

SOUND & COMMUNICATIONS

Volume 39 Number 4

April 26, 1993

AIRLINE TRAINING CENTER

American Airlines trains its personnel via mock ups of planes and airport areas. Cameras in the galley, mics in the ticket counters and remote operation of the audio-visual systems were all carefully installed. **38**



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For near-perfect acoustics, a sound system was needed to provide the flexibility of Boston Symphony Hall — for financial and artistic reasons. Andrews Audio and Evening Audio designed a system that would foster better quality for TV and for live performances without ruining the Orchestra performances. **22**

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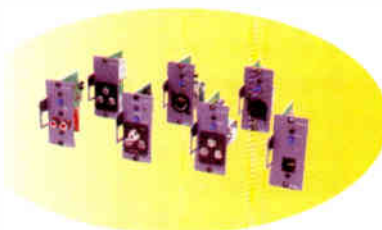
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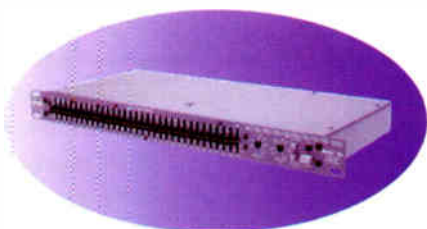
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Orlando and Beyond

This month is far from a fool's month, as we travel to two important conventions.

The NSCA Expo for 1993 was in Orlando and was a scene of some big splashes and some quiet changes. There were exhibitors from other sectors of the industry, proving once again the basic stability of the sound and communications business, at least in comparison with other segments. More and more people want a part of this pie.

MB Quart appeared from the consumer electronics industry, showing in-wall speakers to contractors. And Fender, the musical instrument maker, came to Orlando with its new full line of pro sound products, 60 in all, that were first shown at NAMM in January. Fender also indicated that it will subscribe to the Medialink protocol purveyed by Lone Wolf.

QSC had actual Medialink product, the first to do so to our knowledge. The new Lone Wolf chip will be manufactured sometime this summer at the earliest, and that will allow the second generation of Medialink product.

Speaking of protocols: There was much talk of computer control, with several companies announcing their planned use of the Lone Wolf protocol. New adherents include TOA, along with previously announced Rane, QSC, and several others. Some companies such as Rane have announced alliances with both Lone Wolf and Crown. And in fact, on the last day of NSCA, Crown and Lone Wolf agreed to agree to talk to each other.

Intel Corporation has indicated its intention to develop software applications for the Lone Wolf VLOS operating system. So it seems that there will be a rational world out there for sound systems that make sense in a digital age.

In the midst of the NSCA show, an announcement was made by Pioneer that the Pioneer Communications Group in New Jersey and the Pioneer

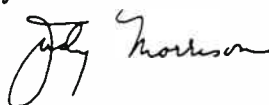


Laser Entertainment group in Long Beach, California, were merging into a new group, headquartered in Long Beach, and designed to cross through markets. Since Pioneer Laser recently expanded into pro sound and CD changers in addition to its karaoke and Laserdisc line, and since the New Jersey group has been active in video, such as the re-writable optical disc and the Video Cube, one can see implications for "multimedia." And everyone is looking at "Multimedia." In fact, two major conventions have full multimedia sections - NAB this month in Las Vegas, and CES in Chicago in June.

We'll keep you posted on both NAB and CES. And we'll be offering follow-up coverage of NSCA Expo.

NSCA events included a wine and cheese party for Women in Electronics, organized by NSCA board member Miriam Evaslin. It was very heavily attended, leading some of the women to hope there will no longer be a need for special parties to make them feel welcome.

Thanks for joining us in this issue of Sound & Communications. It was good to see so many of you in Orlando.

Best Regards, 

Judith Morrison
Editor in Chief

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Small Wonder

ASHLY was founded in 1972 with the stated goal of producing professional audio equipment that would set new standards for sonic excellence and reliability. The Company originally manufactured large mixing consoles with on-board signal processing for touring sound systems. Later, the consoles' built-in processing components were offered as separate rack-mounted units. The initial product line consisted of limiter/compressors, parametric equalizers, and a full selection of electronic crossovers. ASHLY added power amplifiers to its product offerings during the late 70's, and soon gained a solid reputation for the amps'

outstanding sonic performance and incredible reliability.

Building on this background of success and technological innovation, ASHLY has set out to expand its amplifier product line to encompass new markets. The new model SRA-120 professional stereo amplifier has been developed toward this goal, and offers superior sonic quality, rugged construction, and many useful features in a single rack space chassis. The compact SRA-120

is suitable for full-range applications, such as small control room monitor systems or as an ideal headphone distribution amp. With its excellent signal bandwidth, the SRA-120 is also well-suited for driving the high-end of a bi-amplification sound system setup.

The amplifier will deliver 60 watts per channel into 4 ohms stereo, 45 watts per channel into 8 ohms stereo, or 120 watts total into 8 ohms mono-bridged. Its design is based on "Class A" voltage amplifier stages with a complementary bipolar output section for low distortion and excellent overload behavior. Features include turn-on delay circuitry and instantaneous turn-off to eliminate any transients to the speaker. Each channel will also independently turn off its output if an overheated condition occurs.

This model also features rear panel switches to select between two choices of input sensitivity, stereo or mono operation, or normal or bridged mode. Rear panel input connections may be made via 1/4" balanced phone jacks or barrier strips with ground lift provision. Level attenuators for each channel are provided on the front panel, along with a stereo headphone jack. Status L.E.D.'s on each channel include signal present, clip alert, and "protect-mode" indication.

The SRA-120 is approximately 10" deep and weighs in at under 20 pounds, yet has performance characteristics and features typically found only in larger, more costly competitors. All Ashly amplifiers are covered under the company's exclusive Five Year Worry-Free Warranty program, offered at no extra cost to the user.

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- 45 WATTS PER CHANNEL INTO 8 OHMS
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ASHLY

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World Radio History

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By Rusty Mack and Sam Stage

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By Mike Klasco

In his continuing look at the workings of loudspeakers comes our Technical Editor's treatise on the speaker's magnetic structure.

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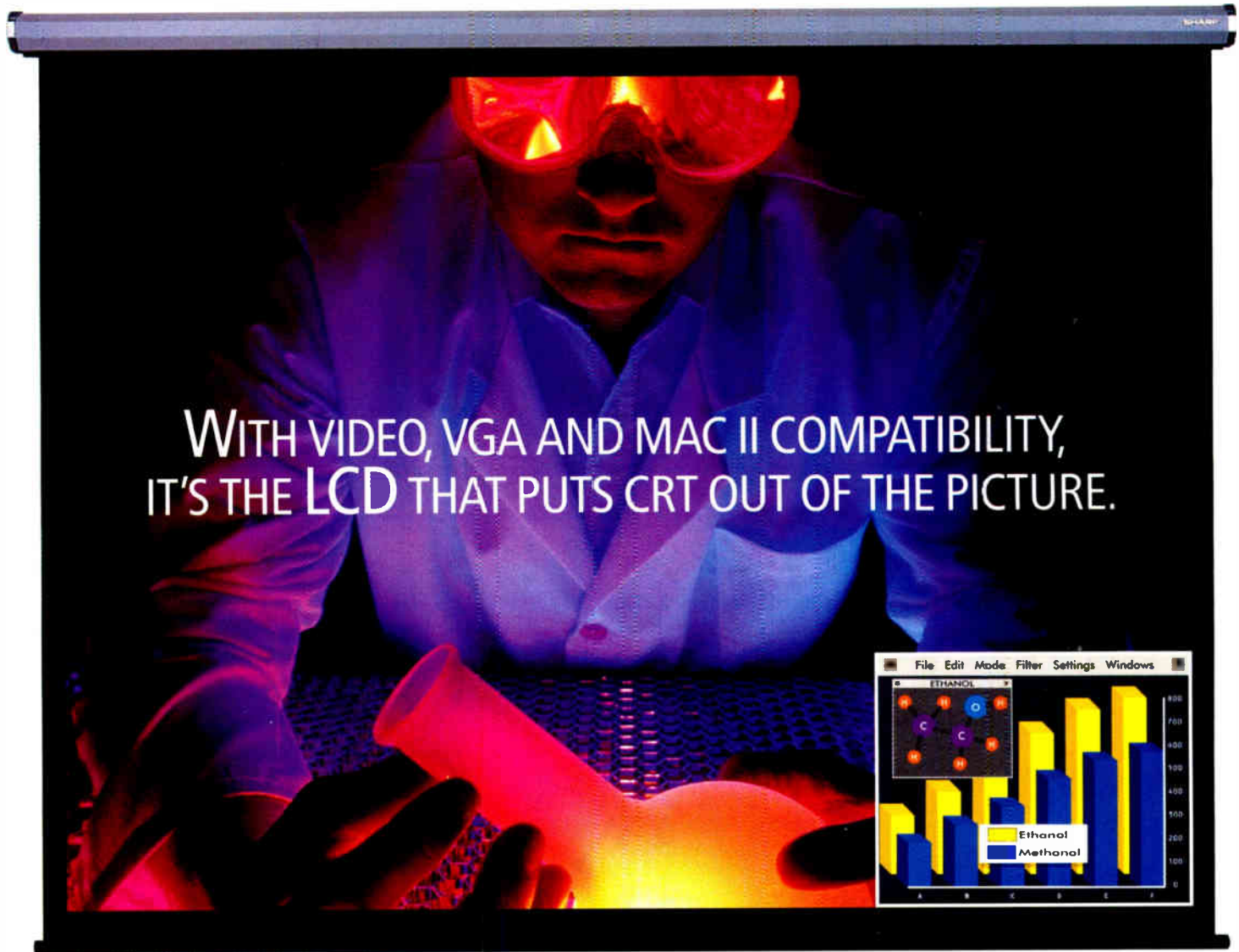
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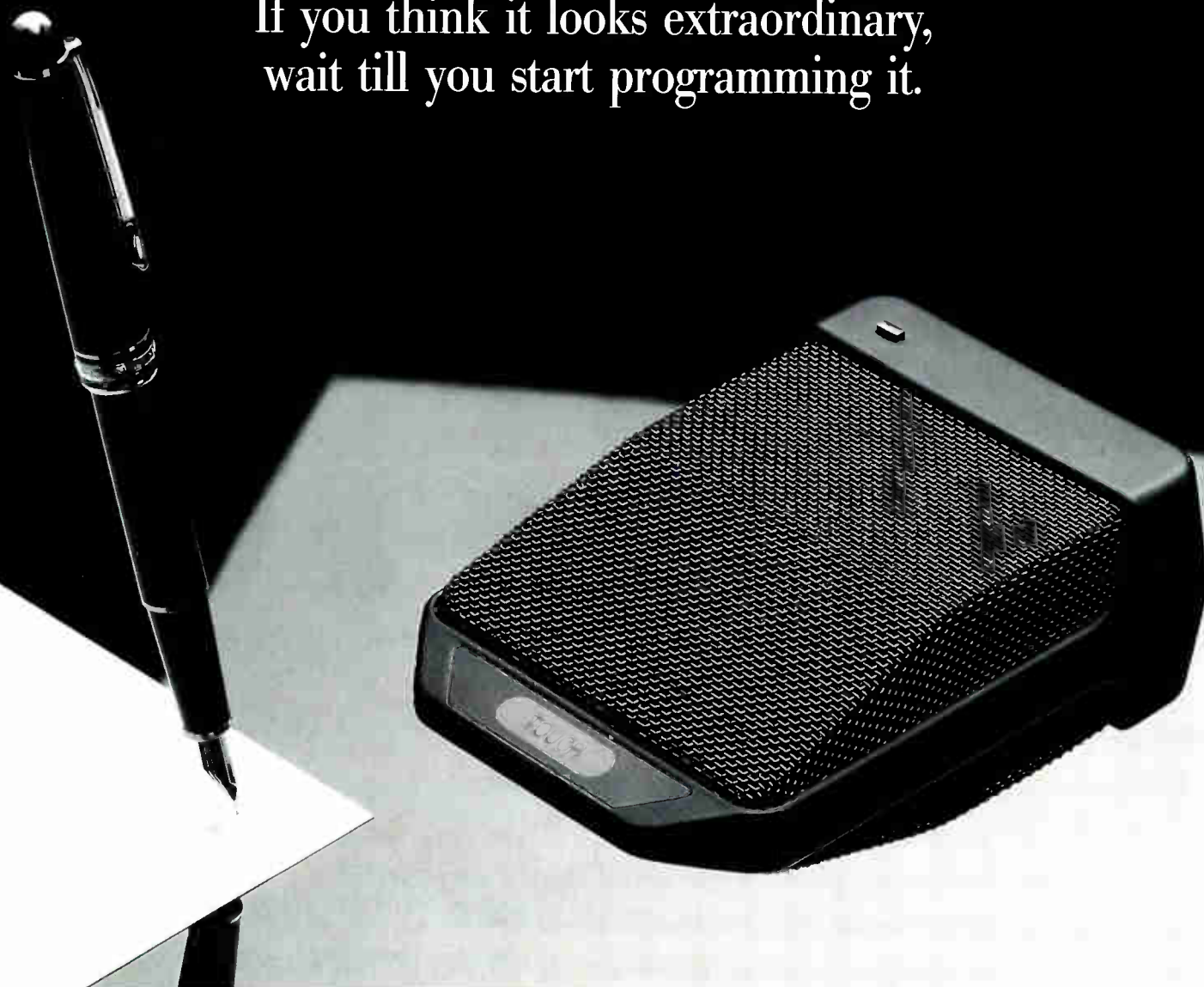
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SHARP
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If you think it looks extraordinary,
wait till you start programming it.



Few microphones are so beautifully suited for boardroom and teleconferencing applications as our new PCC-170 Series. Beautiful, obviously. But beyond mere great looks are the PCC-170's ingenious design features, unequalled sound quality and superior versatility.

Take the PCC-170 SW for example. It gives you the unique ability to program a microphone for three modes of control by virtue of a silent programmable membrane switch. Now you can enjoy touch on/touch-off, momentary on, or momentary off modes at your command.

A surface-mounted supercardioid, the PCC-170's frequency response is carefully tailored to create one of the most natural reproductions of the voice avail-

able. High-end frequency response may be adjusted to compensate for working distances with a bass-tilt switch for tailoring the low-end response.

The new PCC-170 SW from Crown.

Good things come in threes

Along with the programmable PCC-170 SW, two other unique models are also available: The PCC-170 GT features a smooth, noise-free gating capability with an adjustable sensitivity threshold. And the PCC-170, our basic model, offers the superior acoustic characteristics you've come to rely on Crown for.

All of the 170s offer you your choice of two output connectors—a rear-mounted mini-connector or an optional 1/4" stereo phono plug accessed from the bottom of the unit.

And, like all Crown microphones, the PCC-170 Series carries a three-year unconditional warranty against malfunction with a lifetime warranty on the acoustic system.*

For more information on these extraordinary microphones, see your Crown dealer or call toll-free: 1-800-535-6289.

 **CROWN**
Guaranteed Excellence

Made in U.S.A. Exported by Amcron
* See your Crown dealer for full warranty details

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NEWSLETTER

DESIGN CONSULTANTS COUNCIL FORMED

The International Communications Industries Association is sponsoring the Design Consultants Council, a group of design professionals in the audiovisual, sound and video industry. The purpose of the group, according to newly elected chairman, Craig E. Park of Paoletti Associates, is "to provide a forum for business and education discussions between systems consultants and allied professionals to strengthen their ability to provide effective design expertise and promote the role of the professional consultants for design of media presentation and production facilities."

Steve Emspak of Shen Milsom & Wilke is Vice-Chairman. Subcommittee chairs include Ric Baley of Acentech (membership), John Campanella of Shen Milsom & Wilke (standards), Jim Colquhoun of Paoletti Associates (manufacturers), Fred Dixon of Dixon Media Systems and Design (education), and Lee Ritterbush of Kirkegaard Associates (contractors). Meetings are planned nationally in association with industry organization meetings such as ICIA, NSCA, and AES.

FENDER ENTERS PRO SOUND MARKET

Following its initial showing at NAMM in January, Fender has been exhibiting to the trade the Fender Electronics line, which will consist of over 60 products, some of which will use the MediaLink computer control protocol. The products cover the full range of pro sound equipment, including lighting. Special programs are in place for contractors.

NUMARK ENTERS LIGHTING MARKET

Numark Industries has added lighting to its product line. "Numark by Abstract" lighting is designed and manufactured in the United Kingdom by Abstract Design to Light. The line will be distributed through Numark's manufacturers representatives along with the company's mixers, speakers, DJ cases and accessories.

CARVER AMPS RECEIVE APPROVAL

Carver Professional's two "most powerful" amplifiers, the PT-2400 and PT-1800, have received official approvals from Underwriters Laboratories. Steve Payne, national sales manager, said, "Getting UL approval on a big power amplifier isn't easy. . . because of the higher voltage and current levels involved."

HERNDON APPOINTED AT AKG

Amy Herndon has been named Marketing Communications Manager of AKG, after nine years of marketing experience primarily in the television industry. For the last four years she ran her own consulting business specializing in the communications and entertainment industries.

Dave Angress, VP of sales and marketing, said, "We're focusing our marketing efforts. In the past we combined many product managers and marketing communications issues. Now we have one person to focus on the management of marketing while product managers will work more closely with the sales team."

