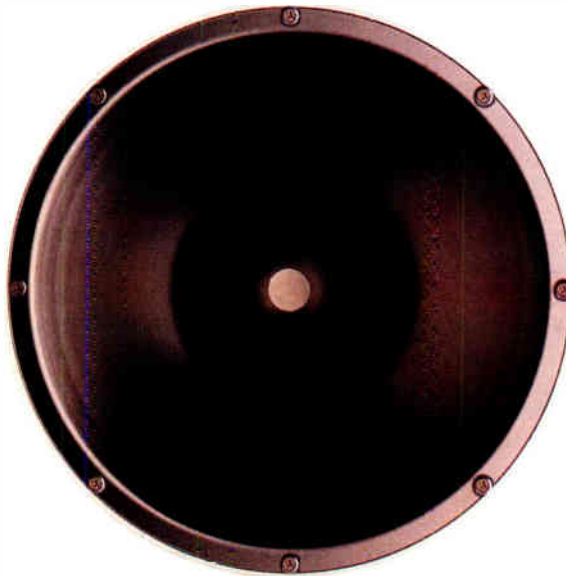
Thanks to Mr. David Angress at AKG/BSS, Mr. Norm Kinnaugh at IRP, Mr. Steve Bartlett at JBL, Mr. Steve Wooley at Panasonic/Ramsa, Mr. Ed Simeone at Virtual Designs/T. C. Electronics, Mr. Richard Krochmal at TOA and Mr. Gerry Tschetter at Yamaha for their help in obtaining the signal delay units for testing. Special thanks to Ms. Debra Brimacombe of Audio Precision for her help and assistance regarding the use and limits of the Audio Precision System One Dual Domain test equipment and for her assistance in the preparation of the graph presented here. ■

Distortion Free.



It's funny, but sometimes the worst things in life are free! Take distortion for example. For too many years, if you wanted the high sound pressure levels that horn/driver combinations deliver, they were the only game in town. Period. There were trade offs of course. Inferior coverage that was never the same at any two frequencies and with this, poor power response that made for inconsistent performance from room to room. And worst of all, poor sound quality and very high levels of distortion. All of this Free!

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We haven't got space here to tell you all of the exciting performance gains in the new T-Series systems and particularly the Spherical Waveguide, so if you would like to know more, please contact us here at Ramsa at (714) 373-7277 and we'll send you more information. But be warned! You're going to rethink all you have come to accept about horns!

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World Radio History

NEWS FROM AROUND THE INDUSTRY

Rowe Wins Award; Winsted Forms Japanese Partnership

Rowe Wins 1992 Jukebox Award

Rowe/AMi's 1992 LaserStar was awarded the Playmeter Magazine Award of Excellence, voted "The Best" Jukebox of the Year by U.S. operators. Joel Friedman, senior vice president of Rowe/AMi, thanked the American music operators and stated, "We recognize our responsibility to the music operators. Rowe's continued dedication to engineering, research and development and our ongoing commitment to give long term value to the jukebox industry will help insure operators continued success."

Winsted Forms Partnership in Japan

The Winsted Corporation has formed a partnership with a Japanese company for the sales and distribution of Winsted products in Japanese markets. According to C. E. Johnson, president of Winsted Corporation, the company has become a co-owner of Winsted Japan, Ltd., a Japanese sales organization originally formed in 1989.

"Winsted products have been sold in Japan for seven years through a distributor," Johnson says. "Our business has been excellent there in recent years, and with this new partnership, we anticipate continued growth in the future." President of Winsted Japan, Ltd. is Mr. Takashi Suzuki who has a background of 20 years in the electronics industry. Gerald R. Hoska, vice president of Winsted Corporation, is a director of Winsted Japan, Ltd.

Harman to Acquire Lexicon

Harman International Industries, Inc. has announced the signing of an agreement to acquire Lexicon, Inc., the Massachusetts based manufacturer of digital audio signal processing equipment and disk-based audio production systems. Lexicon will



Rowe/AMi receives the PLayer Magazine Award of Excellence.

join existing Harman Professional Group companies: JBL Professional, Soundcraft and DOD. As a wholly-owned subsidiary of Harman, Lexicon will retain its operating autonomy and current management. The company will retain existing distributors, independent representatives and internal staff.

A.I.D. and KRK Dissolve Distributorship

Audio Intervisual Design's national distributorship for KRK

Near-Field Monitors has been dissolved.

"We launched our KRK campaign three years ago, introduced the speakers to leading engineers and producers, set up the national dealer network, and have seen KRK become one of the most recognized and respected names in monitoring today," says A.I.D. president, Jim Pace. "It was time for us to concentrate on other new product introductions and let KRK establish the next phase of its presence in the pro-audio in-



Gerald R. Hoska (r) Winsted Corporation vice president and Takashi Suzuki (l) president Winsted Japan, Ltd.

dustry. It's a fine product and we're pleased to continue as exclusive Los Angeles dealer."

Fleet Call to Acquire Interest in AMS

Fleet Call Inc. has announced that it has agreed to acquire a majority interest in American Mobile Systems. Under the terms of the agreement, Fleet Call will purchase at least 7,142,857 shares of AMS stock at a per share price of \$7 by contributing cash and certain Specialized Mobile Radio properties in the state of Florida which Fleet Call owns or has previously made arrangements to acquire.

AMS is licensed to provide SMR service in markets on both the east and west coasts of Florida. Approximately 8 million people live in the areas covered by AMS. "Florida is a very important market to Fleet Call — and AMS is the leading operator in Florida," says Brian D. McAuley, Fleet Call president and chief executive officer. "This transaction is a valuable element of Fleet Call's nationwide strategy."

Encore Purchases Two Ampex DCT Systems

Encore Video, a Hollywood post-production facility, has purchased two complete Ampex DCT systems. Each of the systems includes four DCT 700d tape drives, DCT 700t tape cartridges, one DCT 500a ADO digital effects system, and one DCT 700s post-production switcher. Each Ampex DCT system will comprise a complete edit suite at the Encore Video facility.

Cable Systems to Standardize

Cable subscribers have the right to enjoy all the features that TVs and VCRs offer, according to the Electronic Industries Association's Consumer Electronics Group, in comments filed with the Federal Communications Commission.

These comments were filed in response to the FCC's request for more information on compatibility between cable systems and consumer electronics equipment in compliance with the Cable Television Consumer Protection and Competition Act of 1992. EIA/CEG stated that the same TVs and VCRs that provide high performance when used to receive broadcast signals cannot be used as successfully with cable. The cause of this problem is that cable is not standardized in the same manner as electricity, AM and FM radio, and TV broadcasting. Cable systems can use any number of methods to deliver their service.

"Consumers are finding it harder and harder to use many of the features of their televisions and VCRs due to impediments by cable companies," says Gary J. Shapiro, EIA/CEG vice president. "Many of these problems are not caused by faulty consumer product design but by cable companies scrambling channels, changing cable converter remote control codes or changing the channels on which they are delivering programs, to name a few."

Copia Awarded Patent for Fax Retrieval

Copia International has been awarded a patent for same call interactive Fax-On-Demand fax retrieval. The patent is titled a "Facsimile Information Distribution Apparatus". Same call Fax-On-Demand solves the issue of cost containment and privacy. Using FaxFacts one call system design, the National Institute of Health's CancerFax receives thousands of requests per week from people seeking information on a variety of cancers. Because the call is placed from the fax machine phone and the fax is received immediately, NIH incurs no phone charges and the caller can safeguard the privacy of the information received.

Copia has announced a complete

new release of FaxFacts. Version 4.35 is shipped with a 210 page manual which includes screen shots and step by step tutorial.

Digital and Public Utilities Fortnightly Magazine Announce New Award

Digital Equipment Corporation and Public Utilities Fortnightly Magazine have announced the ULTRA, Utilities Leadership Technology Recognition Award, to be given annually to the utility company using computer technology in the most innovative way. The ULTRA will spotlight utilities that have achieved breakthrough applications that enhance business performance and the standards of excellence in the industry. A nine-member panel of technology and utility experts will judge the entries on the uniqueness of each solution, quantifiable results, productivity savings, cost effectiveness, ease of operation, integration with existing solutions, how well the application addresses a corporate need, and the flexibility of the system to accommodate future plans and growth.

Victor Musical Industries and Nippon AVC Merge

JVC (Victor Company of Japan, Ltd.) has announced that Victor Musical Industries, Inc., which handles JVC's software business, and Nippon AVC Co., Ltd., JVC's exclusive software sales company, have merged to form Victor Entertainment, a new total-software company. Victor Entertainment, Inc. will assume the businesses of both companies, from planning and production to distribution. Through this merger, JVC aims to create a successful total-software company to enhance the promotion, marketing and distribution of software, as well as promote new developments. The new company will also provide a consignment service now handled by Nippon AVC.

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When *Sound and Video Contractor* magazine asked its subscribers which company comes to mind *first* when they specify or purchase wire and cable, more respondents answered *West Penn Wire* than any other. There are some very good reasons for that.



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& CEO, told the Senate Communications Subcommittee. "The FCC should judge applicants for broadcast spectrum on their fitness to serve their local communities — not on the size of their wallets." The Senate proposal, S. 335, is generally meant to open up government-controlled airwaves for private use, providing additional spectrum for new technologies such as personal communications services, cellular phones and other communication services.

IMA Supports Common Open Software Environment

The Interactive Multimedia Association announced its endorsement of the leadership steps taken by Hewlett-Packard Company, IBM Corp., The Santa Cruz Opera-

tion, Inc., Sun Microsystems, Inc., Univel and UNIX System laboratories, Inc. to deliver a common open software environment for multiple UNIX system platforms. "The efforts of these companies complement the goals of the IMA's Compatibility Project," says Philip Dodds, executive director of the IMA.

"The problem to date," according to Mr. Dodds, "is that each vendor developed its own specific multimedia system based on different services, data, and file formats. A multimedia application or title was capable of being played back only on the system for which it was designed. To solve the problem the IMA published three Requests for Technology (RFT) for: Multimedia System Services; Multimedia Data Ex-

Minnesota News Network Acquires 501's

Steve Poindexter of Harris Allied Broadcast Equipment recently supplied three Symetrix 501-01 Peak/RMS Compressor/Limiter's to Minnesota News Network, St. Paul, MN. The three compressors are installed between the News Studio and the STLs, one for each of the satellite uplink channels, offering general level control and spike protection.

AVDA Holds First Meeting

The first annual meeting of the American Video Duplication Association was held at 3M's Wonewok Conference Center in Minnesota recently. The AVDA was formed in the fall of last year to further the interests of American video duplicators and loaders and to share information, technology and generally enhance the quality of services offered.

The current chair, Bill Schibart, estimated that representatives from over 50 percent of the non-theatrical duplication industry were in attendance. Several indus-

try study groups were formed and began work in areas ranging from raw material sourcing, shell nomenclature, recycling and source reduction of packaging to plant security, copyright education and protection and technology user groups.

The current Board of the AVDA includes Bill Schubart of Resolution, Bill Smith of Allied Film and Video, Joseph Barber of Cine Magnetics, Jack Napor of WRS Film and Video and David Willette of Vaughn Communications. The Board and membership have scheduled the next meeting for June 14, 1993 in Santa Clara, CA., to coincide with Replitech.

NAB Endorses Senate Proposal

The National Association of Broadcasters said that it would endorse a spectrum allocation proposal that exempts radio and TV airwaves from spectrum auctions.