STENTOFON INTRODUCES NEW LINE

Stentofon Communications, Inc. has introduced the 1800 Series of mixer/amplifiers and the 1850 Series of paging horns for industrial/commercial applications. Four mixer/amplifier models are available from 10 to 120 watts. The paging horns are all metal outdoor-type loudspeakers for general purpose paging.

XTA ELECTRONICS LIMITED FORMED

A new company, XTA Electronics Limited, has been formed to manufacture "high quality" products for the pro audio, sound contracting and sound reinforcement markets. Michael Woodward and Andrew Grayland are the UK principals and design engineers. Jack Kelly, in the U.S., is president of Group One, Ltd, which will serve as the exclusive distributor and marketer for XTA products in the United States. XTA's first creation is the DS400 mic/line distribution system. Future products include a real time analysis system and a range of other signal processing equipment.

NEWSLETTER

BRUHN TO RETIRE

Karl Bruhn, the director of market development for the National Association of Music Merchandisers, will retire at the end of this year, according to NAMM president/CEO Larry Linkin. Linkin commented, "Following his retirement from Yamaha in late 1989, we asked Karl to join NAMM to establish our new Market Development Department." Linkin praised Bruhn for his leadership role in organizing the National Coalition for Music Education. Bruhn has indicated he will be available to further help the cause of the Coalition on a selective basis.

BEC TO STUTTGART

BEC Technologies has announced that it has been selected to supply digital fiber optic transmission, switching, and routing equipment for a new audio system at the Gottlieb-Daimier Stadion, an outdoor sports stadium complex in Stuttgart, Germany. The facility was formerly known as the Neckarstadion. Equipment supplied by BEC will be integrated with other related equipment supplied by IED, the sub-contractor for audio switching and distribution systems. Principal contractor for overall audio systems engineering and installation is Siemens of Germany.

AUDIO MEASUREMENT WORKSHOP

Synergetic Audio Concepts will sponsor an Audio Measurements and Instrumentation Workshop August 18 through 20, 1993 in Bloomington, Indiana at Indiana University. Mike Klasco is the Workshop Chairman. The workshop will concentrate on discussions, demonstrations, and hands-on work in analysis of speakers, audio components, sound systems, acoustics and auralization. Instrumentation will be the Bell Laboratories SYSid and the Signalogic Hypersignal Acoustic running on the Ariel DSP-16 and IBM compatible computers. Jont Allen, Phd, a member of the staff at Bell Laboratories, will discuss SYSid's operational concepts and recent experimental measurements in hall acoustics. Eugene Patronis, PhD, Jeff Brower of Signalogic, and Sam Berkow of SIA Consulting will explore their uses of Hypersignal Acoustic.

NEW CABINET PROGRAM FROM ATLAS

Atlas/Soundolier has announced a Cabinet Program in effect through June 30, 1993. Any quantity of qualifying Quick Shipper cabinets ordered via fax will receive a 50 percent freight discount on regular prepaid ground freight, and orders for four or more qualifying its will receive an additional five percent discount off the sale price of the product.

RICHARDSON NAMED PRESIDENT OF EPE

Chris C. Richardson has been named president of EPE Technologies, the producer of uninterruptible power supplies. EPE is an integral business unit of Square D Company, which is a key business of Schneider North America, part of Groupe Schneider, headquartered in France. 1992 sales for Groupe Schneider totaled approximately \$11 billion. According to Richardson, "1993 will be a banner sales year for EPE. We are introducing major new product families . . . and focusing all of our strategic resources on leading the power protection industry in technology and performance." Richardson also serves as president of Anerson Products, the electrical connector business of Square D.

THEATRICAL SOUND DESIGN WORKSHOP PLANNED

Syn-Aud-Con will sponsor a Theatrical Sound Design Applications Workshop on August 10 through 12 at Purdue University in Lafayette, Indiana. Mark Miceli of the University of Arizona is the program chairman, and Richard Thomas of Purdue University is the workshop coordinator. Abe Jacob, executive secretary of the Theatrical Sound Designers Local 922 and sound consultant of the New York City Opera will be on the instructional staff along with other professionals.

WE CAN SHOW YOU ALL THE FEATURES THAT SET OUR NEW MPL 2242 APART EXCEPT ONE.

- 22 inputs. 10 XLR balanced inputs featuring a low noise, padless pre-amp design. Six true-stereo inputs.
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- Rotating jackfield for conventional mixing or rackmounting.
- 5 dB more overall gain than any mixer in its class.



- High quality, center-detent Panasonic® faders.
- Panasonic sealed potentiometers.
- 4 true-stereo returns.
- The only 4 buss design in its class (using 4 dedicated sub group faders) with discrete Group and Main summing outputs.
- 128 dB overall signal-to-noise ratio, A weighted.
- 10 Hz to 30 kHz frequency response.
- Ceramic hybrid channel design that further reduces noise and optimizes stability.

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For more information about the MPL 2242, please contact Samson Audio, a division of Samson Technologies Corp., P.O. Box 9068, Hicksville, NY 11802-9068 (516) 932-3810 FAX (516) 932-3815

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Defining Terms and Terming Definitions; Behind the Survey

LISTENING OR HEARING

Some years ago, I conducted a largely successful campaign to get people to use the term "signal delay" or "audio delay" instead of the then common but incorrect "time delay."

Today, we are encountering a similarly inappropriate term, and I would like to recommend its replacement to our industry. The term is "assistive listening system," and it is a gross misnomer.

In the first place, the equipment is not a listening system. It does not listen; people do. In the second place, it does not even assist people to listen. Listening is something people do on their own, without requiring any assistance. What the system does is to assist people to *hear*.

Let us, therefore, call it a *hearing assistance system*.

After all, we do not talk about looking eye dogs!

Peter W. Tappan
Downers Grove, Illinois

HUMOROUSLY DEFINED; SURVEY SAYS

I found your comments in "Transparency of Multimedia" [Letter from the Editor, December 29, 1992] quite humorous. Please let me tell you why.

About 1957 at age 14, I started working in a radio and TV repair shop because of my interest in electronics and the overwhelmingly higher pay this profession offered compared to that of a grocery delivery boy. Needless to say I've read and heard several decades worth of technical writers and editors at this stage of my life and find humor in the efforts of their toil.

Your definition of Multimedia, quite correct, is surely a relative definition of the term. Probably not at all accept-

able to the legal staff of AT&T who would like to hoodwink our Congress into accepting Multimedia to mean mixed strand (wire, fiber, coax) networks; truly a deliberate attempt to confuse certain political issues presently before Congress. Likewise, adjectives such as transparent, seamless . . . are just as relative to a computer and its operating system, a Telephone to its ESS, or broadcast hardware to programming. Not that I disagree with your definition. No, I just find it humorously reassuring or reassuringly humorous that science has developed yet another new technology which the technical press can find only old adjectives to describe. I guess Webster's will never run out of reasons to print new editions.

I'VE READ AND HEARD SEVERAL DECADES WORTH OF TECHNICAL WRITERS AND EDITORS.

As to the Sound & Communications 1992 Supplier's Survey: Comments such as, "Know your damn products!", can only be attributable to the extreme stupidity of certain manufacturers and the way they choose their factory reps, who display the same ineptness in their choice of distributors and dealers. A manufacturer who has to talk to customers has chosen the wrong distributor/dealer and deserves to have high sales costs. I am willing to bet that the manufacturer who made that comment to you asks as their first question to prospective dealers, "How many widgets can you sell this year?", before they explain what a widget is or

bother to get references on the technical expertise of a proposed distributor/dealer. They also seem to find it hard to believe that full-service marketers can't compete with mail order box houses who couldn't care less about anything other than a turns ratio approaching the number of working days in a year.

The trade shows you discussed are getting so expensive for the exhibitors, as well as crowded, disorganized, and frustrating for the attendee, that it is no wonder the statistics read the way you portray. Maybe money spent on trade shows would be better used supporting dealers instead of the cast of thousands, camping on \$100-plus-per-square-foot concrete. Extravanzas such as the world's greatest show disaster (to date), the 1992 Fall Comdex, are reminiscent of the Airborne Cadence: stand-up, hook-up, shuffle-to-the-door, which could be parodied as fly-in, crowd-in, wait-at-the-door, if-you-wear-your sneaks, you'll-get-a-peek, but-not-much more.

One last observation about your "New Market and Applications" chart. Thirty-one of the bullets denote market components and applications at least 10 years old. However, with a little imagination and creative engineering, systems incorporating these components will provide new solutions for yet unknown applications. Will "control," as you say, then be key? I rather think products of purposeful integration that are simple to use which offer solutions to sophisticated problems will prevail. A fact more properly dictated by need.

John R. Graf
President
Synergy Concepts, Inc.
Dallas, Texas

14 User Selectable Channels, UHF, True Diversity Wireless And...

Vestax introduces the new VT9100 Pro UHF wireless system. The 9100 Series features 14 user selectable channels, noise reduction and XLR balanced output all within a true-diversity system.

User Selectable Channels can be changed by end user easily.



WM9100 Wireless Microphone transmitter, 14 user selectable frequencies, high quality element. WM9100S Same as above with Shure SM58 Element.



IT9100 Belt Pack transmitter, up to 18 hour battery life, 14 user selectable frequencies, level control with input attenuator to accept any type of source. (mic, guitar, keyboard, etc..)



EM100L High quality clip on lapel microphone



Detachable clip on antennas can be placed at proper height for best reception.



WM9100, 9100S



IT9100



CHANNEL
Back of VT9100PRO

Operating Frequency

Channel	Frequency
B11	947.250
B12	948.250
B13	950.250
B14	951.750
B15	949.000
B21	947.750
B22	949.750
B23	950.750
B24	951.250
B25	948.500
B31	949.250
B32	948.750
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THE AMERICANS WITH DISABILITIES ACT, PART ONE: WHAT THE ACT SAYS

By Jeff Ader

On July 26, 1990 The Americans With Disabilities Act (ADA S.933) was signed into law.

Since then we have seen the gradual implementation of handicapped parking spaces, easy access ramps and wider rest room facilities to mention some of the areas of compliance. Of special note to sound installation and a/v contracting companies are the regulations concerning the hearing impaired.

ADA Requirements: "no person shall be discriminated against on the basis of disability in the full and equal enjoyment of the goods, services, facilities, privileges, advantages and accommodations of any place of public accommodation."

DISCRIMINATION INCLUDES:

(1) Failure to provide auxiliary aids and services unless the entity can demonstrate that such a provision would fundamentally alter the nature of the program or cause an undue hardship.

(2) Failure to remove architectural and communication barriers in existing facilities unless the entity can demonstrate that the change is not readily achievable.

There are no exemptions for small businesses.

Facilities Affected: All privately

System	Advantages	Disadvantages	Typical Applications
Induction Loop Transmitter: Transducer wired to induction loop around listening area. Receiver: Self-contained induction receiver or personal hearing aid with telecoil.	Cost-effective. Low Maintenance. Easy to use. Unobtrusive. May be possible to integrate into existing public address system. Some hearing aids can function as receivers.	Signal spills over to adjacent rooms. Susceptible to electrical interference. Limited portability. Inconsistent signal strength. Head position affects signal strength. Lack of standards for induction coil performance.	Meeting areas. Theaters. Churches and Temples. Conference rooms. Classrooms. TV viewing. Classrooms.
FM Transmitter: Flashlight-sized worn by speaker. Receiver: With personal hearing aid via DAI or induction neck-loop and telecoil; or self-contained with earphone(s).	Highly portable. Different channels allow use by different groups within the same room. High user mobility; variable for large range of hearing losses.	High cost of receivers. Equipment fragile. Equipment obtrusive. High maintenance. Custom fitting to individual user may be required.	Classrooms. Tour groups. Meeting areas. Outdoor events. One-on-one.
Infrared transmitter: Emitter in line-of-sight with receiver. Receiver: Self-contained. Or with personal hearing aid via DAI or induction neckloop and telecoil.	Easy to use. Insures privacy or confidentiality. Moderate cost. Can often be integrated into existing public address system.	Line-of-sight required between emitter and receiver. Ineffective outdoors. Limited portability. Requires installation.	Theaters. Churches and Temples. Auditoriums. Meetings requiring confidentiality. TV viewing.

/ Source: Rehab Brief, National Institute on Disability and Rehabilitation Research, Washington, D.C., Vol. XII, No. 10, (1990).

owned businesses providing goods and services to consumers, clients or visitors.

CATEGORIES INCLUDE:

- an inn, hotel or similar place of lodging.
- a restaurant, bar, or other establishment serving food or drink.
- a motion picture house, theater, concert hall, stadium, or other place of

exhibition or entertainment.

- an auditorium, convention center or lecture hall.
- a bakery, grocery store, clothing store, hardware store, shopping center, or other similar retail sales establishment.
- a laundromat, dry cleaner, bank, barber shop, beauty shop, travel service, shoe repair service, funeral parlor, gas station, office of an accountant

Jeff Ader is a writer and consultant in the sound and communications industry.

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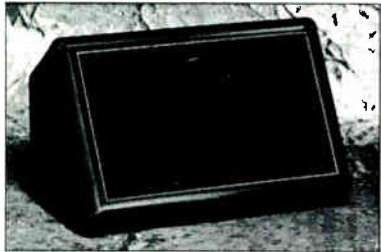
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- a gymnasium, health spa, bowling alley, golf course, or other similar place of exercise or recreation.
- theme parks, sports facilities and stadiums, fraternal lodges and organization, recreational facilities, state and national parks.

FACILITIES EXCLUDED:

- Entities operated by Federal, State, or Local Governments. These are covered by the Rehabilitation Act, with provisions similar to ADA.
- private clubs and other facilities not open to the public.
- religious organizations or entities.
- residential accommodations, such as apartments or small, owner resided inns.

The term "auxiliary aids and services" includes — telephone handset amplifiers, assistive listening devices and systems, telephones compatible with hearing aids, telecommunication devices for deaf persons (TDDs), or other effective methods of making aurally delivered materials available to individuals with hearing impairments.

Our next concern is what type of systems are available and how they are applicable.

According to section 1102.6: "(a) An assistive listening system shall be installed in an assembly space having an occupancy capacity of 50 persons or

more where sound reception of audio information by the audience is essential for the occupants. For the purpose of this section assembly space shall include theaters, meeting halls, hearing rooms, amphitheaters, concert halls, auditoriums, and similar occupancies. (b) The assistive listening system shall provide audio coverage to the entire assembly space. (c) The number of individual receivers/transducers available for use by the audience shall be equal to not less than nine (9) percent of the number of persons which the assembly space is designed to accommodate up to 1,000 . . . Where the number exceeds 1,000, there shall be two (2) additional receivers/transducers available for each 500 (or fraction thereof) occupants above 1,000. [Individual states' interpretation of (c) varies; some are more stringent than federal guidelines.] (d) At least one notice shall be prominently posted within the assembly space, to provide as follows:

NOTICE (1)

An assistive listening system has been provided in this (building) (room) (theater) (auditorium) (amphitheater). (A specific number of) individual receivers/transducers are available for use by occupants requiring enhanced sound reception.

For further information concerning availability of receivers/transducers contact (2) _____

Complaints maybe addressed to (3) _____

⁽¹⁾ Type shall be 96 point or larger with black lettering on a very light or white background.

Table A2, reprinted from a National Institute of Disability and Rehabilitation Research, shows some advantages and disadvantages of different types of assistive listening systems. (See Table A2)

In the next installment we'll cover employers' responsibilities, enforcement of the ADA and penalties. ■

Seen and Heard at CES

A Visit to the Consumer Electronics Show

BY ROBERT BAUM

This year marked my first visit to the Consumer Electronics Show. My years at CBS were in manufacturing, and my later work at Apogee as a speaker engineer did not provide enough of an excuse for a trip to the show. Luckily, my current employer, Aura Systems, was exhibiting at the American Loudspeaker Manufacturers Association, which meets during CES. (Aura has developed a unique magnetic system for speakers and is working with a number of commercial sound speaker manufacturers.) But, more important than magnetic technology, I got to go to the show, and here is what I saw, along with my views.

NEW FORMATS

Is Philips' new digital tape cassette format DCC going to make it? American and Japanese stores that pushed DCC hard are selling only three or four a month, I'm told. Marantz has announced they will import only a few hundred a year. There are problems with production yields of the film heads, and some of the electronics giants have gone over to disk drive manufacturer Seagate for their thin film heads. The question now is if the price is low enough. DAT was

Robert Baum is currently employed by Aura Systems.



Virtual Vision Sport allows viewers to watch big screen television through portable, five ounce eyeglasses.

too expensive to make it as a mass-market item, yet DCC prices at close to a grand aren't any cheaper. Sony's 2.5-inch MiniDisc may pick up the pieces: this format records and plays back, costs less than DCC. Sony is even trying to reformat MD for use as 130 megabyte computer storage discs.

VIDEO

Emerging video technologies, such as wide screen and improved definition video, have clear commercial applications. Closed caption decoders have been mandated for all TVs sold

in the US from this year on. Vidikron introduced a self-aligning projector. The high resolution VPF 40 HD (\$18,000) projects a 5-foot to 25-foot image. Harman Video showed the ALD-1, a \$2,300 consumer line doubler/controller and the Series II LD-1 front-screen data grade projector (\$8,000). Custom installs, home theater, clubs, hotels, and sports bars are natural users of these technologies.

Personal projection TVs were on display, mounted within special wrap-around sunglasses with stereo earphones. A video image is reflected from a tiny LCD color screen into one

eye, appearing to float 10 feet away. Now you can watch video anywhere, doing anything, since you can also see what you are doing. A belt pack contains the electronics, tuner, inputs and antenna. Virtual Vision (\$900), Video Headset and Sony either have or are developing these products. These products might be very useful to security guards, who could watch a closed circuit picture as they patrol.

CD + STILL PICTURES = PHOTO-CD

Kodak's Photo-CD uses the vast data storage capacity of the CD to hold still pictures with accompanying sound. Kodak has a retail network for the transfer of film and video stills onto Photo-CD. Contractors can package one of these units (\$380 retail) instead

of, or in addition to, a CD player, since Photo-CD players can also play CDs. The client now has a nifty still video system: Now maybe he can be sold a few more monitors.

BACKGROUND MUSIC SYSTEMS

Denon demonstrated a 200 disc CD changer. Pioneer showed a 300 disc changer. Pioneer's CAC-V3000 (\$6,000) is a flexible package, about two feet high with less than a 15-inch x 15-inch footprint. It can play continuously by using the two independent CD players and the on-board cross-fader. Its computer interface (to a Mac or PC) permits easy control over all the songs (not just CDs) from up to five custom play lists. Sony introduced a very cost-effective 100 CD changer

for \$1,200. Fisher's Studio 24-CD player for \$500 joins Pioneer's low cost PD-TM1 18-disc player, both offering multi-magazine continuous play operation. Fisher's product lets users play discs by user-defined criteria, like type of music or title. Audio Source introduced an AM/FM receiver integrated with a six-CD changer. The Model CD Ceiver One (\$400) has a remote control and 30 watts per channel, an inexpensive self-contained foreground music system. Note that unauthorized commercial use of CDs is frowned upon by ASCAP and BMI, music licensors who will insist on compensation. Don't say I didn't warn you.

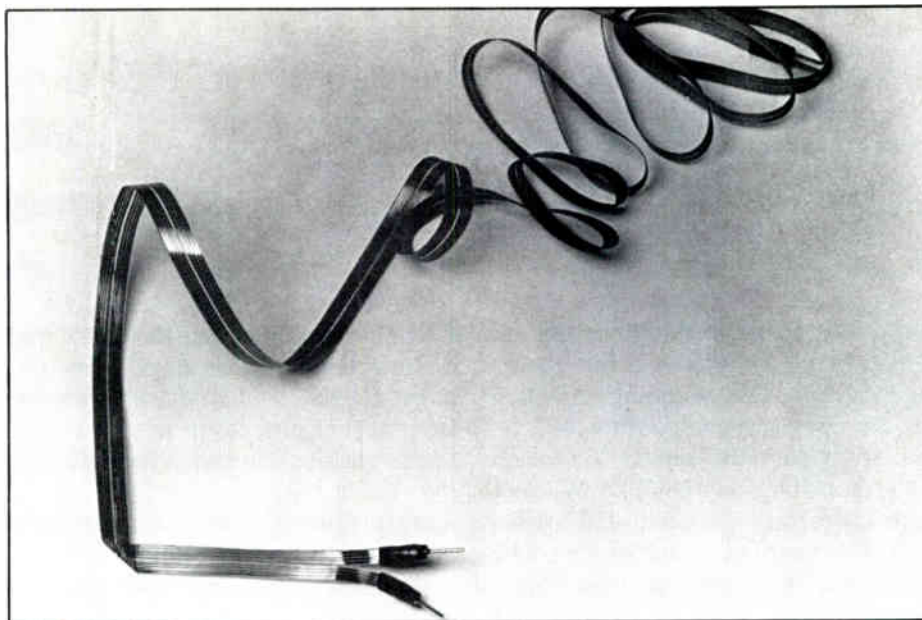
AUDIO

Equalizers, graphic or parametric, can flatten a sound system's in-room

MIXa Amps. Pure QSC.



steady-state frequency response, but typically ruin the time (impulse or transient) response. Several firms introduced revolutionary digital signal processing (DSP) based speaker/room correction systems at CES. DSP is powerful because it permits the decoupling of the frequency and time domains. While similar systems have been introduced for audio conferencing from NEC and others during the last few years, the products introduced at the CES are "hi-fi" quality. These DSP-based systems compensate for uneven frequency response without the aberrations in time response that all non-minimum phase equalization causes. And they can compensate for time-based errors, which traditional equalizers can not. Time-based errors include strong, early



Flatline speaker cable from Nordost Corp.

(<5 millisecond) reflections from floor, ceiling or mixing console. The sound takes on its indirect path to your ears.

All these products require measurement of the uncorrected time and frequency response at the listening position, typically by the dealer. Both parts of the speaker/room system contrib-

ute to the sound we ultimately hear, and both may be corrected. Since the shortest distance between two points (speaker and listener) is a line, delay is required to give the reflection extra time to travel a longer, indirect path to the listener. Digital error correction works against reflections by sending an out of phase signal to the speaker,

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delayed to arrive at the listener's ear at exactly the same time as the offending reflection. The offending reflection and its out of phase counterpart destructively combine, neutralizing each other at the listening position. Without such corrections, almost all systems suffer from very large amplitude peaks and troughs in the frequency response, which can be readily seen on any high precision acoustic analyzer.

Cambridge Signal Technologies displayed the SigTech professional (i.e., studio) processor (AEC 1000), which corrects mostly from 1200 Hz down, and has been out for over a year. A lower priced consumer version (TF10D-3, \$4,750) is due by the time this issue hits your desk. B&W's system corrects for speaker response and for room response below 500 Hz.

Room correction across the entire frequency band is due next year. JM Labs' (Division of Focal SA) digital loudspeaker processor, the iIR-1, corrects speaker distortions in several of JM Lab's speaker models. Snell Acoustics' DSP system cancels early reflections from room boundaries for up to 0.9 seconds at low frequencies. DSP correction modules (\$250) are designed for specific Snell speakers, and plugged in to the CQ-10 processor (\$2,500). Later this year another processor, the CQ-20, should be available to perform crossover functions digitally.

I spent most of my time at Paravoid's booth, as my pet project was being demonstrated. Paravoid's 18-inch high-excursion subwoofer achieves enormous displacement, ap-

proaching three linear inches, peak-to-peak. The GMAS-18 ("Great Mother of All Subwoofers") uses a radially magnetized neodymium magnetic structure supplied by my employer, Aura Systems. Such high excursion subwoofer drivers hold promise for pro and touring sound firms that truck around a lot of bulky enclosures. Since output quadruples (+6 dB) each time excursion is doubled, fewer cabinets will be required to reach a given low frequency SPL using this driver.

Acoustic Sciences, of Tube Trap fame, introduced their new Tower Traps. Tower Traps are entry level multi-purpose corner-loaded bass traps for studios, control rooms, or home hi-fi systems. They will sell in sixpacks for about \$1,000.

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Flat wire, an idea whose time has come and gone several times, has resurfaced from Nordost Corp. (Framingham, Mass.). "Flatline" cable is useful for runs under carpets, in custom installs, home theaters and in cars. Flat wire can be run outside of walls, attached with double-faced tape, covered with drywall and then painted. Or, a narrow slot can be cut to install the wire edge-on. The slot is then covered with joint compound and painted. The Teflon insulation is said to pass all fire and building codes, and be suitable for harsh marine environments.

CORDLESS PHONES

To increase their range and fidelity, several cordless phone companies have started to switch from the 46-49

MHz band to the 900 MHz band. Some of these new phones also use robust "Spread Spectrum" transmission techniques, which rapidly shift frequencies to stay ahead of eavesdroppers and interference (especially at longer ranges). In Spread Spectrum, first used by the military in the 1940s, the signal is broken up and simultaneously transmitted (or spread) over a random range of many frequencies or channels (the spectrum).

Questech International showed the Transition 2000 (\$100), a phone with a crude pitch-shifter built in. A one-person office can use the device to screen calls. Women can now answer the phone in a man's voice, and men can more readily make crank calls, using a woman's voice.

Square D, the electrical distribution firm, showed the Elan HD, a retrofitable multi-zone, multi-source audio, video and phone system for the home. The modular system integrates all the homeowners products, including the doorbell: when it or the phone rings, a chime is piped through the audio system (unless this feature is overridden). This comprehensive, configurable system will sell from \$4,000 to \$12,000 installed, depending on capability.

There were over 1,700 exhibitors at CES, so I can't begin to cover them all. Total attendance was slightly down, with the number of exhibit booths slightly up. But no one was complaining, and the show looked busy and dealers were buying product. The next CES is in June in Chicago. ■

SOUNDSPHERE SPEAKERS LOOK & SOUND CHOSEN BY CUB FOODS STORE CHAIN

While Soundsphere Loudspeakers have been utilized in Cub Foods stores in Eden Prairie, Cottage Grove, Bloomington and Plymouth, Minnesota, the most recent installation has been at the newest 120,000 sq. ft. store in Apple Valley. Twenty-five Soundsphere #110A speakers with transformers tapped at 75 watts were installed to gain quality music and voice page.

Craig Streich, the Store Manager, takes advantage of the music quality and added efficiency of clear voice page when reassigning workers to various tasks in the expansive store.

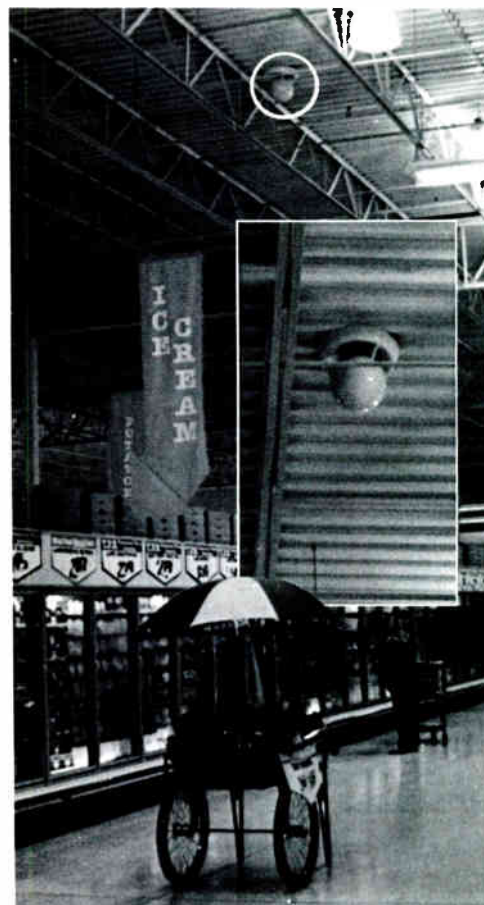
Scott Miller, Manager of Pro Sound at Muzak of Minneapolis, notes that the Cub Foods executives selected parchment-colored #110 Soundspheres to meld with the ceiling color and felt that the shape and color were highly compatible with the contemporary interior design esthetic.

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Making the Best Flexible

Boston Symphony Hall Becomes a Multipurpose Facility.

BY KEITH CLARK

Built in 1900, Boston Symphony Hall is the performing home of the Boston Symphony Orchestra as well as the popular Boston Pops concerts.

Long known as one of the best acoustic performance venues in the world, it is designed in the tradition of the finest symphonic halls of Europe. Physical characteristics of the hall include a rectangular shape, high ceilings and two wraparound balconies.

Famed acoustician Leo Beranek, in his book "Music Acoustics and Architecture," characterized sound in Boston Symphony Hall as "clear, live, warm, brilliant and loud, without being overly loud. The hall responds immediately to an orchestra's efforts. The orchestral tone is balanced, and the ensemble is excellent."

But while the near-perfect acoustics are ideal for symphony needs, they aren't enough to serve a variety of needs demanded by other types of modern-day performances. The Boston Symphony Orchestra, owner and operator of Symphony Hall, realized that a modern, permanent sound system would need to be installed for the venue to be truly effective as a multipurpose facility.

A very small permanent system had been in place for more than two decades. It worked fine for public address announcements and emergency

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



Boston Symphony Hall.

paging, but it couldn't come close to meeting music requirements. The system had three speakers running up each side of the proscenium arch that stretches over the stage, with single speakers on each side dedicated to the floor level and two balconies.

David Andrews of Andrews Audio Consultants in New York, was asked by the Boston Symphony Orchestra to provide a house PA system for the videotapings of the "Evening At The Pops" television series produced by WGBH for the Public Broadcasting System.

Andrews worked closely with Steve

Colby of Evening Audio Consultants in Kensington, New Hampshire, on system design, development and troubleshooting. Colby serves as the primary sound reinforcement audio consultant for Symphony Hall, in addition to engineering the Boston Pops TV series. House sound and lighting man Russ Costa also provided substantial input.

"The Boston Symphony Orchestra wanted to put in a system that was attractive to out-of-house clients, in addition to enhancing the guest artist segments of Pops performances," Colby says. "Prior to installation of the new permanent system, rental equip-

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ment had to be brought in. It was realized that a specially tailored system would present logistic and financial advantages.”

Colby points out that, “Boston Sym-

It was realized that a specially tailored system would present logistic and financial advantages.

phony Hall has always been a very tricky place to do sound reinforcement. As in any hall that is designed for superb natural acoustics, putting in a PA that performs well is a challenge.”

Andrews specified a system that was installed on a temporary basis and evaluated by the Boston Symphony Orchestra organization throughout the course of a Pops season. After evaluating another system throughout the following season, it was decided that Andrews’ recommendations for a permanent installation with Meyer Sound Labs’ speakers powered by Crown amplifiers would best meet their needs.

RADICAL TRANSFORMATION

A major consideration in the system design is the hall’s different floor and stage configurations. Conventional floor seating is attached to a “false” wood floor that slopes gently up to the back of the room. This seating and flooring, used for BSO and other performances, is removed for the Pops

season and replaced by small cocktail tables with portable chairs.

The stage, which is fairly shallow and runs the length of the room, can be expanded into the audience by up

As in any hall that is designed for superb natural acoustics, putting in a PA that performs well is a challenge.

to 40 feet for Pops shows. “The main idea was to try to design a system that would meet the specialized needs of the Pops and also could serve as a permanent house system for a variety of other acts,” Andrews says.

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Power for all speaker systems is supplied by 12 Crown Macro-Tech 1200 amplifiers that are rack mounted in an equipment room in the basement directly beneath the stage.

Final installation of the system in was fast paced, needing to be complete within two weeks to accommodate the opening of Pops season. The Boston Symphony Hall installation team, under the direction of Costa, worked closely with Andrews to install the entire system, including motors and hanging points for two central cluster positions, within the narrow time frame. Cabling, however, was temporary. There just wasn't enough time for the required cables to be fabricated and for conduit to be run. Permanent conduit and cabling, completely hidden from view, was subsequently installed after the season.

"We could never have completed this installation on time without the substantial work of Costa and his crew," says Andrews. "They made us look very good."

A central cluster, composed of seven Meyer UPA-1B processed sound reinforcement speakers, is suspended over the end of the expanded 40-foot stage used for Pops performances. After the

Pops season concludes in midsummer, the cluster is taken down and re-suspended above the permanent stage.

Meyer UPA-1B speakers, an updated version of the UPA-1A, feature a combination of a new high-frequency driver and a Y-1PC network. High-frequency response extends to 20 kHz with response very flat in the 500 Hz—8 kHz range. "Meyer speaker systems present many advantages," in Andrews' view. "They come with customized electronics that are specifically designed for the needs of the speaker. In addition, Meyer systems were the first to use a trapezoidal design for array purposes. My own preference is to work with the original and not imitations."