"Applying competitive bidding to the assignment of broadcast spectrum would work against the public interest, rather than for it," Edward O. Fritts, NAB president

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staffed during the start-up phase with a full-time sales executive, Steve Zaretsky. Technical support for the products that ONE sells will be supplied by two separate companies. Tape machine warranty service and sales technical support will be handled by New York Technical Support, Inc., Chappaqua, NY. Pro Disk warranty service and sales technical support will be handled by Film-Tek and Associates, Fair Lawn, NJ.

NYNEX and Rochester Tel Cellular Finalize Agreement

Nynex Mobile Communications Company and Rochester Tel Cellular announced that they have finalized a definitive agreement and will launch a cellular supersystem in upstate and western New York.

This partnership will provide cellular telephone customers with expanded geographic coverage in upstate New York.

The partnership is a 50/50 joint venture, with Rochester Tel Cellular as the initial operating partner. John K. Purcell, Rochester Tel's Corporate vice president for planning, will become president of the new company and Robert O. Bailey, vice president of Rochester Tel Cellular, will become executive vice president of the joint venture company. Brian J. McIntee, of NYNEX Mobile, will be vice president and chief financial officer of the company.

NYNEX Mobile will chair a Partnership Board, consisting of four members — two each from Rochester Tel Cellular and NYNEX Mobile — that will have strategic

change; Scripting Language for Interactive Multimedia Titles. The IMA welcomes the joint responses from HP, IBM, SCO, SunSoft, Univel, and USL to the Multimedia System Services RFT. Complete responses to all three RFTs are expected, with formal "Recommended Practices" published in the third quarter of 1993. The IMA Compatibility Project has formed evaluation teams, each with a high level of expertise and experience against which to evaluate response to the RFTs.

SMCC Signs Agreement with Russian Technology Co.

Sun Microsystems Computer Corporation has signed a technology licensing and joint development agreement with ELVIS+ Ltd., a private Russian corporation, to develop wireless network communication technology to be incorporated into its nomadic computing. SMCC will also be taking a 10 percent equity position in ELVIS+.

ELVIS+, a Russian acronym that stands for Electronic Com-

puter and Information Systems, was founded by DR. Alexander Galitsky, who was chief designer of a new generation of communications satellites for the Russian computer space program.

As part of the agreement, ELVIS+ will not only work jointly with SMCC engineers on wireless communication projects but the company has also agreed to use the Sun SPARC computing platform for all future workstation-based products they design.

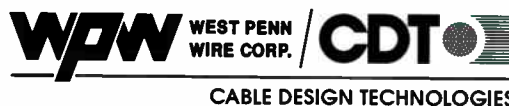
Otari Opens New York Sales Office

Otari Corporation has announced that it has established a direct sales office in New York City, Otari North East Regional Direct Sales Office (ONE). This office will have direct end-user sales responsibility for Otari's products which include the DTR-900, MTR-100, MTR-90, ProDisk 464, and all console/automation products. The territory covered by this office includes the Boston, New York, Philadelphia, and Washington, D.C. areas.

The New York office will be

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oversight responsibilities for the operation.

MFS Communications Announced Sale of Common Stock

MFS Communications Company, Inc. has announced that it has filed a Registration Statement on Form S-1 with the Securities and Exchange Commission for an initial public offering of 8,500,000 shares of common stock (plus an additional 1,275,000 shares of MFS' common stock pursuant to the over-allotment option granted to the Underwriters). Salomon Brothers Inc. and Bear, Stearns & Co. Inc. are co-managers of the offering.

MFS intends to use the net proceeds from the offering for expenditures relating to the expansion

of its existing networks and services and the development of new networks and services.

ADS Technologies Inc. recently Formed

ADS Technologies Inc. has been created to combine the audio business of Analog and Digital Systems Inc. (a/d/s) of Wilmington Massachusetts and Museatex Audio Inc. of Calgary, Canada. This merger has been capitalized at \$14 million, with an additional investment for the merger being provided by the venture capital firms involved with both companies and the respective company founders.

In conjunction with the merger financing, the Shawmut Bank of Boston has entered into an agreement to finance the working capi-

tal requirements of ADS Technologies.

Jim Sullivan, vice president sales, ADS Technologies says, "We will support and expand a/d/s and Museatex brand names. The Museatex product line caters to the audiophile market, while a/d/s is a high performance line that appeals to a broader segment of dealers and consumers."

Allsop Receives Award of Excellence

Allsop, Inc.'s Consumer Electronics Division received an Award of Excellence for its continual support of jazz from Jazziz Magazine. John Walstad, national sales manager of Allsop's CE division, accepted the award on behalf of the company, thanking the magazine for the honor and recognition. In

addition, Walstad congratulated Jazziz on its success and the magazine's outstanding coverage of jazz and its performers.

Muzak Purchases Yamaha YPDR601 Compact Disc Recorders

Muzak recently purchased five Yamaha YPDR601 Compact Disc Recorders to convert its music libraries from tape to digital compact disc. Muzak's Environmental Library, consisting of over 5,000 active titles, is the first of their music collection to undergo the conversion to compact disc. "I tested every recorder on the market, and I found the Yamaha YPDR601 to be the only one that completely met all our needs," says Muzak chief engineer Richard Goodwin.