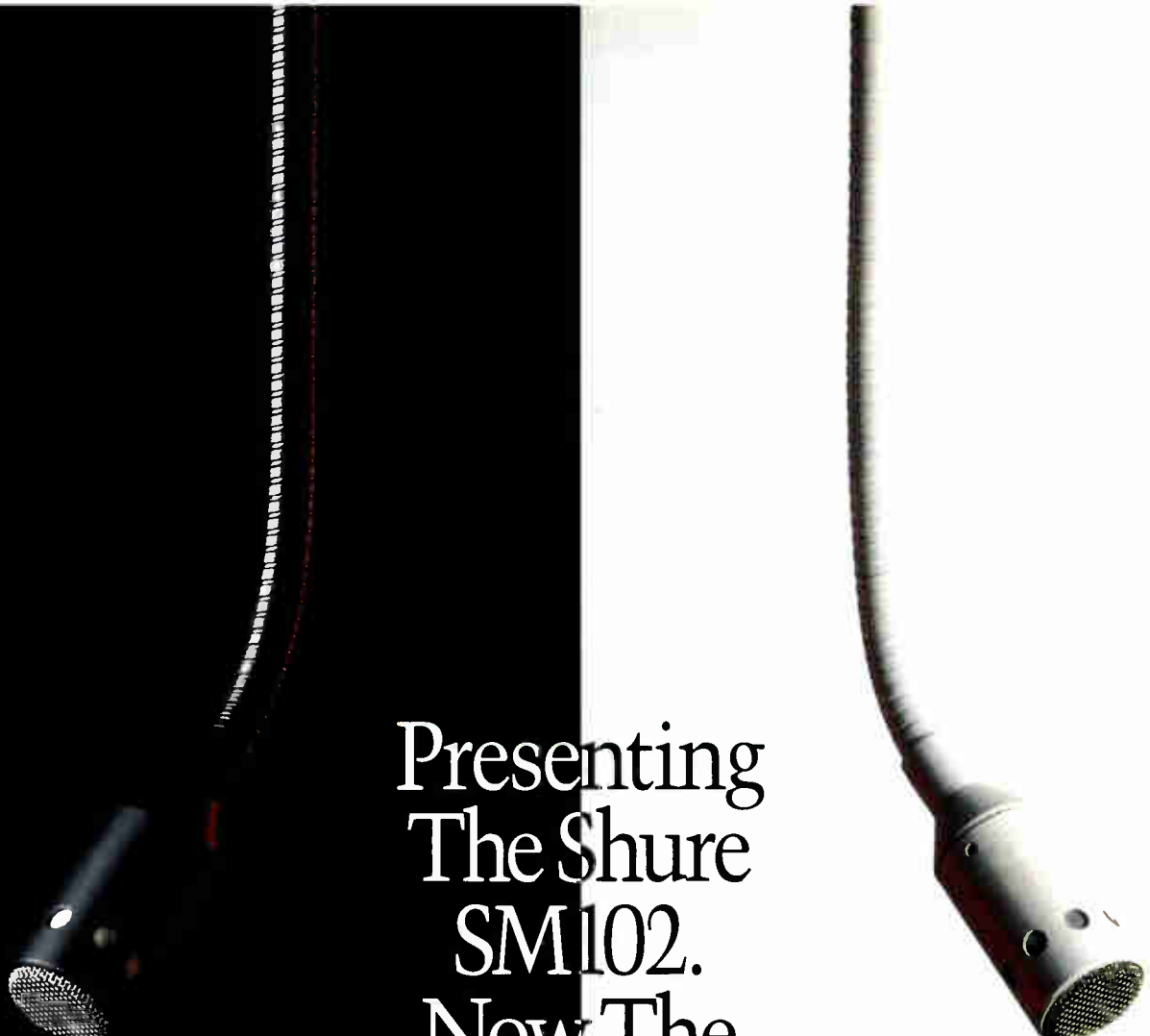
Two delayed underbalcony systems supply additional coverage to some floor and first balcony seats. Each is made up of six Meyer UPM-1As. "The last octave is gradually removed by air absorption. The underbalcony systems restore high frequencies lost for seats that are too far from the central cluster. In addition, some of the seats in these areas are shadowed and only get reflected sound rather than directed sound," says Andrews.

"When you're sitting in the coverage

Two delayed underbalcony systems supply additional coverage to some floor and first balcony seats.

path of these underbalcony speakers, you're not really aware that they are on," he continues. "However, if they were to be turned off during a performance, you would notice that something had been taken away."

For public address and paging during Boston Symphony Orchestra concerts, three UPA-1B speakers run up each side of the proscenium in the



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Rear view of the Crown amplifiers showing the wiring involved.

spots formerly occupied by the old system speakers. The speakers are custom-painted gold to blend in with their surroundings. A single UPM-1 is placed to each side of the stage to provide support to seats shadowed by the stage when it is extended. Eight additional UPM-1As with stands are available for use "as needed" for infill to the first three rows of seats.

Andrews utilizes Meyer's SIM (Source Independent Measurement) System II. The latest version is a portable, DSP-based instrument for acoustical measurements and sound system alignment.

Large-scale stage monitor systems were not included with the new system and are only brought in when necessary. Colby explains that, "The Boston Symphony Orchestra wanted to allocate their resources towards installing a sophisticated and flexible basic sound system, rather than spending money on hardware that they wouldn't

be using frequently, like big stage monitoring systems.

However, we took great care to ensure that elaborate stage monitor systems can be easily interfaced with the permanent system."

POWER REQUIREMENTS

Power for all speaker systems is supplied by 12 Crown Macro-Tech 1200 amplifiers that are rack mounted in an equipment room in the basement directly beneath the stage. The central cluster and proscenium speakers are driven by four amplifiers each, with the underbalcony systems and infills driven by one amplifier each.

"When powering processed speaker systems, the idea of using huge amplifiers with a lot of headroom kind of falls apart," says Andrews. "You want to protect against driving through the processor's limiters, which aren't a brick wall. Too much power can drive right through them and cause damage."

All speakers are running a 4-ohm load except the underbalcony systems, which are 16 ohms. Because three

Cabling for the sound booth is stored in a floor compartment where it can be pulled out during setup.

underbalcony speakers receive one channel of power from a single Macro-Tech 1200, the load only ends up being 5.33 ohms.

Andrews says, "My preference in an installation is to use one model of amp, unless there's a very good reason to do otherwise. We're very careful to load the amplifiers properly. I only specify Crown amplifiers."

Running cable to the remote amplifier location didn't present any prob-

lems; it is routed down a cold air shaft that runs from the ceiling right into the room. The house system employs a Yamaha PM-1800A console that is cabled and wired for 40 channels. Cabling for the sound booth is stored in a floor compartment where it can be pulled out during setup. Enough cable is included for a side house mix position, if needed.

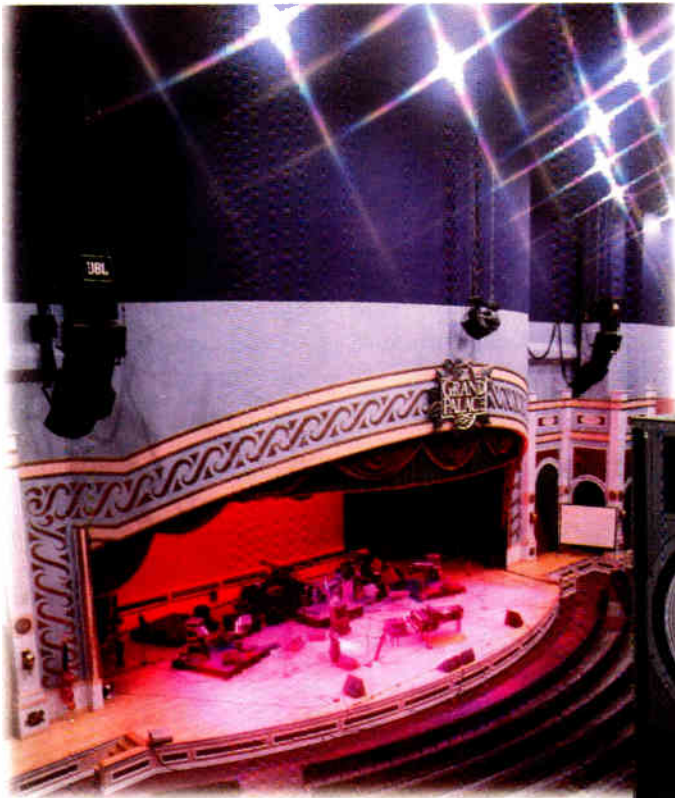
FLEXIBLE STAGE INTERFERENCE

"My overall objective with regard to stage miking systems and equipment interface was to come up with a design affording maximum flexibility," says Colby. He devised a network of microphone lines, tie lines and patch bays that would allow the system to be reconfigured to fit any need. In addition, the mic system needed to be able to accommodate the WGBH television



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A central cluster, composed of seven Meyer UPA-1B processed sound reinforcement speakers, is suspended over the end of the expanded 40-foot stage used for Pops performances.



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The competition to produce the "ultimate" sound reinforcement system is fierce. Each new system design brings claims of having *achieved perfection* or touts *this is the one*. Yet, in time, you can expect the very same manufacturers to introduce new models claiming to have further *perfected perfection* or that their *unorthodox* technology has rewritten the laws of physics. Sound familiar? So how do you impress everyone who has heard it all before? Simple.

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Pictured above, Array Series installation at the Grand Palace, Branson, Missouri.



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broadcasts and two radio station broadcasts.

A network of nine-pair subsnakes route from stage pockets to a master I/O (Input/Output) panel located backstage. This panel allows cross-patching of any stage mic line to any house console input via mic cable jumpers. For Pops TV mixes, accent mics are used to enhance certain instruments like the harp, bass section, etc. The bulk of the microphones shared between TV and sound system are delegated to the guest artist appearing with the Pops.

"Microphone demands can be as simple as a single microphone for Victor Borge, or as complicated as an additional 32 inputs for Bonnie Raitt and her band," Colby notes. "The big point is that it is possible to patch any sig-

nal anywhere in the building. We really took great pains in terms of both dollars and design to make this possible."

The newly installed patching system includes an integrated hardwire splitter to deliver microphone signals to the house and monitor mixing consoles, but is designed to accommodate a "guest" transformer-isolated mic splitter when brought in by a remote truck for the purpose of live recording. (In such a case, the remote truck splitter creates a direct feed and two transformer-isolated feeds of each mic signal, providing an extra degree of isolation between remote and sound system mixing consoles.)

A wide variety of mics are available to meet a range of needs, including handheld dynamics and lavaliers. A Vega R-42A wireless microphone sys-

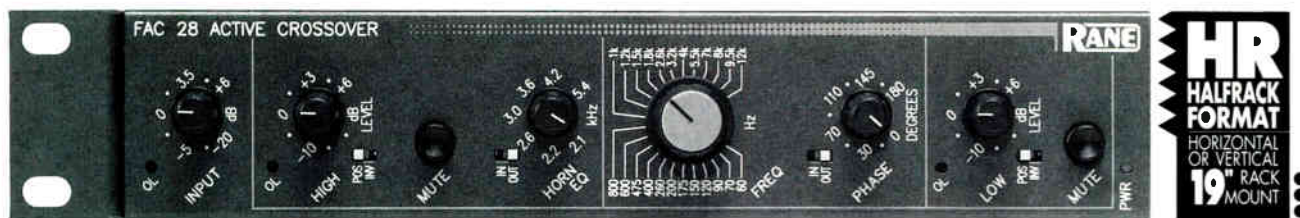
tem (with DYNEX III audio processing) is also on hand when needed.

CONCLUSION

House sound and lighting man Costa notes that the new system has already been used in shows featuring performers ranging from the Lincoln Center Jazz Orchestra to Liza Minnelli, and that it has "performed extremely well." He adds that, "The system has lived up to our expectations."

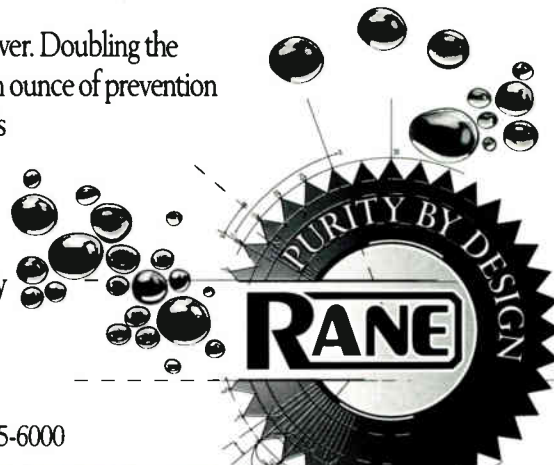
Colby explains that the system design is "based upon the efforts and knowledge of many audio professionals and engineers who have worked the hall throughout the years. All of that experience has culminated in a very good system — one we're very happy with." ■

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Networking the Conference Center

GRP Records Can Access From Any Office

BY JEFF ADER

GRP records recently celebrated its 10th anniversary as a record company and consolidated its operation into one building in New York City.

The company's recording studio, called "The Review Room," was an early installation (on the 12th floor) instituted well before the consolidation phase. The task faced by the contractor was to integrate the existing recording studio into a network that would link it to the new "media/conference center" and to the top executives' offices on the 10th floor. These key people in the company would then be able to access any of these rooms and utilize or monitor them.

Finally, there had to be a consistency of sound between the "media room," the "review room" and the private listening room in Larry Rosen's home. (Mr. Rosen is the "R" in GRP records. His partner is Dave Grusin. Together they have played on, engineered and/or produced countless albums and productions for the top jazz artists of the world.)

When the decision to consolidate was made they had to find the right person to handle these diverse but critically important rooms. There was really only one person for them who

could do this the right way, the man responsible for "The Review Room" and Larry Rosen's listening room, Harry Hirsch.

Harry Hirsch and his partner Jerome Bunke are the owners of Digital House, the leading CD and cassette production service. Their services include tape preparation, mastering, replication and duplication. Digital House is also regarded as the foremost de-

There had to be a consistency of sound between the "media room," the "review room" and the private listening room.

signer and printer of customized packages for the specific needs of CD and cassette releases. Their motto is "for those who hear the difference."

But this is only one area in which Harry shines. He is also a musician, an award winning audio engineer, recording studio owner, audio consultant and studio designer, a founding member of SPARS, the founder of the Center for the Media Arts School of Audio Arts and a member of the New York chapter of NARAS. He has been on the Grammy Nominating Committee for

Engineering for the past 10 years.

He maintains numerous contacts with the top people in the business. This enables him to put together the best team of people for such an important job as this.

THE TEAM

Harry has a real knack for finding the right people in a given situation. This proved to be the case for this project, too. He enlisted the talents of Greg Hanks for selection and installation of the computer network that interfaces the studio, conference room and executive offices.

Greg Hanks is the founder and president of New York Technical Support, Ltd. He specializes in the design, installation and repair of audio equipment and in this case: Computer Aided Services, Ergonomic Optimization; Mechanical, Enclosure and Panel design; Installation and wiring design; AutoCad operation.

He was previously the Chief Engineer at Wally Heider Recording Studios in Hollywood, Calif. and Technical Director at Audiotechniques Inc. in New York. He founded New York Technical Support, Ltd. in 1982.

Harry told Greg that he needed custom built remote controlled equipment that could be run from the conference table. The system that Greg proposed was a AMX touch-controlled panel

Jeff Ader is a writer and consultant in the sound and communications industry.

composed of: a Crestron Crestnet 2 Multipurpose Controller; an Autonet Audio-Video/Data Crosspoint Matrix; and a PC.

The Crestnet runs the Crosspoint controller, and the PC runs the Crest-

Greg designed the conference room to be a “server hub” with the work stations being the executives’ offices.

net through a serial interface.

The system has a threefold function:

- Boardroom presentations and international video teleconferencing.

RICHARD LAIRD PHOTOGRAPHY



The Review Room at GRP.


- A universal copy center (any format from any format).
- Accessibility from any executive’s office via remote.

Greg designed the conference room to be a “server hub” with the work stations being the executives’ offices. By utilizing the Crestron in this manner, it became destination oriented. There are also tie lines to the recording studio — “The Review Room.” Originally a relay system was proposed but the AMX/Crestron proved to be vastly superior. Within these pages, you can see a photo of the Conference Room, and a list of equipment provided by Mark Wexler, Senior Vice President of Marketing and Promotion at GRP.

The next person Harry enlisted for the “team” was Victor Schwartz, architect. Construction of the “Media/Conference Room” had some very specific problems to address including tie lines to four executive offices and the “Review Room” (recording studio). The first thing was its location in the center of the floor with offices all around it. This was solved in a large part by putting corridors and the reception area in the adjacent spaces. The next factor to consider was the sound isolation of the room itself, especially in relation to the floors above and below where other tenants have occupancy and would be concerned with unacceptable levels of sound.

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RICHARD LAIRD PHOTOGRAPHY

The GRP Conference Room.

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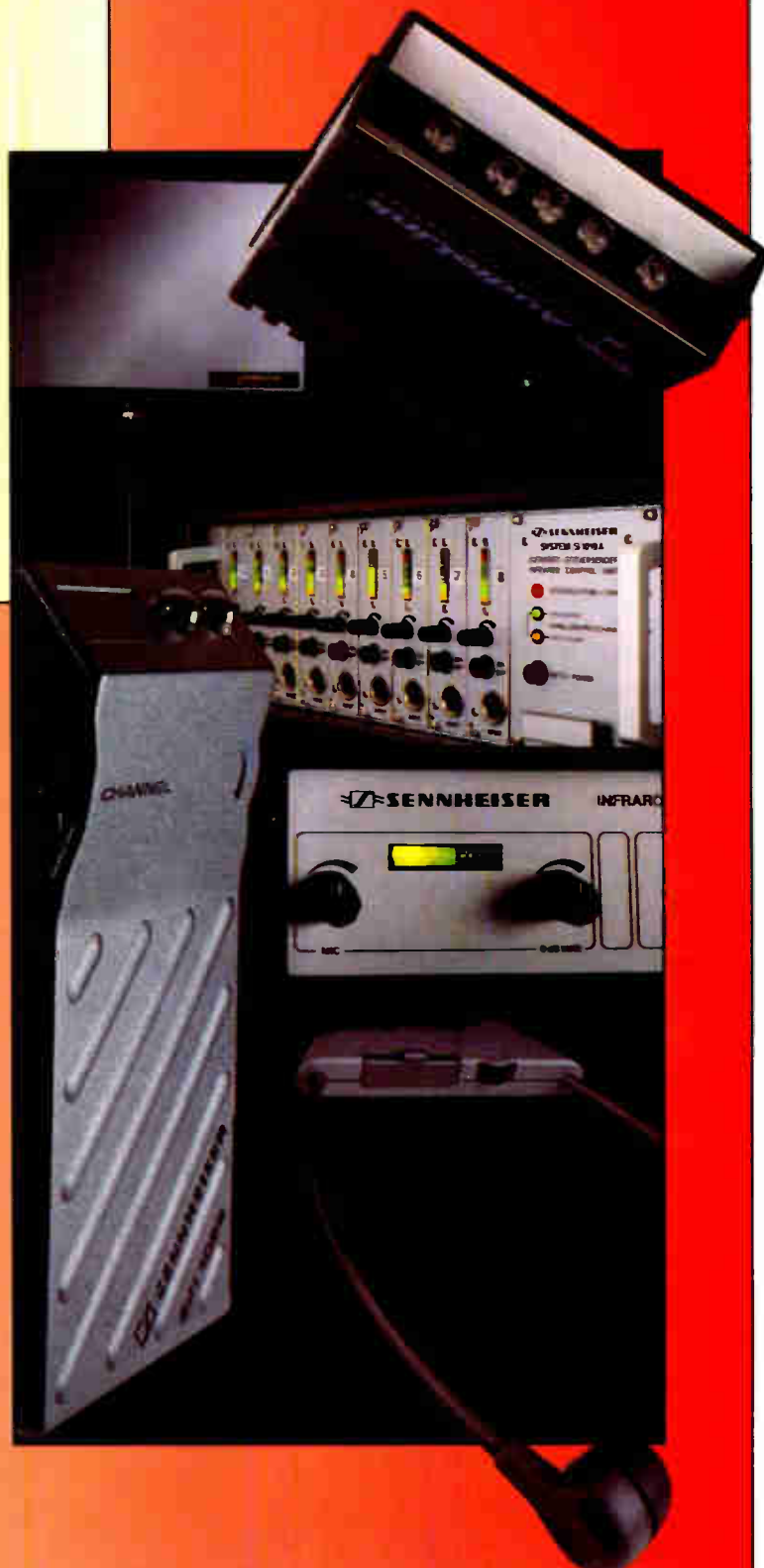
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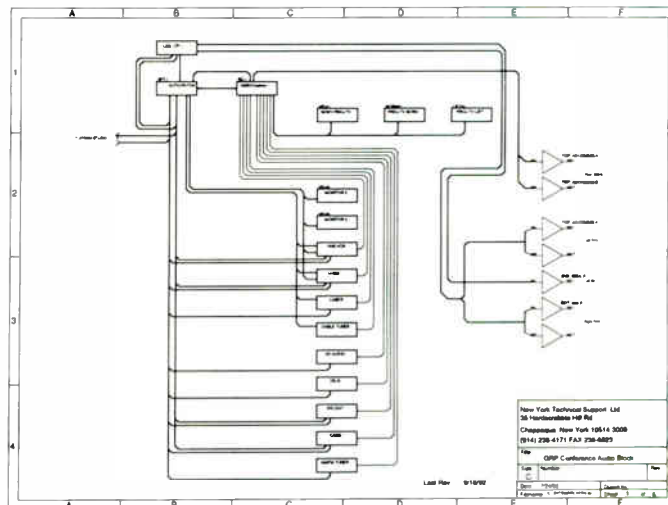
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A diagram of the destination oriented conference room.

The solution to this problem was using a combination of sheetrock (three layers), plywood (two layers) and sheets of fiberglass pucks to a thickness of five inches, to build up the floor.

This made for a very resilient floor, and venting it properly was of paramount importance. It had to "breathe" properly and flex. The finishing of it

The ceiling height is approximately 9½ feet and the wall on one side of the room acts as a diaphragm to absorb sound.

was just as important as its construction and composition.

The ceiling height is approximately 9½ feet and the wall on one side of the room acts as a diaphragm to absorb sound.

Victor Schwartz said, "It's great that Larry had the foresight to insist on getting someone to put the room together. He brought Harry in to assemble the specialists. They (GRP) wanted the inter-connectivity to run the equipment a certain way. They got what they wanted. Harry did the research until he found what was needed."

From an ensuing discussion with

Harry Hirsch and Larry Rosen we find the proliferation of High Definition TV and film projects that GRP is becoming involved with and the need for teleconferencing with Matsushita (Japan), which now owns GRP. One such project is a forthcoming Dave Grusin album entitled "A Homage to Duke" that will have a High Definition Video

"THE REVIEW ROOM" EQUIPMENT LIST

NEVE 8058 MK II Console
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OTARI MTR-10 4 Track
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2 SONY DMR-4000s
SONY PCM 2500 A/B DAT Machine
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AKG BX10 Spring Reverb
YAMAHA REV-7 Digital Reverb
UREI 813A Monitors
ACOUSTIC ENERGY AE-1 Near Field Monitors
McINTOSH MC-2500 Amplifier

shoot to complement it.

High standards are an integral part of GRP because of Larry's and Dave's own experience of making records, engineering, producing and playing as musicians. Hearing a production in the best possible environment and translating that quality to wherever it will be heard has always been their goal.

According to Larry Rosen, "The level of excellence that you are trying to achieve is always to that level of professional sound quality. I think that is the frame of reference. Certainly between Dave Grusin and myself, we've both always been able to achieve that in the time we've been working together. The question then becomes, 'How do you project that into other areas of your business?' So when it comes to something like my home where I would get something like

GRP CONFERENCE ROOM EQUIPMENT LIST

REMOTE CONTROL:	Crestron Crestnet II
DISTRIBUTION MATRIX:	Auto Patch
ENVIRONMENTAL PROCESSOR:	Lexicon CP-1
EQUALIZER:	Richler Scale Series 3 1/2, Octave EQ Analyzer with Subsonic Filter and Electronic Crossover
AMPLIFIERS:	2 Adcom 6FA-535L (1 right speakers) (1 center speakers) 2 Adcom 6FA-555 II (front speakers)
SPEAKERS:	Martin Logan "Quest" - (Front) B & W CWM8 - (Surround)
TELEVISION / MONITOR:	Sony "Super Bright" Projection Mitsubishi CS-35 FX1 NAD 13" Monitor
RECEIVER:	Luxman R117 Digital Synthesized AM / FM Receiver
DAT:	JVC XD Z110
CD:	Nakamichi CD2 Music Bank System JVC VS-611 Compact Disc Graphics Decoder
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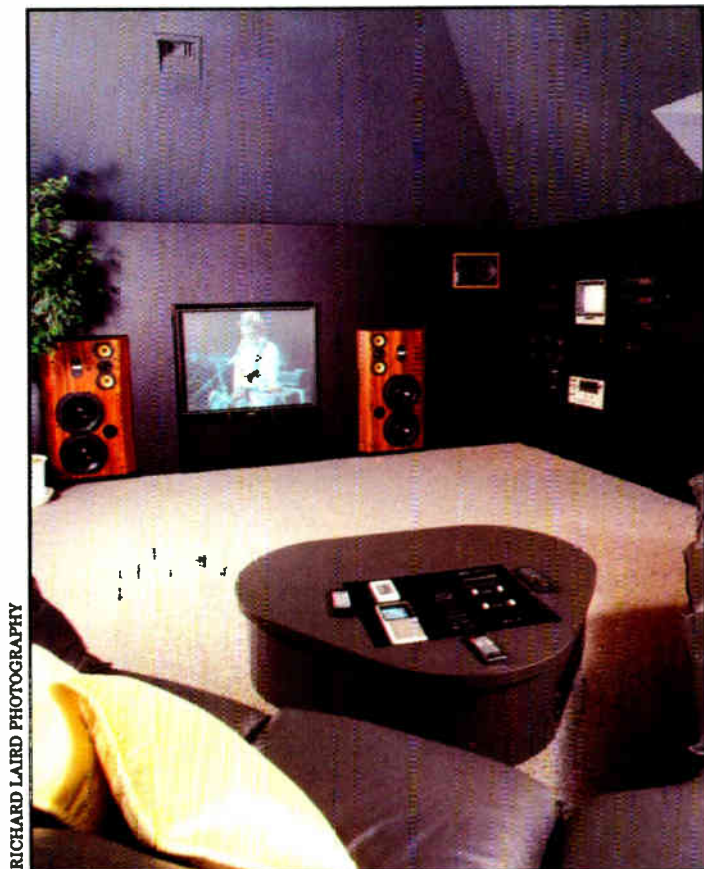
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RICHARD LAIRD PHOTOGRAPHY

Larry Rosen's listening room was isolated so that there was no vibration going to any common beam of his house.

DAT's of works in progress or whatever, I want to listen to it in the best possible environment. That's what led to the building of a listening room in my house: the best possible proportions that we could get with the technology that was available at that time. It encompassed all the formats available, in audio and video.

Putting a room together in my house had its own set of problems with my wanting to listen to product at 12 o'clock at night and having kids who are going to high school. This created another listening environment problem — not only the acoustics in the room itself but the isolation factor. We spent a lot of time working on this problem. Harry practically cut off one half of my house from the other. He built airlocks going into the room and completely isolated it so that there was no vibration going to any common beam. It all worked out great. It was really amazing as to the isolation."

"Harry was also involved in building the recording studio for GRP 10 years ago. We called it the "review room" because Dave and I wanted a room

that we could playback in; a place where we could do two-track edits after producing an album and spending

Harry practically cut off one half of my house from the other. He built airlocks going into the room and completely isolated it.

hours mixing it. We found ourselves doing lots of sequencing of songs. We were constantly running back and

forth from studios. Harry with an eye to the future said, "You're going to need a 24 track studio."

They not only expanded and built a 24 track studio. Under Harry's advice they ran tie lines from their executive offices and were able to record from their individual rooms into the studio at any time of day or night. Mike Landy, Chief Engineer and Technical Director of GRP Records, was kind enough to supply a list of equipment currently used in The Review Room.

From looking at these three rooms we get a glimpse of the evolution and growth of a record company and the underlying ideology that guides it. There is no doubt that Larry Rosen Dave Grusin, and Harry Hirsch have all had — in their particular endeavors — a commitment to excellence. ■



RICHARD LAIRD PHOTOGRAPHY

Larry Rosen's listening room control panel.

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Corporate Training is Flying

Training Personnel at American Airlines' Facility

BY RUSTY MACK and SAM STAGE

Every corporation faces the challenge of training its personnel. It is a time consuming and costly process. This is especially true in the airline industry. How, for example, can an airlines adequately prepare flight attendants before they take their first working flight? In addition to their regular service duties, flight attendants must be thoroughly versed in security precautions, safety procedures, and strict federal guidelines mandated by the Federal Aviation Administration.

To train airline employees such as flight attendants requires traditional classroom instruction as well as specific training in simulated working environments.

American Airlines, one of the world's largest carriers, met this training challenge head-on by establishing the American Airlines Learning Center. This facility, is a three-story, 150,000-square-foot classroom building designed to offer American employees a comprehensive training program that, to every extent possible, would simulate real-world working conditions.

Rusty Mack is Project Manager, Pelton Marsh Kinsella, and Sam Stage is Project Director, AVW Audio Visual, Inc.

The main entry of the American Airlines Learning Center, designed to resemble an airport concourse with working ticket counters, gate check-in desks, and the exterior of an American Airlines jet.



The Center, located at American's headquarters in Fort Worth, Texas, is the principal training center for all American Airlines personnel.

At the Learning Center, American trains a variety of personnel including flight attendants, ticket counter and gate personnel, baggage handlers, maintenance and security personnel. In addition, airline and travel agency personnel are trained in the use of the American Airlines Reservation System.

The main entry of the building features a two-story atrium resembling an airport concourse. There are ticket

counters, gate check-in desks — even the silver fuselage of an American Airlines jet.

The building includes a 300-seat A/V auditorium, six 80-seat tiered A/V classrooms, three 40-seat classrooms, six 20-seat A/V classrooms, and thirty 20-seat training classrooms, along with specialty areas such as Sabre aircraft interior simulators with working galleys; an airport gate mock-up area; and an operational airline ticket office with baggage conveyor and concourse area.

There are audiovisual systems

New Products



Presentation Switcher Series

The IN3800 series of Presentation Switchers is announced by INLINE. S-Video, Composite video, RGBH&V and audio are easily routed from up to 12 inputs to 3 or 4 outputs. Multiple video formats can be simultaneously routed through a Presentation Switcher, and some models offer previewing capabilities.

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IN3834

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IN3850

Inputs: 12 sets of 5 BNCs and balanced audio inputs on captive screw terminals
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IN3854

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The Presentation Switcher Series comes with a professional labeling kit for the front panel. All models are rack mountable in 3 rack units.

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INLINE, Inc. announced the expansion of the PATHFINDER series of matrix switchers. The series now has available models for routing in RGBS and Stereo audio, Y/C and Stereo audio, Composite Video and Stereo audio or Audio matrixing. The PATHFINDER series is available in various configurations of inputs and outputs within a total of 16 channels. Each channel can have up to 4 BNC connectors and 2 RCA connectors or all RCA connectors. The number of inputs and outputs can range from 2-in-14-out to 14-in-2-out or any combination in between. Mikhail Gershfeld, President of INLINE says, "Not only is the PATHFINDER flexible, it will replace all the switchers and DA's needed to create a true matrix the 'old way' thereby reducing the time and labor cost for the installation."

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throughout the Center's large classrooms, auditorium, and seven aircraft cabin simulators. A building-wide television distribution system has 85 outlets, including those in the 28 computer classrooms, labs, and staff offices. Background music and paging are provided by 305 ceiling speakers.

Audio and video systems throughout the building are controlled by AMX remote control systems. Pelton Marsh Kinsella, the A-V consultants for the project, and AVW Audio Visual, Inc. (Sam Stage, project director), the systems integrator, both of Dallas, worked closely with American to design a learning center that offers students and staff the latest in advanced training systems.

Of the large classrooms, 11 feature video projectors with standard video and computer inputs. Each classroom can access the building's TV distribution system which provides five channels of American Airlines instructional programming. Dual slide projectors and stereo sound systems round out the typical classroom. The equipment in each room is controlled by an AMX Axcet system with wired and wireless pushbutton panels.

Because of the extensive use of training tapes provided by the airline and the FAA, a central RF distribution center was designed and installed to provide five in-house local origination channels to all teaching areas. This allows the staff to play selected training tapes on specific channels at scheduled times. All classes have access to the tapes without having to duplicate and distribute them. It also allows the tapes to be played after class hours in selected locations to give students additional viewing times.

At this central control location, tie-lines allow the selection of two audio/video feeds from the aircraft simulators to be broadcast over the system. Students, especially those in orientation classes, may look in on a simulator class and get a glimpse of what



Lectern-mounted control panel and wireless controller in the Auditorium.

training lies ahead for them without disturbing the class.

Part of the central system are two remote control cameras located in the main concourse to allow viewing and tape recording of personnel training at a ticket counter. Microphones are located in the ceiling above the ticket counters for audio pickup. An AMX control panel allows the instructor to pan, tilt, zoom, and focus a camera and record an actual ticketing procedure. Later, an instructor can sit down and critique the student's performance. It also allows other students to watch a ticketing procedure in progress from any classroom in the building.

A background music and paging system is also located in this central control room, providing service for the entire facility. The system also acts as a training aid by allowing paging in the concourse area from the ticket office just like an airport concourse. To add a sense of realism, actual airport background noise is fed into the concourse background music system.

The biggest challenge in the A/V design for this facility was in developing systems that allow a large number of students to observe procedures in the tight confines of an aircraft interior. A typical class consists of approximately 60 students. Trying to show 60 people at once how to operate a cabin control panel or the coffee pot in the galley was a challenge.

The challenge was met by installing several Hitachi miniature and micro cameras on ceiling-mounted sliding tracks along the length of the aircraft cabin. The instructor can move the cameras into the exact position for viewing a particular demonstration.

Extensive research was conducted during actual training sessions to determine proper camera, camera loca-

tion, lens size, and number of cameras needed for each type of simulator.

Elmo miniature cameras move on tracks mounted inside the galley for close-ups of food preparation. Miniature LCD video monitors in the galleys aid the instructors in aiming the galley cameras.

The video is then sent through a video routing switcher and distributed

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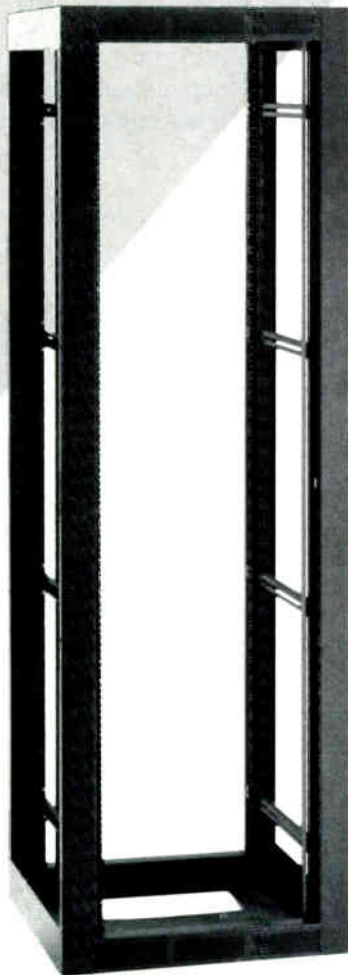
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Aircraft simulator with overhead monitors and ceiling-mounted camera on sliding track, controlled by AMX Axxess system.

to a series of television monitors located in the cabin area itself, as well as the adjoining observation area with seating for an additional 60 students. The instructor is free to move about the cabin using a wireless microphone and a wireless AMX control panel to operate the routing switcher, as well as video tape and a slide-to-video converter.