Synergetic Audio Concepts 1993 Workshop Schedule

Theatrical Sound Design Applications Workshop

**Purdue University, Lafayette, IN—\$650
August 10-12, 1993**

**Program Chairman: Mark Miceli, University of Arizona
Workshop Coordinator: Rick Thomas, Purdue University
Staff: Abe Jacob, Sound Designer, New York City, along with Mark Miceli and Rick Thomas**

Audio Measurements & Instrumentation Workshop

**Indiana University, Bloomington, IN—\$650
August 18-20, 1993**

**Program Chairman: Mike Klasco, Menlo Scientific
Workshop Staff: Jont Allen, PhD, Bell Labs; Sunil Puria, PhD, Ariel SYSid;
Eugene Patronis, PhD, Georgia Tech; Sam Berkow, SIA Consultants; Jeff Brower, HyperSignal**

For More Information—Call 812-995-8212 or Fax 812-995-2110

PRODUCTS

Samson Mixes; PAS Reinforces



Samson Introduces MPL 2242 Mixer

Samson Audio, a new division of Samson Technologies Corp., has introduced the MPL 2242 professional mixer. The MPL 2242 is designed for a variety of recording and live applications. It is a 22 channel mixer with 6 stereo and 10 mono channels, complete with 10 XLR inputs. It can function as a 19-inch rackmount device or as a table top mixer. A 4-bus mixer, the MPL 2242 has PFL and in-place soloing functions that can be monitored using the unit's LED meters. Additional features on the MPL 2242 include a 4 band EQ on each channel; six aux sends and returns; a frequency range of 15 Hz to 30 KHz; a built-in headphone amp; and inserts on all the XLR mic channels.

Circle 1 on Reader Response Card

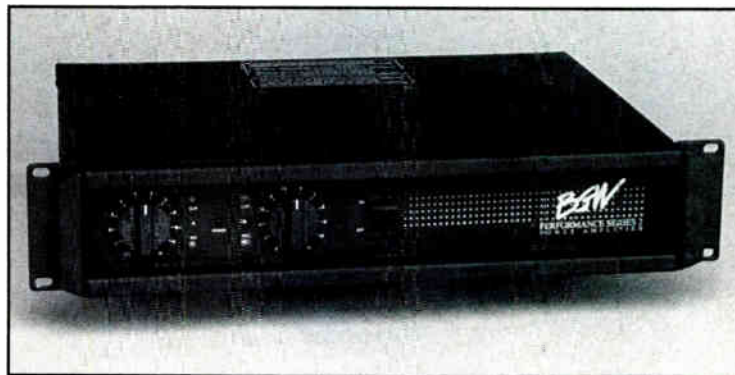
PAS Introduces TOC System 1 Series

Professional Audio Systems have introduced the TOC System I sound reinforcement series. The four models in the series — the RS-1 Club Array Loudspeaker, the SW-1 Stage Wedge, the VM-1 Vocal Monitor and the EB-1 Extended Bass — feature the convenience of passive crossover filters, which do not require a biampification

and a complex set-up procedure. Each unit is equipped with one amplifier connection allowing for simple installation.

The RS-1 and SW-1 contain 15-inch coaxial loudspeakers, and the VM-1 has a 12-inch coaxial loudspeaker — each with a 1-inch throat compression driver and 30 x 60 degree constant coverage horn. The EB-1 is a single 180-inch high power excursion woofer, which has 35 Hz fundamental bass response in a five-cubic-foot enclosure.

Circle 2 on Reader Response Card



BGW Performance Series 2

BGW has announced a line of performance series power amplifiers, the BGW Performance Series 2. The bSeries 2 is a two rack space, 300 watt per channel power amplifier designed for the audio professional and musician.

Features include dual speed forced air cooling, LED indicators, detented front panel gain controls, XLR and 12/4-inch input connectors.

Five way binding posts are supplied for reliable speaker connections.

Circle 3 on Reader Response Card

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IR312B Patient Station

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Circle 285 on Reader Response Card



Cohu Camera

Cohu, Inc., Electronics Division, has introduced the 8280 and 8380 Series High-Performance Color Mini-Remote-Head CCD Cameras. This camera features a small, 1.75-ounce head which measures 1.123-inches in diameter. The mini-remote head

is connected to the Camera Control Unit by a detachable cable, which comes in optional lengths of 10, 25, 50, and 100 feet. It is designed for scientific and industrial applications such as microscopy, medical imaging, and machine vision.

Circle 4 on Reader Response Card



Millbank Pac Systems

Pac and Power Pac systems from Millbank are modular solutions to voice evacuation and critical communication requirements. Power Pac amplifiers use switch mode techniques to reduce physical size as well as stand by battery consumption. More amplifier power can be housed per rack system at less cost.

The Pac system incorporates elements necessary to assemble custom systems including microphones, pre-amplifiers and digital record and play voice messages and alarm signals. The passive routing system enables inputs to be directed to the appropriate output power amplifiers.

Circle 5 on Reader Response Card

Time Lapse VCR

Javelin's JR5124A time lapse recorder features recording for two, 12, and 24 hours with audio, using T-120 cassette. The recorder has two heads allowing slow and still playback. It also features various playback functions, such as picture search.

It provides noise-free, still playback, real time recording, and selectable auto repeat recording. The JR5124A can also be programmed for 15 programs for timer recording, two programs per day plus one for a specified time of day throughout the week. It also provides skip function where no recording is wanted.

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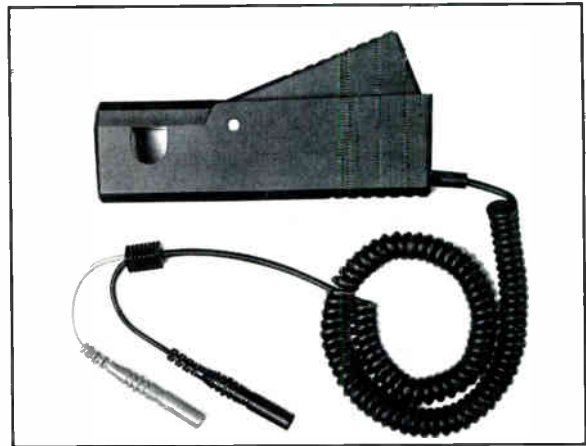
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Circle 204 on Reader Response Card
World Radio History



Sony Debuts Recordable MiniDisc

Sony Corporation has announced the availability of a 74-minute recordable MiniDisc, the MDW-74. "Consumers are attracted to the MiniDisc because it combines the recordability and portability of cassettes with the instant random access and digital sound of compact disc," says Bob Striano, vice president, Consumer

Tape Division, Sony Recording Media of America.