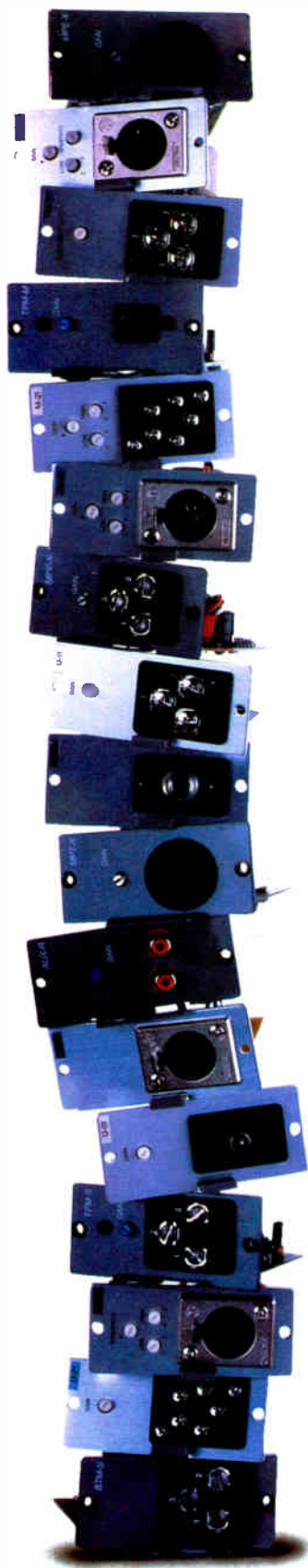
Large sections of seven different aircraft cabins were constructed to train flight attendants in their actual work environment. Everything from ovens and coffee makers to the flight attendants' control panels operate just as they do on the real aircraft. The DC-10 aircraft simulator features a working lower level galley which is an exact replica of the aircraft galley. The simulator has a working elevator which takes flight attendants from the upper galley at passenger level down to the lower level. Wireless microphones and remote cameras in the lower galley allow the instructors to teach students located in the passenger seats and viewing area above.

The simulator video systems are also connected to the building's TV distribution system, allowing classes throughout the building to observe aircraft training in progress. The cameras, matrix switchers, VCRs, TV tuners, slide-to-video transfer units and audio systems on the seven simulators are controlled by one AMX Axxess control system. Each simulator features a wired pushbutton panel at the instructor's lectern and an LCD-display wireless transmitter.

The Learning Center's auditorium is used for instructional purposes such as orientation classes and other follow-up training courses for working flight attendants. It is also used for graduation ceremonies. The auditorium's audio and video systems were designed with a podium panel identical to all the other classroom panels, allowing the instructors continuity from the auditorium to the classrooms. If more complex audio/visual presentations are needed, a touch panel with advanced features, as well as preview monitor and small audio mixer, are provided in a roll-around cart, allowing the operator to control the system from either the rear projection room or from a small control room at the rear of the auditorium.

Each new class has its orientation and graduation in the auditorium. The 10-foot x 20-foot rear projection screen displays IDTV video and computer graphics via a BarcoData 1100. Multi-projector slide presentations are also used frequently in the curriculum. The auditorium is complemented by stereo playback and voice reinforcement audio systems designed by Pelton Marsh Kinsella, the audio video consultants for the entire project.

With integrated control systems and the latest technology available for training, the instructional staff at American Airlines now have at their fingertips the power to monitor and control a full range of training equipment. The result is a cost-effective training facility providing students the real-world experience they need to perform their jobs. ■



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Rack Enclosures

Part Three: A Primer on the Enclosures Themselves

BY MIKE KLASCO

In Part one of this series, we explored power distribution, conditioning and voltage regulators for racks. Part two took a look at rack accessories like drawers, slides, security panels and the like. In Part three we have finally gotten around to a comprehensive primer on the rack enclosures themselves.

The rack is much more than a box. The right enclosure can mean the difference between success or failure in a growing number of installation applications. The enclosure is the most apparent aspect of your installation. To the casual passerby, or the facility manager who signed the purchase order, the quality of the equipment is not so easily judged as the exterior construction, fit, and finish of the racks. Stylish installations must be appropriate for the situation. Some vandal-prone environments might call for armored construction!

Still another non-generic rack feature we will survey in this report is RF shielding. Audio equipment installed in close proximity to high power radio transmitters, or even the system's own lighting controller and dimmers, can benefit from RF shielded racks. And I can think of many "disco" installations that would have survived a lot longer co-existing with the club's fog machines if the rack met NEMA 4X standards for dust/water tightness and corrosion resistance.

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

COSMETICS AND ERGONOMICS

Certain rack locations call for purely utilitarian solutions, while other locations present an opportunity for a showcase — including boardrooms, conference rooms, and high-exposure locations. The custom rack market has greatly expanded in the last few years, and for many rack suppliers, this is now their main business. Front doors can range from smoked Plexiglas with backlit lighting to security gates. Angled mounting, originally designed for viewing video monitors from a sitting position, has been expanded to

provide a Star Wars control style command center for applications ranging from FAA control towers, security monitoring systems, recording studios, broadcast stations, post-production, as well as many other types of sound and display systems. Perhaps the most popular suppliers to the audio and video industry of these enclosures are Atlas/Soundolier and Winsted.

Custom color matching the racks is an extra-cost option with many rack vendors, although almost all rack suppliers now offer many stock choices. Custom logos from your client's art-

Atlas/Soundolier cabinets include the System V cabinets, consoles, and desks that are available in a variety of modular and factory-assembled configurations.



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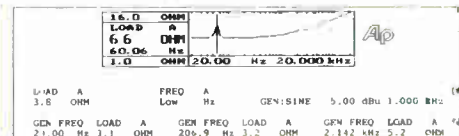
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work is an option from many vendors.

Aside from your installation looking pretty, there is the ergonomic consideration — is the equipment laid out in a well thought-out arrangement? Can everything be reached, and are the most used devices the most accessible? Will the operator (or operators) sit in front of the equipment, or will they be moving about? Will the layout work for someone five feet as well as six feet tall, for left handed people as well as for righties? Video Design Pro offers unique software to help resolve these problems.

CONSTRUCTION

Welded rack construction can eliminate the screws — improving strength, long term integrity, and keeping appearance clean, as well as reducing variability of quality and misalignments of on-site assembly. Sub-rail assemblies on the rear of the enclosure can help support heavy components from sagging over time, or prevent damage during shipping. The metal gauge is another factor, with 14 gauge withstanding greater abuse than lighter gauges. The metal itself is another consideration, with aluminum offering better heat transfer and greater corrosion resistance than steel, while steel provides better RF shielding, and greater strength.

Seismic hardened racks are offered by Hoffman, Equipto, and others. Hoffman offers a retrofit kit which provides bracing to the welds and other structural reinforcement. Critical communication equipment must withstand earthquakes, and seismic reinforcement is a good idea just if you prefer to load your racks at the shop and ship the system pre-wired to the job site.

Explosion proofing your rack may not be a common requirement, but you are likely to encounter this where volatile gases are present, such as in hospitals, certain industrial processing installations, and Mexican food diners. This is a bit out of the scope of this survey, but you can ask your enclosure

vendor if it supplies NFPA (National Fire Protection Association) rated enclosures, such as NFPA 496. These systems pump an inert gas at a controlled rate into the enclosures, preventing entry of volatile gases — and whenever there is a loss of pressure (from opening the rack, loss of power, etc.), your equipment is shut down.

EMI/RF

The availability of stock electromagnetically shielded cabinets and enclosures has been driven by the imposition of stricter federal regulations on both consumer and industrial equipment, military specifications, and the explosion of electronics equipment using switching power supplies and digital circuitry that requires shielded enclosures to meet these regulations.

Not too many sound contractors are ever going to be asked if their installation meets FCC A or B standards for RF radiation. These regulations relate to the type of RF field leaving the integrated case of a product. It's now limited to computers, but could be expanded to devices such as CD players, digital signal effects processors, or power amps with switching power supplies. Of course RF interference is not a new phenomenon. Certainly we all remember the most critical moments of a TV show being inadvertently jammed by interference by a neighbor's vacuum cleaner. A more recent consideration is the increasing concern that electro-magnetic fields may have an adverse effect on people in close proximity to equipment. Shielded rack enclosures would provide an extra layer of protection to workers from the fields within the enclosures.

But aside from meeting government regulations, specially shielded rack enclosures can be a Godsend in problem installations, by shielding your precious equipment from nasty nearby high-powered RF transmitters. I know of many jobs in midtown Manhattan

that are line-of-sight with the Empire State Building's transmission tower and that desperately needed this sort of protection. In one installation on the top floor of the Chrysler Building (about 75 floors high, less than ten blocks away from the Empire State Building), there was so much RF power present that florescent bulbs would light up — just sitting on a shelf!

If your job has known EMI (electromagnetic-interference) problems, then you might want to consider using RF shielded enclosures and balanced signal wiring from the start. If you run into problems during preliminary testing stages, you should consider going back to your clients to discuss upgrading to RF resistant enclosures.

EMI shielded enclosures range from extreme military-spec grade, such as Tempest, to the less stringent "FCC" class and the non-rated RF resistant enclosures. Most upscale rack manufacturers offer RF resistant enclosures, including Equipto, Optima, Zero, Emcor and others. Tempest grade enclosures are intended for the military and intelligence community, using copper mesh and beryllium, where the purpose is for data and signal protection and security. But most RF resistant racks are non-rated enclosures that have been treated with light spray-on coatings of carbon or nickel particles.

If you do not have the budget to replace the racks in an EMI infested installation, you might consider the do-

it-yourself approach using coatings, bonding, sealing and shielding formulations from Master Bond. Similar formulations can be found on plastic enclosures used for mixing boards and other audio equipment. If RF is still sneaking in on your signal lines, you may want to check out "The Silencer," TDK's clamp-on cable filters, an after-market product based on ferrite bead techniques, also supplied by TDK and others such as Ferronics. Ferrite beads have been used by circuit design engineers for many years, usually slipped over the leads of input stage components.

NEMA

Protection is not limited to RF getting in or out of enclosures, but also



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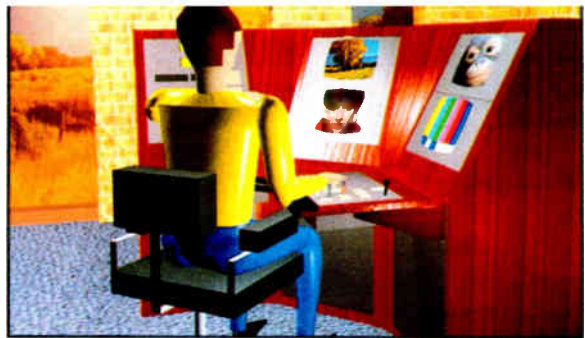
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dust, moisture and other contaminants. Perhaps you have seen NEMA ratings in the rack catalogs. These are from the National Electrical Manufacturers Association, which determines the level of protection an enclosure requires for various environments. Most basic NEMA-rated enclosures are NEMA 12, dust tight; providing protection against dust, dirt and splashing of liquids. These enclosures are gasketed at all openings. An interesting trend is non-metal NEMA enclosures — using fiberglass or engineering plastics.

Up from there is NEMA 4, dust tight and water tight, and finally NEMA 4x, adding corrosion resistance. These enclosures will withstand direct cleaning with a hose without leaking water inside. While most installations may not require NEMA rated enclosures, jobs in high humidity environments, basement installations, or outdoor installations will benefit from the extra level of protection.

Operator interface is still another factor, and in sound reinforcement installations that use a mixing board, you can only hope that the controls are of the sealed type, or at least the slide pots have dust protection. But for installations that can be locked up, with only a keyboard or control panel outside the rack, you may want to look for NEMA-rated controls. Membrane switch panels often will meet NEMA standards, but for some applications a more positive feel and full travel switch-type is needed, and the answer may simply be a sliding drawer containing the control panel.

NEMA ratings are very nice in protecting amplifiers from dust and corrosion, but your amplifiers will not last a day if they are frying in a sealed enclosure. While aluminum skinned enclosures have better heat transfer than steel, this is not enough if the enclosure is sealed. The typical audio and video rack system is not sealed, but instead is open-backed, using the fans

built into the equipment, or using an accessory fan cooling system. But sealed designs using stock heat pump cooling systems are available from Norlin and Rittal, and can cool the equipment inside the rack to five degrees of the ambient room temperature. A heat exchange system only transfers heat — without exchanging air (or dust) beyond the enclosure boundaries. This was briefly surveyed in Part Two of our Rack Series. Hoffman not only supplies NEMA 12 rated racks, but offers a line of bolt-on rack air conditioners that can take the inside of the rack to below outside ambient air temperature.

Aside from keeping the contaminants out of the enclosure, environmental issues have been regulating the rack suppliers in what they dump into the air while painting and finishing the enclosures during manufacture. Rack colors and finishes have been changing as the selection of paints, solvents, epoxies, primers and plating must now meet new and stringent environmental requirements.

DESIGN TOOLS FOR RACKS

Various design tools for designing and documenting racks have been available to the sound contractor over the years. The Bose Rack-Maker is an adjunct program to their popular Mod-eler program. Aside from rack layout, Rack-Maker is useful in creating equipment lists for cost estimating. VDP offers programs for rack design, as well as wire runs and other aspects of job documentation.

You may not want to spend your hard earned cash on rack software. So . . . is there rack software for free? A number of rack manufacturers offer freebee packages, and here is a quick run-down.

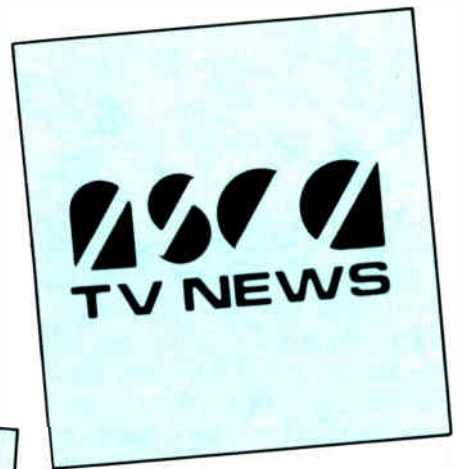
Equipto started the software giveaway about three years ago with a very limited package that essentially was a catalog on disc. Graphics were limited

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to a line drawing of a specific product. This program was useful for configuring and ordering, but not much more. Apparently Equipto liked the response to this marketing gimmick and last year introduced a far more ambitious effort. Three packages are now available, all more comprehensive than their first offering. Equipto offers

these packages for free, and your selection is based on how much disc space you have and how much you want to get involved in Equipto's program. On the fanciest level, the Equipto CAB-NET program takes up about 30 meg (!!) of disc space, includes over 13,500 items, complete descriptions, photos, technical draw-

ings, and pricing, all of which can be printed out. CAB-NET automatically checks your inventory levels and updates your catalog and software (by modem), to mention a few features.

The other two variations of this program are progressively less ambitious. Still other (free) support items available include a galvanic compatibility chart and shielding test results. Equipto has promised to have a new version of the program that actually sends gnomes to your shop (through the modem connection) to mount and wire the equipment into the racks while you sleep at night. But maybe they were just kidding me. If you have a modem, you can check out CAB-NET on Equipto's bulletin board at 708-897-7512.

Rittal offers the Rilay software program which works in conjunction with a CAD program to allow customers to configure an enclosure and select components with an automated drawing board. Customers can change important design features before the actual enclosure solution is purchased. You can design and assemble enclosure systems by retrieving images of this firm's components and applying their own design criteria to fit their specs. They can design an enclosure solution and add, modify, or delete components as needed. Rittal also offers Therm, another software program for calculating heating within the rack as well as selection of Rittal's rack cooling systems.

Hoffman provides (free) APX product selection software to help configure the enclosure. The APX system promises simplified specifying from design to ordering. Hoffman promises to assemble and ship your custom enclosure within five working days.

I hope you have had your fill of rack articles. I certainly am racked-out! For a complete listing of rack suppliers you should check the Sound & Communications Blue Book. ■

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NOTES FROM NAMM: A CONSULTANT'S VIEW OF THE WINTER MARKET

By Neil A. Shaw

The 1993 Winter NAMM Show was many things to different people. Neil Shaw traveled the aisles and reports here on what he personally found of interest. — Editor

The 1993 Winter National Association of Music Merchants (NAMM) International Music Market was held in California at the Anaheim Convention Center from January 15-18, 1993.

The Winter NAMM show was the largest in memory, with nearly 800 exhibitors and over 30,000 people attending. As the name of the sponsoring organization implies, this show is where buyers from retail music outlets come to see and buy. These buyers were exposed to everything from super noiseless cables to high-tech, environmentally friendly instruments. The show also provides a forum for training and education, by offering over 18 educational sessions.

Many manufacturers who also exhibit at the NSCA Expo and the AES Convention were at the Winter NAMM. In an effort to avoid overcrowding at both Infocomm and NAMM, these shows were held concurrently in different cities. [That's a joke. In the incomprehensible world of trade show scheduling, NAMM and Infocomm were incomprehensibly

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



Soundcraft's Spirit Folio Professional Portable Mic Mixer.

scheduled for the same days a continent apart. — Editor]

One draw for many of the attendees at NAMM is the number and variety of musicians and recording artists in attendance, either to see the show, or, more commonly, to sign autographs at one of their sponsors' booths, and at the various evening concerts promoted by many of the manufacturers. Among the artists engaged at manufacturer exhibit booths were Branford Marsalis, Chick Corea, Robben Ford, Rick Nielson of Cheap Trick, Tommy Lee and Vince Neil of Motley Crue and Alan White of Yes. Some of the concert events were Drums Along the Hilton, featuring Chester Thompson (Genesis), Russ McKinnon (Tower of

Power) "and many others"; Monster Bash II, featuring BB Chung King, "and many more"; Freight Train Jane, which features guitarist Tommy Bolan and his band, Freight Train Jane; the Gibson NAMM Jam, with the Red Rebel Devils, Regulators, Asphalt Ballet, Soul, Home Boys with Celebs, and Gypsy Carns.