According to Striano, the fact that consumers can now record on a disc provides several new benefits, including virtually unlimited re-recordability without significant sound degradation and direct access to individual tracks without waiting for fast-forward or rewind.

In order to achieve the 74-minute recording time, Sony en-

gineers developed a way to slow the disc revolution speed (from 1.40 meters/second for the MDW-60 to 1.22 meters/second for the MDW-74).

Circle 7 on Reader Response Card

A.W. Sperry AC Current Adaptor

A.W. Sperry Instruments, Inc. has announced the introduction of their AC Current Adaptor

model CA-200 This AC Current Adaptor measures 0-199.9 Amps AC (continuous) with 3% accuracy on 50-400 Hz circuits. It works with all A.W. Sperry Digital Multimeters and most other manufacturers models having 0-200mV DC range, and >1 Megaohm input impedance. It will provide true RMS readings with a true RMS DMM.

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Circle 252 on Reader Response Card



Quest Vibration Meter

The model VI-100 Vibration Meter is now available from Quest Electronics. The VI-100 can be applied to different types of industrial applications such as

noise control, quality control, preventive maintenance, machinery acceptance tests and product insurability tests.

The VI-100 is a wide band vibration meter that measures vibration in units of either displacement, velocity or acceleration. Wide band measurements allow for quick indication of a machine's condition when related to previously measures base line levels. An increase in vibration typically indicates a deteriorating condition.

The control panel provides easy operation and the LED read-out makes for easy viewing of data. The handheld meter weighs 14.6 ounces. If a tripod is needed, a threaded insert on the back of the unit accepts a standard 1/4-20 tripod mounting screw.

It is powered by two alkaline 9-



volt batteries which provide roughly 40 hours of operation.

Circle 9 on Reader Response Card

MCM Announces The Tenma Trainer Oscilloscope

MCM has announced the Tenma Trainer 20MHz oscilloscope, model 72-905. This unit

features a high sensitivity of 5mV/div and a smooth roll off exceeding 20MHz. It also offers a maximum triggering sweep of .2 sec/div. The Tenma Trainer comes with a two year warranty and includes two probes, power cord and owners manual.

Circle 10 on Reader Response Card

SOUNDSPHERE SPEAKERS KEEP NEWSDAY PRESSES ROLLING...

The Newsday corporate offices and printing plant are in a large building in Melville, N.Y. It contains the largest color offset operation in the country with ten printing presses. While they operate at the highest efficiency, the collation and inserting operations could not be stopped quickly when problems were encountered. The insert machines could not be turned off resulting in improperly collated newspapers.

After trying flashing lights, buzzers and various horn speakers, a Soundsphere #2212-1 model was tested and five more were installed in the extremely noisy inserting operations room.

Patrick O'Hanlon, Production Maintenance Electrical General Foreman at the site states, "The area in question is a high density noise area and communication is difficult. When Bernie Lory of Craftsman Sound talked about Soundsphere speakers in airport terminals, I knew it was the system for us. The even distribution allowed us to maintain a volume level that would not be overbearing, to permit quick quality control adjustments in the insert area and to still be heard in remote corners of the room."

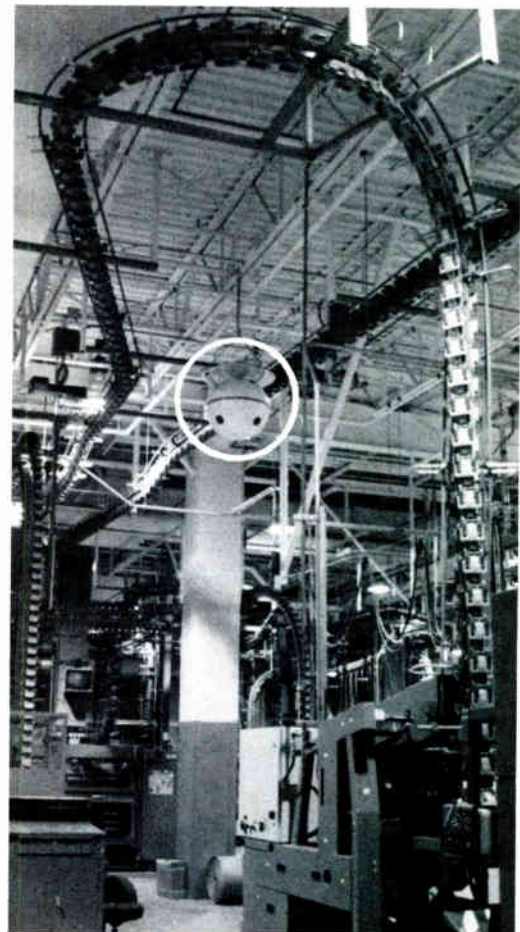
The installer, Bernie Lory has also put two Soundsphere #2212-2 speakers in the stacker area to improve the efficiency of that portion of the operation. He is planning to use more Soundsphere loudspeakers at this site to solve other operational problems.

Write or call direct for further information.

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An 8-page report from the contractors themselves. This in-depth research report on the industry covers market dollars and trends as well as likes and dislikes. Topics include the most important and expanding markets, favorite products and reps, total dollar sales and analysis, projected sales and much more.

•THE RETAIL INSTALLATION MARKET 1993

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Burle Slide Gates

Burle Security Products has recently developed the AHSG, SHSG, and CHSG Slide Gates to accommodate individuals using wheelchairs or other mobility aids who can not use security turnstiles. These gates have been designed to work efficiently and smoothly with facility entrance and exit access control systems.

All three slide gate models feature welded construction, electro-mechanical operators, and provide 36-inch passage to meet most user requirements.

Circle 11 on Reader Response Card

Alesis Syncs Up With TimeLine

Alesis announced the introduction of the Alesis AI-2 by TimeLine. The AI-2 is a companion synchronizer for the ADAT digital recorder, specifically designed and manufactured by TimeLine.

The AI-2 permits stand alone operation of ADAT professional digital audio recorders with Sony video editors, MIDI control de-

vices, as well as the TimeLine Lynx-2 and micro Lynx synchronizers. The AI-2 includes: SMPTE/EBU Time Code Chase; Sony BVE-900 video editor interface; simultaneous Alesis BRC Master remote control connection; external MIDI command input; LTC and MTC generation; and internal and external digital word clock interface.

Circle 12 on Reader Response Card

Nady 950GS UHF Wireless System

Nady Systems, has announced the introduction of the Nady 950GS UHF Wireless System. It is a rack mount, True Diversity unit with 40 frequency synthesized channels, arranged in four user selectable groups of ten channels each. The receiver is available with Nady's all-metal, Surface Mount Technology handheld, lavalier or instrument transmitters. The 950GS uses Nady's proprietary UHF RF link plus Nady's companding noise reduction for refined audio quality.

Circle 13 on Reader Response Card



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NSCA SEMINARS

(Continued from page 22)

loss (say 25 km without repeaters) and high bandwidth (ability to carry a lot of information). Single mode is used in applications that consume huge amounts of bandwidth, like videoconferencing between two buildings. Single mode is typically used with laser diode light sources and avalanche (APD) detectors. The disadvantage of single mode fibers is that the narrow fibers are hard to splice, and will not splice to the thicker "multimode" fiber (typically 62.5 micron core).

Multimode, which is much cheaper because it's easier to manufacture, refers to the use of several frequencies (wavelengths) of light in the same fiber at the same time. The range is reduced to about 4 km without the use of repeaters, which is adequate for many applications. Multimode systems, typically using LED light sources and PIN photodetectors, are reliable for short length systems (say,

under 10 km). Contractors should remember that multimode is cheap and reliable for most of the situations they will encounter. Note that it is possible to make composite cables of optical fiber for signal and copper for power. Such cables are used in certain closed circuit TV systems.

SUMMARY

Fiberoptic technology offers contractors many real-world advantages in their installs today. The increasing demand for CD audio quality as well as for full motion video requires huge increases in data transmission rates (bandwidth) which fiber optics delivers. When combined with fiber's small size, light weight, and resistance to electrical interference, fiber optics become very attractive. In the future the demand for bandwidth will continue to grow exponentially, as everything from videoconferencing, high definition TV and high speed data highways find their way into US business, factories, entertainment facilities and even homes. ■

CAD TOPICS

(Continued from page 60)

such as EASE can take hours of processing using a non-DSP "sound board" (such as a multimedia plug-in). The Ariel DSP-16 has a powerful DSP processor, which can reduce processing time down to twenty or thirty minutes for a minute music segment. But it would be very nice to have pass-

PERHAPS MOST
INTERESTING OF ALL
THIS IS THAT BOTH
ARIEL AND SIGNALOGIC
ARE OFFERING SYSID
AND HYPERCEPTION-
ACOUSTIC AT
REDUCED COST.

through real-time processing and this will be demonstrated at the workshop by combining Hypersignal-Acoustic, the Real-Time Convolver, and Ariel's DSP 3210 board. Cost of this capability, with SYSid and other options will be discussed in order to help determine commercial feasibility of this package. Although not confirmed at press time, it is tentatively planned that Dr. Anher (the developer of EASE) will be a participant.

Anyone who is engaged in sound system design and installation and electronic or acoustic measurements, but has not yet fully explored FFT analysis techniques, distortion testing, or auralization will find this an extremely important workshop to attend. Perhaps most interesting of all this is that both Ariel and Signalogic are offering SYSid and Hyperception-Acoustic at reduced cost to participants to help offset their cost of attending.

The workshop days are August 18-21, 1993 in Bloomington, Indiana, at Indiana University. Registration fee for the workshop is \$650 per person. Syn-Aud-Con can be reached at (812) 995-8212. ■

CALENDAR

Upcoming Events

JUNE

Personal Communications and Computing Show: Chicago, Illinois. Contact: (202) 457-4919. June 3-6.

ShowTech '93: Berlin, Germany. Contact: 030/3038-0. June 8-10.

International Teleconferencing Association (ITCA): Washington, D.C. Contact: (202) 833-2549. June 14-17.

REPLItech International: Santa Clara/San Jose, California. Contact: (914) 328-9157. June 15-17.

Enterprise '93: Boston, Massachusetts. Contact: (508) 879-6700. June 16-18.

JULY

Image World: Dallas, Texas. Contact: (800) 800-6474. July 12-16.

AUGUST

Shure Applied Business teleCommunications, BASIC Seminars '93: Denver, Colorado. Contact: 303-987-2000. August 4-6.

International DJ Expo: Los Angeles, California. Contact: (516) 767-2500. August 23-26.

International Security Conference & Exposition: New York, New York. Contact: (708) 299-9311. August 31-September 2.

SEPTEMBER

AEI Business Music Conference: Seattle, Washington. Contact: (800) 345-5000. September 24-26.
DSP World Expo: San Francisco, California. Contact: (617) 964-3817. September 28-October 1.

OCTOBER

Image World: New York, New York. Contact: (800) 800-5474. October 4-8.

Audio Engineering Society: New York, New York. Contact: (212) 661-2355. October 7-10.

Media Summit '93: New York, New York. Contact: 203-352-8316. October 19-21.

NOVEMBER

TeleCon XIII: San Jose, California. Contact: (800) 829-3400. November 8-10.

DECEMBER

Image World: Orlando, Florida. Contact: (800) 800-5474. December 6-10.