A selective listing of products that interested this writer follows:

Carver displayed its product line of tuners, cassette decks, CD players and changers, and, of course, power amplifiers, that are all rack mount. Carver is looking to sell these products to sound contractors, which is a refreshing attitude compared to many suppliers of this type of equipment.

JBL/Soundcraft introduced the Spirit Folio Professional Portable Mic Mixer. This is a small, some would say notebook sized, mixer with list prices starting under \$500.

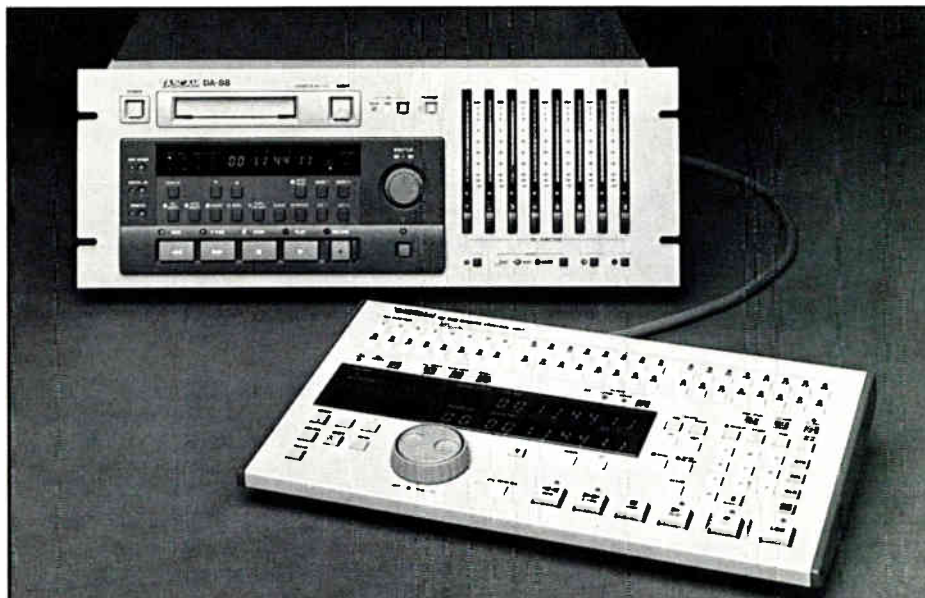
Sabine Musical Manufacturing Company introduced the FBX-1200 Feedback Exterminator. The unit automatically gets rid of acoustic feedback by finding the ringing frequency and moving a parametric dip to the location. It includes parametric EQ, shelving filters and a real-time analyzer for less than the cost of an RTA alone.

True Image Audio showed its Mac-Speakerz Speaker Design Toolbox. This loudspeaker design software for Macintosh computers allows one to design high performance loudspeaker systems using drivers from many manufacturers; and adding new drivers is easy.

Tascam introduced its DA-88 eight-track digital recorder, first mentioned during AES, which uses Hi-8mm tape cassettes. Also introduced was the SY-88 synchronization board, which allows time code located on a sub-code channel and does not require stripping and attendant loss of a track, so that up to 128 tracks can be synched.

BGW showed the Performance Series 2 Audio Power Amplifier. This professional amplifier offers the quality and features the industry expects from BGW, at a competitive price.

Sony had a strong presence at the



Tascam's DA-88 with the RC-848.

show. Products from the pro line included a CD player (rackmount with variable speed), DAT machines, wireless mics, and the unique NT "Scoopman" digital stereo micro recorder which uses postage stamp sized tape cassettes. In addition, a Mini-Disc display took up much of the booth.

Rane unveiled the CM 86 Commercial Mixer, a compact 8-in/6-out 19 inch rack mount design aimed at sound reinforcement applications in churches, clubs, schools and teleconferencing.

Audio-Technica showed the Engineered Sound line of miniature microphones for sound contractors. The line includes hanging microphones, single-goosenecks, double-goosenecks and boundary microphones. Also included with the line is a complete set of accessory mounting hardware.

QSC demonstrated its audio control system, Q'SControl, which is based on the Lone Wolf MediaLink network

technology. For clubs, this would be an ideal system that would allow instant switching from club-turnstile format to live band PA format. The MX, a line of power amplifiers, was also featured.

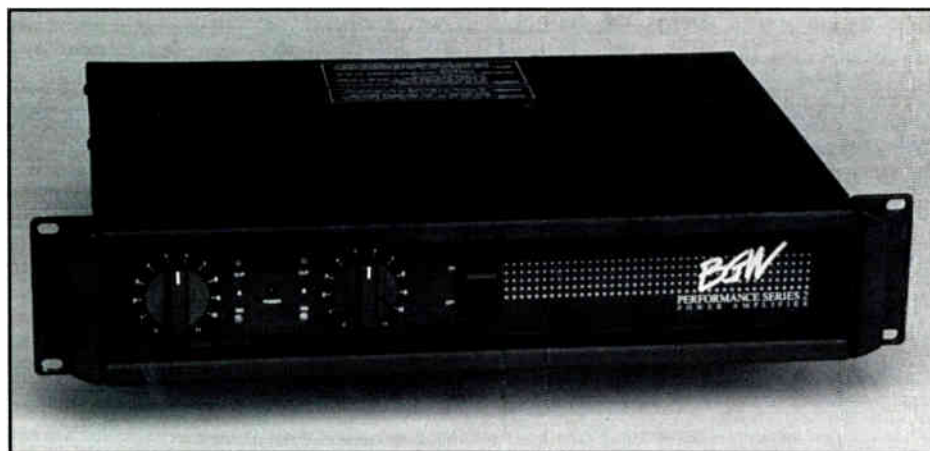
AKG introduced two new Tri-Power condenser microphones for live performances. The C5900 hand-held vocal microphone features a hypercardioid pattern, while the C5600 instrument microphone features a cardioid pattern.

Telex showed its ELM series sub-miniature electret lapel microphones. The ELM-22 omnidirectional pattern microphone and the ELM-33 cardioid pattern microphone are both 5.1 mm in diameter and 7.6 mm long. These are among the smallest cord-connected microphones available.

Karaoke was strong, with Nikkodo, JVC, Pioneer and others showing both hardware and software. CD+G (CD music plus graphics — still picture video or text) as well as CDs with full motion video were displayed, along with Laserdisc karaoke. Pioneer Laser Entertainment introduced several new audio products for Karaoke and non-Karaoke use.

There was heavy activity in DJ oriented CD players, with Stanton showing the CD-33, a more advanced version of their popular CD-22 double transport player. A joystick now replaces the joywheel, with pitch bend and instant start functions available at the touch of the control.

Denon introduced the DN-2200F, which is essentially their DN-2000F



BGW's Performance Series 2 audio power amplifier.



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AKG's Tri-Power series of condenser mics.

with a Karaoke Button which switches operation to CD+G. This mode plays the CD+G Karaoke CDs, which are the same size as an audio CD, and which contain digital graphics info (text for sing-a-long lyrics or still pictures) to Denon's DN-820 Karaoke Preamp for conversion for use with any TV monitor. Denon also introduced the DN-720R variable speed cassette deck which is rack mount, and a 200 CD changer.

Another entry into CD+G was Hosa. They showed a design that looked similar to the Denon unit with double

transport, separate control and transport. But this unit was only a hand built proto, not a production unit.

Gemini was showing its new (not yet in production) CD players also. One model was similar to the Numark 6020, using the now familiar format pioneered by Numark: double transport, and separate controller, both rackmount. The second model was more like a consumer CD player, but with the all-important added feature of slide control of variable speed.

Numark is back in action, showing both at the CES and NAMM shows.

Aside from their full line of mixers, amplifiers, and speakers, a new turntable was being previewed.

At Community, the Community "Dance Meister" subwoofer was introduced. This subwoofer is specially designed for mobile DJ use.

Samson, a popular supplier of wireless mics, has created a pro-audio division ("Samson Audio") and is promising a full product line of rack mount (PA) mixers and amplifiers.

Although pro audio and club equipment was spread out throughout the show, this year a separate lighting and sound exhibit area was set up, with Stanton, Lineartech, Renkus-Heinz, Digital Design and other pro-sound companies taking advantage of this special focus section. This approach has worked out well previously for the band and acoustical instrument companies. But many of the audio exhibitors decided to stick to their established booth locations, like Gemini, JBL, Tascam, E-V, and others.

All-in-all a good show, with many new products, technologies, and exhibitors, indicating, one hopes, a healthy year for our industry. ■



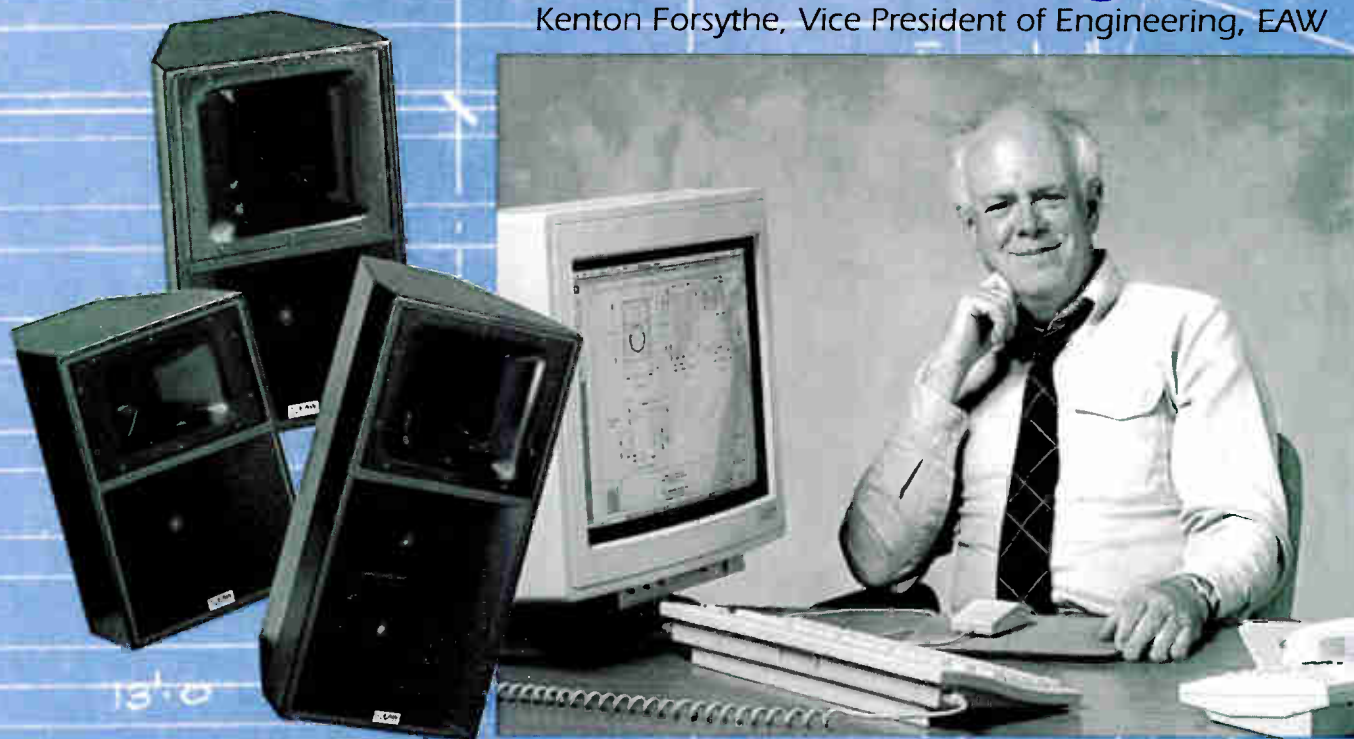
Audio-Technica's AT933R/ML shotgun mic from its Engineered Sound line.



The Community "Dance Meister" subwoofer.

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Back to Basics, Again

A Look At What's New With Magnetic Structures

BY MIKE KLASCO

Almost all commercial sound and pro audio speakers are comprised of a motor, cone assembly and frame. A coil of wire is located in a magnetic field within the motor, with a cone attached to the voice coil bobbin. A compliant suspension is used to control the movement of the cone. Both the magnetic system and the cone assembly are attached to the frame.

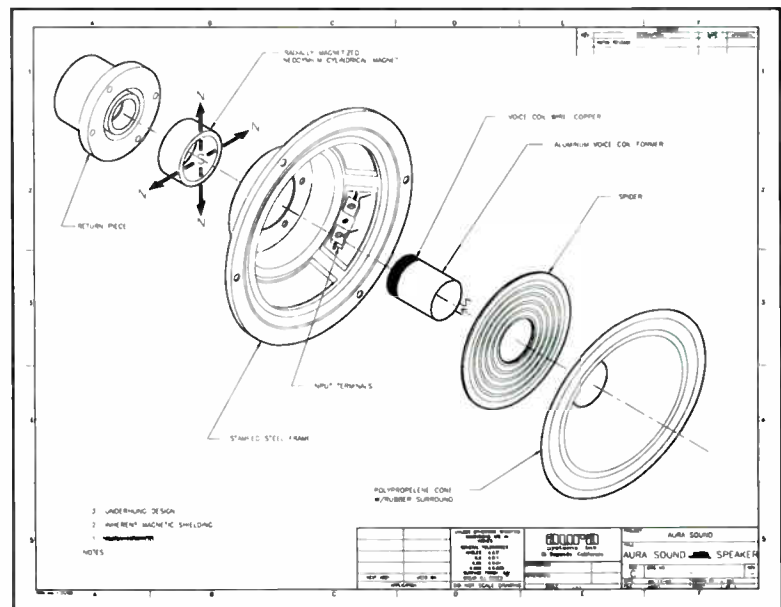
With the existing ferrite magnetic system, the motor assembly is composed of five basic parts. These include the backplate, pole piece, the ferrite ring magnet, top plate and voice coil. The pole piece and the top plate are concentric and in close proximity and form the magnetic gap for the voice coil. The backplate, top plate and pole piece are made from a highly permeable material (good magnetic flux conductor), such as low carbon steel, which forms the magnetic return circuit for the magnet. The magnet is typically made of a ceramic ferrite material that has been wet pressed into a ring shape. The magnetic circuit is completed at the gap, with a strong magnetic field in the air space between

the pole piece and the front plate.

The conventional ferrite ring is magnetized axially, with the opposing poles facing the top and bottom plates. The lines of force must be focused perpendicularly by the top plate to jump the gap, which results in wasteful fringing of the magnetic energy. The thickness of the top plate determines the depth of the magnetic field in the gap.

Before WWII, speakers were electromagnetic, using field coils to create

the magnetic field. The power supply of the radio would be used to create the electromagnetic field. Alnico permanent magnets took over after the war, but during the late 1960s the supply of Alnico became scarce, and eventually the speaker industry switched over to ferrites. Ferrites offered some benefits over Alnico, including less vulnerability to heat and shock, but also required a magnetic system that had higher mass to achieve equivalent performance. While speakers got



Aura Sound speaker.

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

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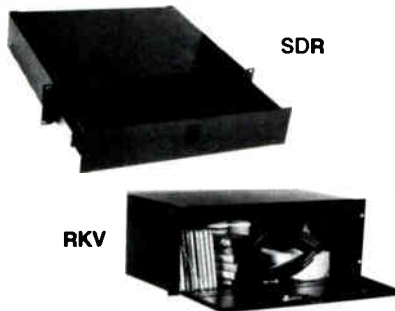
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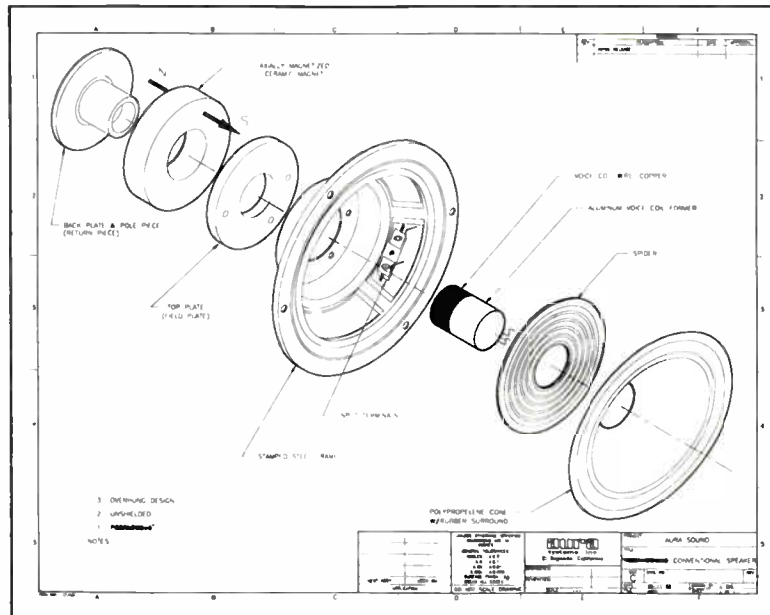


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Typical speaker.

heavier, they also were able to better dissipate the voice coil heat due to the heat sinking of the larger surface area of the magnetic system. Early ferrite magnets were dry pressed into their final form. A higher performance process, known as wet press, established itself. Although the tooling costs were higher for magnetic suppliers, wet pressed magnets offered higher energy for the same size and weight. Big suppliers for wet pressed ferrite magnets are General Magnetics, Sumitomo, TDK, and Hitachi.