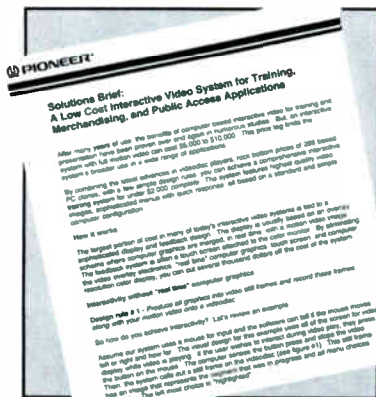
LITERATURE

Pioneer Solutions; In-Wall Companion

Interactive Video Solutions

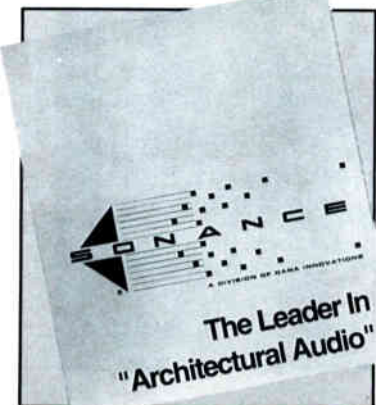
Pioneer Communications of America, Inc. is offering a series of Solutions Briefs on interactive video production, free. There are three briefs in all, each of which shows how to develop interactive video, easily and inexpensively. Two are designed to introduce current video producers to the interactive format, the third is for developers who want a low-cost alternative to expensive systems.

Circle 14 on Reader Response Card



Companion to Catalog

In-wall loudspeaker manufacturer Sonance has announced a companion volume to its recently published full-line dealer catalog. The 53-page three-hole punched booklet incorporates the same product photos, specs, and detailed descriptions as the proprietary dealer edition, and gives sug-



gested retail prices for each item.

According to Kevin Leja, Sonance's Director of Marketing, the red-covered catalog gives installers a way to introduce Sonance to clients who may be unfamiliar with the company.

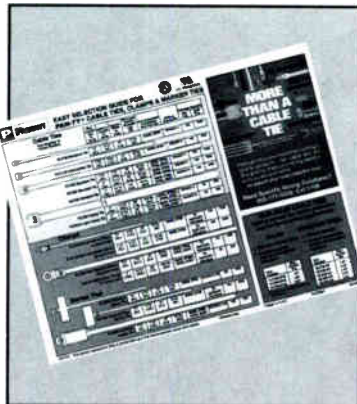
Circle 15 on Reader Response Card

PAN-TY Selection

A guide designed to help the user select the proper PAN-TY cable ties is being offered by Panduit Corp., Electrical Group of Tinley Park, Illinois.

The full color guide describes the full line of PAN-TY cable ties and is designed for on-the-job use. It is laminated and has a grommet for hanging at the job site. Product specifications, including part number, maximum bundle diameter, minimum loop tensile strength, tie length and width are given in tabular form. In addition, military standard and recommended installation tooling are shown.

Circle 16 on Reader Response Card



MultiLink Lit

MultiLink, Inc. has announced the availability of a brochure to assist organizations in the evaluation of multipoint audioconferencing systems. The four-color piece outlines the various benefits associated with teleconferencing and the company's line of multipoint audioconferencing systems.

Circle 17 on Reader Response Card

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- Security/Surveillance Consoles
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PEOPLE

Herndon at AKG; Ferrofluidics Appoints Bowden

AKG Hires Herndon

AKG has reorganized its marketing services group and hired Amy Herndon for the position of Marketing Communications Manager. In addition, AKG has expanded the number of full-time people for marketing communications. David Angress, VP of Sales and Marketing, explained "Now we have one person to focus on the management of marketing while product managers will work more closely with the sales team."



Herndon

Herndon brings nine years of marketing experience to AKG primarily from the television industry. For the last four years she ran her own consulting business specializing in the communications and entertainment industries. Prior to that, she supervised the marketing efforts for a group of video companies.

ADI Appoints V.P.

ADI has announced the promotion of Chris Lanier to Vice President of Regional Sales. Lanier, who joined ADI in 1990, started as Inside Sales Manager for ADI's Dallas, Houston, San Antonio New Orleans, Denver and Albuquerque centers. He was promoted in March 1991 to Regional Manager for the West Coast region.



Lanier

Lanier has maintained an active position in the security industry; he has been an NFPA member since 1986, has served on the Board of Directors of the Dallas

County BFAA, and worked as an NBFAA CEU Instructor for Fire Alarm systems.

Barco Appoints Managers

Barco, Inc. a manufacturer of large screen, video/graphic display and projection systems has appointed three regional managers in the U.S. Tom Madsen and Paul Gomes joined Barco as regional sales managers for large screen display products and industrial monitors, and Bruce Allers was promoted to central regional manager/special projects engineer.



Madsen



Allers

Nady Appoints Klinger

Nady Systems has announced the appointment of Paul Klinger as General Manager. A native of Long Island, N.Y., Klinger moved to New Orleans to attend the University of New Orleans, where he received a B.S. in Marketing. For the next six years, Klinger held several operations manager positions in the various divisions of the McKesson corporation in Texas. His last assignment with McKesson was in the San Francisco area. He then joined Amot Controls, Inc. where he worked for two years before joining Nady Systems.

Altec Names Schultz

Davis Schultz has been appointed applications manager at Altec Lansing. He is specializing in professional sound products

designed for the architectural segment of the market.

Before joining Altec Lansing, Schultz worked in the sales and marketing of audio and video systems for sound contractor, Ford Audio. In his career he has worked as a manufacturers representative, in broadcast advertising and managed a theater company.

FerroSound Program Hires Int'l Sales Manager

Ferrofluidics Corporation has named Scott Bowden International Sales Manager for the Fluids technology Division. Bowden oversees the sales of audio ferrofluids to loudspeaker engineers and manufacturers throughout Asia, Europe, Canada and South America. Formerly

with Molecular BioQuest Corporation, Bowden has five years experience in the magnetic media industry. He spent three years as the Sales and Marketing Manager for BioQuest's audio



Bowden

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Bowden is the international audio industry's primary contact to the FerroSound program, a customer support program for speaker manufacturers.

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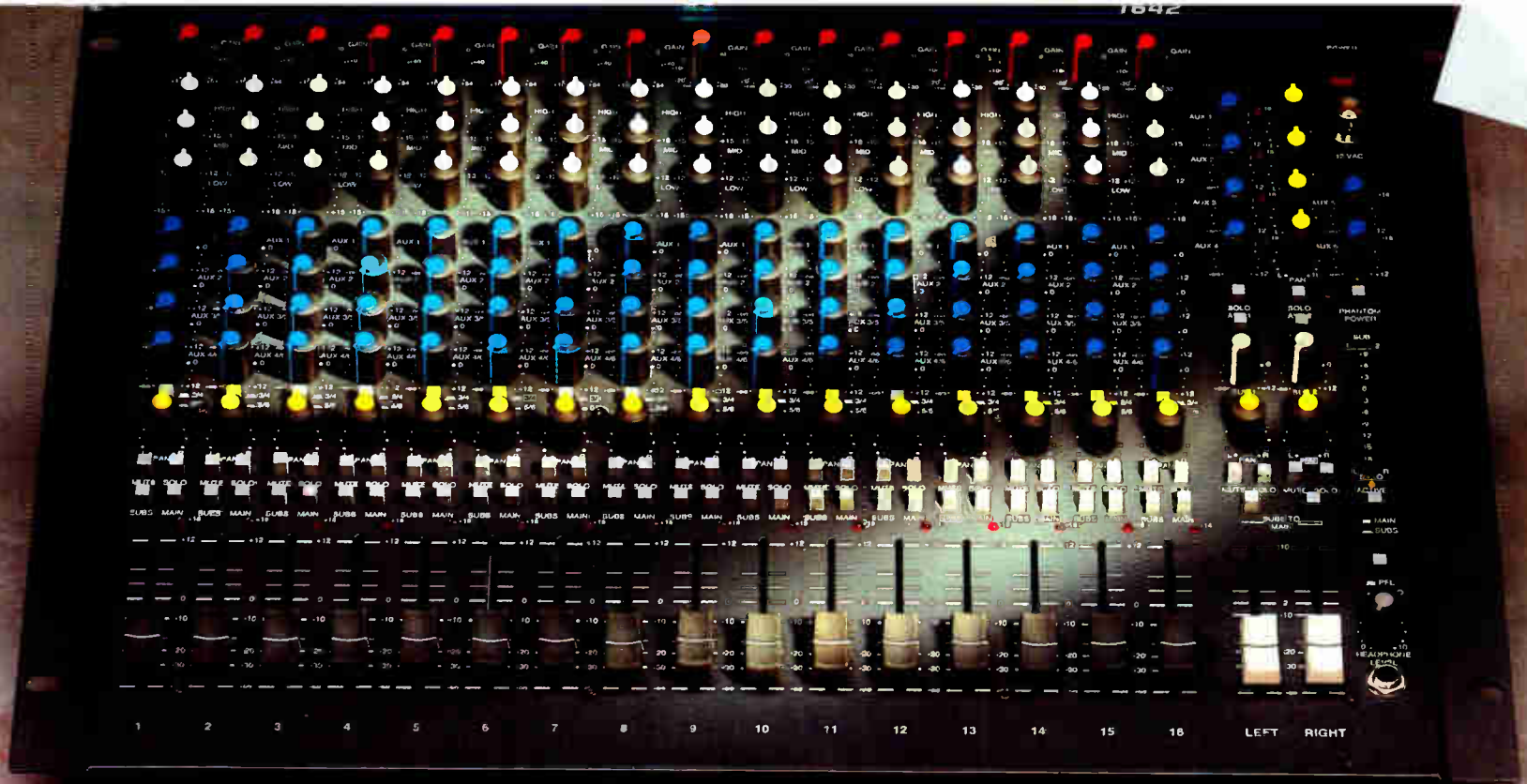
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1. The sampling pool for the survey consists of sound and communications contractors from Sound & Communications' subscription list. Only contractors within the United States and Canada are called.
2. In a telephone survey, contractors/installers selected 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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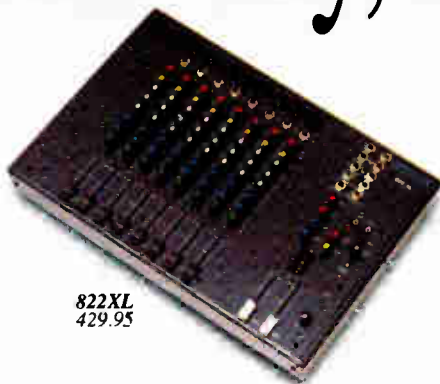


The other guys missed the bus. Actually, 2 of them.

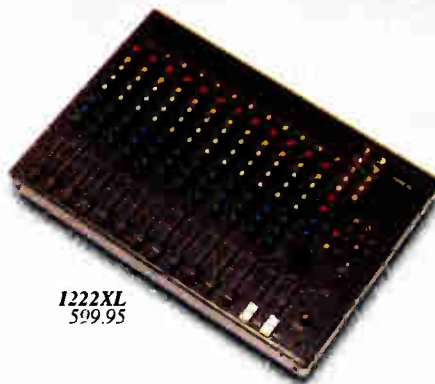
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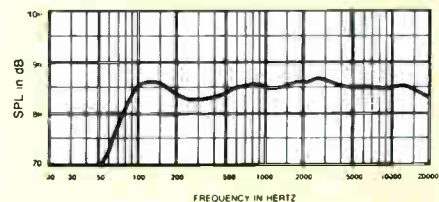


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