Aside from the magnet, the magnetic system consists of a steel magnetic circuit. The typical speaker magnetic circuit consists of a donut or washer shaped top plate, a backplate, with the magnet ring sandwiched in between. The top plate and backplate are connected by a pole piece, except that the pole piece is separated by a tiny radial gap from the top plate. The magnetic force jumps this gap. Inside the gap is an intense magnetic field. This radial gap is a good place to locate the voice coil.

Sometimes the back plate and pole piece are cold-forged as a single piece. The process starts with a large diameter steel rod that is cut into slices. Each slice is placed in a knuckle press, with ratings of 700 tons to even 1,000 tons! The disc sliced from the rod is then bashed and by the sheer force of the press, the metal flows and a cold forged back plate/pole piece is formed. Other metal shaping processes sometimes used include pow-

der forming which compresses metal particles under high pressure, and cast ductile iron.

Top plate thickness, chamfering of the tips of the top plate, pole piece shape — such as under cutting the pole piece — will all have significant effects on excursion linearity, distortion, power handling, sensitivity.

The steel used for magnetic circuits must be soft — that is, have a low carbon content. Japan and Taiwan are big suppliers for low carbon magnetic circuit steel. The mottled gold finish you sometimes see is the cadmium-zinc plating, while the black finish is black zinc. Aside from looking better, the black offers better heat emissivity (the ability to dump heat).

NEW MAGNET MATERIALS AND MAGNETIC SYSTEMS

Neodymium was first introduced to audio a few years ago by E-V in a compression driver. Neodymium was originally developed by GM Delco, and their product is Magnequench, with other patents held by the Japanese giant Sumitomo. Still other fabrication and process patents are held by the Russian Atomic Energy Commission. Neodymium is a very potent magnetic material and promises lighter and more efficient speakers. Early formulations were extremely expensive and were too sensitive to temperature, but all aspects of this material have improved. This magnet is becoming very popular in auto sound tweeters, and recently JBL has introduced a pro

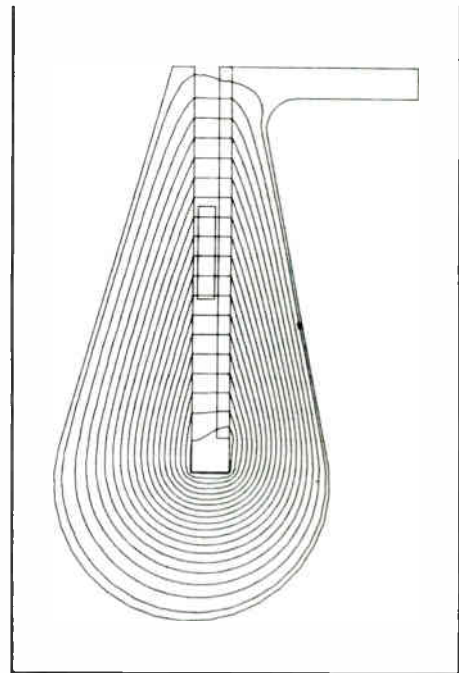
sound woofer with a Neodymium magnet.

Loudspeakers may be in for some big electromagnetic changes, if Aura Systems, a U.S. west coast aerospace technology company, has its way. Aura's main business is electromagnetic linear actuators, which can develop over a half ton of force with strokes almost a meter long! These transducers are used for proportional valve controls, precision positioning, shaker table actuation, and active vibration cancellation. The actuators offer a combination of linearity, long stroke, wide bandwidth and cost effectiveness that are the product of a clever and unique magnetic circuit. Aura is now making its magnetic structure available to speaker manufacturers. What does this mean to the pro sound industry?

Aura Systems has patents pending

on a magnetic structure that has fewer parts, less weight, less distortion, and more energy than ordinary magnetic systems, but also has many times less stray magnetic field than even a shielded speaker.

The Aura geometry is simple and elegant. The backplate is the magnetic circuit return structure with a center pole piece. As with an ordinary magnetic circuit, the magnetic return system should be highly permeable. Unlike conventional magnetic systems, this is the entire return structure, with a tubular Neodymium magnet acting as both the magnet and the top plate. The magnetic poles in the Aura geometry are radial (at right angles to conventional axially polarized speaker magnets) so the magnetic energy flows from the pole piece through the concentric tubular Neodymium magnet, jumps the



Aura Sound 18-inch woofer/four-inch v.c. cross section showing flux lines. (underhung)

gap, and follows the pot structure back to the pole piece. Some significant benefits accrue from this geometry, including extreme linearity in conjunction with long stroke, an insignificant stray flux field, improved heat transfer from the voice coil, and higher sensitivity. Because of the linearity of the magnetic system, accuracy of closed loop servo speakers can be achieved.

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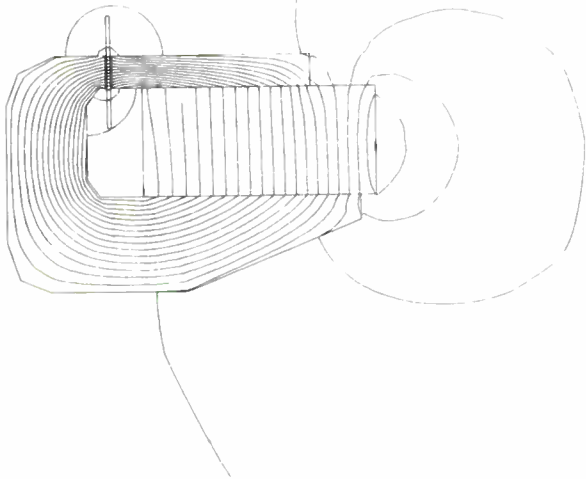


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Typical 18-inch woofer/four-inch v.c. cross section showing flux lines. (overhung)

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In a conventional speaker, up to 70 percent of the magnetic force is wasted. This stray flux not only is unproductive, but results in non-linearities in the speaker's response and interferes with color CRTs. The Aura geometry is inherently focused, so no electromagnetic shielding is required. The flux path is closed internally, which results in improved linearity and virtually no external electromagnetic interference leakage. This is important for home theater projection television systems, but even more critical for direct view large screen units with 30-inch and larger CRTs whose convergence is hypersensitive to stray flux.

Another benefit of this focus gap is higher efficiency because a much larger percentage of the magnetic flux is used to drive the voice coil, instead of being wasted as in conventional speaker drivers. The radially polarized magnets eliminate flux gradients along the length of the coil, resulting in superior linearity (lower distortion). The motor system has fewer parts so manufacturing is simplified. The mass of Neodymium needed with this geometry replaces over ten times the amount of ferrite in a conventional motor system. Actual cost of the new magnetic circuit is about the same as an equivalent shielded ferrite magnetic system, but the Aura geometry has higher efficiency, less distortion, and longer excursion capability. In addition, the Aura magnetic geometry is about 30 percent lighter than conventionally shielded magnetic structures.

While the depth of the magnetic gap is determined by the top plate thickness in existing magnetic systems, in the Aura geometry the gap depth is the height of the magnet. Extending the gap depth does not significantly degrade the flux density; all that is required is to extend the height dimension of the magnet. The force in the gap is extremely constant, which eliminates a number of critical, but rarely considered, non-linearities.

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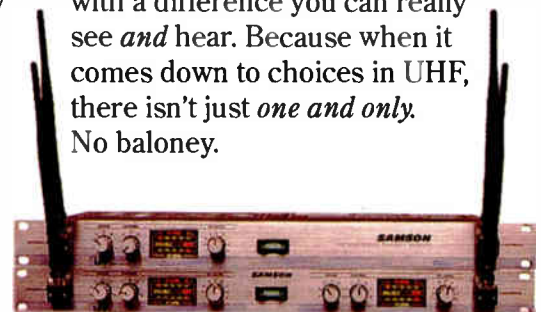
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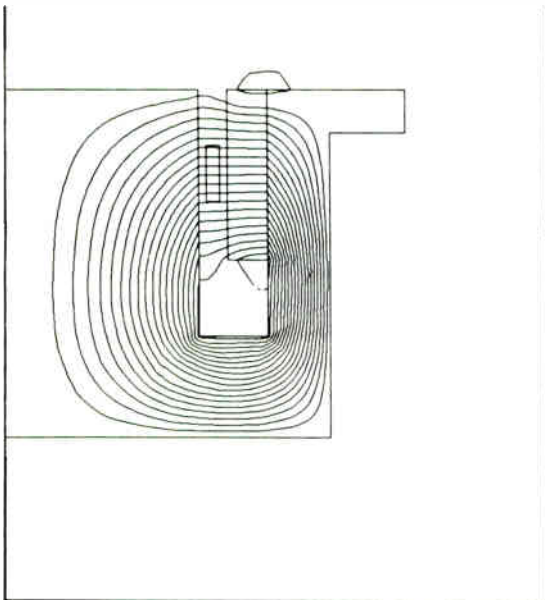
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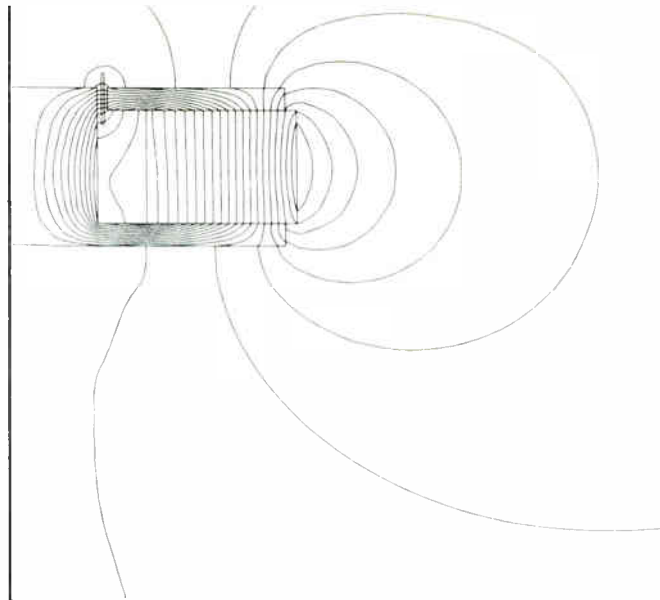
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Aura Sound ceiling speaker cross section showing flux. (underhung)



Typical ceiling speaker cross section showing flux. (overhung)

speaker engineers attempt to so accurately measure are not constant with changes in stroke position in the typical driver. As the coil moves out of the zero-crossing position (the "at rest" location), the Q and many other parameters all begin to significantly shift. This is the cause of certain dynamically modulated non-linearities. The Aura geometry offers far greater stability of the speaker's parameters

throughout a much wider range of excursion and an inherently more linear transfer function.

An additional benefit of the geometry of this magnetic circuit is that a very wide gap has very little drop in the flux density. So not only can long coils be accommodated in an underhung configuration, but the designer has the option of 4 layer, 8 layer, larger gauge wire, or high aspect ratio flat

wire, without the severe flux density loss penalty of ordinary magnetic systems. All this adds up to is previously unattainable BL products (motor strength), lower power compression, enhanced bass response, higher sensitivity and power handling.

The increased mass of the higher power handling and longer excursion voice coils can be compensated for with low mass round copper clad alu-

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minum wire and flat edge-wound flat wire. To counteract the higher inductance of more turns of wire, copper caps and other eddy current canceling techniques take on new importance. Ferrofluids provide another option for getting more out of Aura's longer excursion capacity as its levitation effect is an important contribution to maintain stable coil centering with long travel operation.

The lighter Aura speaker motor can be fitted into existing frames, or the gauge of the frame can be reduced. As the actual motor force is significantly increased over conventional structures, the speaker designer might want to keep the frame strength the same. Using a mid-priced ceiling speaker as an example, a 10 ounce ferrite ring magnet was replaced with an Aura geometry structure with a .67 ounce Neodymium magnet, with price and efficiency matched. A comparison of a few parameters follows:

	Aura Structure	Conventional Structure
BL (motor strength)	4.0 T-m	3.8 T-m
Xmax (excursion)	3.5 mm	2.0 mm
l gap (magnetic gap depth)	0.071 inches	0.055 inches

The Aura structure speaker has almost double the excursion capacity of the conventional speaker, and this can be used to downsize the cone area from an 8 inch to 6 inch to reduce cost and widen coverage area yet maintain bass response. With the increasing popularity of higher quality 4 inch full range ceiling speakers for foreground music systems, the Aura technology can help put some bass into these designs.

Complete motor systems are available from Aura using low carbon steel return structures, pre-assembled and magnetically charged. To further support its licensees Aura Systems provides design services for conversion of transducers to the new geometry. The most sophisticated magnetic circuit analysis modeling programs are used to optimize efficient use of magnet and steel as well as per-

formance characteristics.

At the Winter Consumer Electronics Show, Parasound demonstrated an 18 inch subwoofer with 2 inch linear excursion. Also, at the ALMA meeting (American Loudspeaker Manufacturers Association), held at the CES, Aura exhibited a line of high performance miniature speakers it is producing for Daewoo's large screen direct

view televisions. Other products under development at Aura for its customers include a magnetic structure for a high output compression driver; magnetic structures for 1-inch, 1.5-inch and 2.5-inch voice coil diameter woofers. Although still in the early stages of introduction, the signs are that we are seeing a new chapter opening in speaker engineering. ■

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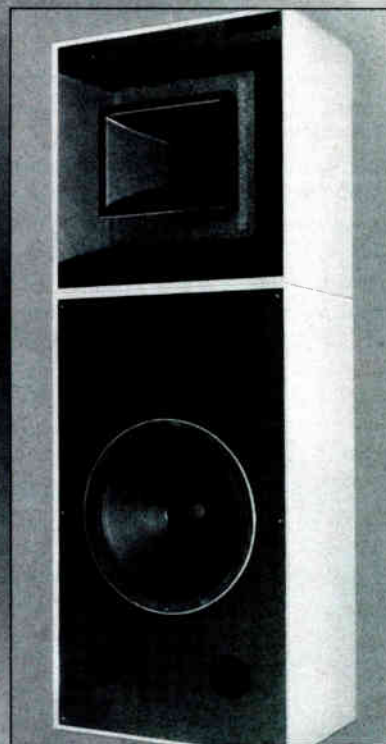
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NEWS FROM AROUND THE INDUSTRY

Video for the Head; Fox Gets Crown

Panasonic Helmet-Cam for Law

Panasonic Broadcast & Television Systems Company has introduced Helmet-Cam, a tactical video camera system designed for law enforcement applications.

The Helmet-Cam consists of the Panasonic GP-KS202 1/3 inch CCD remote-head color microcamera, the Panasonic AG-505 5-inch color monitor/Hi-Fi VCR, the DSR-900CT video receiver and DSX-910PS video transmitter from Dell-Star Technologies Inc., a riot helmet and a threat-level IIIA bullet-proof vest with a compartment for the AG-505.

The system is powered by an Anton Bauer battery belt, and the vest, built by Top-Line Body Armor, was designed by Innovative Enforcement Products.

The GP-KS202 microcamera is attached to the riot helmet without modifications. The video from the GP-KS202 travels through cable down the back of the vest to the VCR and/or video transmitter, which can transmit the composite video signal to a video receiver, located in a surveillance vehicle or at the base station.



Helmet-Cam.

Crown Amps at 20th Century Fox Theater

Crown Macro-Reference amplifiers are being used to power the theater sound system in the Daryl F. Zanuck screening theater at the 20th Century Fox Studios in Hollywood. The 200,000-square-foot theater is used for film soundtrack mixing as well as screening of 20th Century Fox films. Twentieth Century Fox stage engineer Jay Palmer initially used a Macro-Reference to power three custom low frequency enclosures that each house two 18-inch TAD subwoofers. Eventually, three additional Macro-Reference amps were added to power left, center and right speaker clusters, made up of JBL speakers and TAD high-frequency components.

Group One to Distribute Focusrite in U.S.

Group One, Ltd, Farmingdale, New York, has been appointed as the United States distributor for Focusrite, the British manufacturer of recording consoles and signal processing equipment. Group One will initially distribute three recently introduced Focusrite products: the Red 1 4-channel microphone pre-amplifier, the Red 2 two-channel equalizer, and the ISA 215 two-channel microphone pre-amplifier and equalizer. Group One will focus on developing a dealer network by providing a U.S.-based inventory, sales, and service facility. Group One will also implement a marketing program in the U.S. for both the products and the company. Focusrite products will be distributed to pro audio dealers that service the recording, post-production and broadcast markets.

Baker Joins BGW

Mark Baker has recently joined the technical and marketing staff at BGW Systems, Inc. Baker, an electronics engineer, was previously with Compaq Computer. He will head the Industrial Computer

Division, and manage the development of BGW's computer control amplifier products.

Altec Lansing Installed in Three Arenas

Altec Lansing has manufactured sound equipment recently installed in three arenas: Utah Jazz Arena/Delta Center in Salt Lake City, Utah; the University of Dayton Arena, Ohio; and Alumni Hall at the U.S. Naval Academy in Annapolis, Maryland.

The University of Dayton Arena upgraded its sound system and installed 19 299-16A drivers; eight MR64B, four MR42A and three MR94B horns; eight 34645 throats and four 34542YY dual throats; four 817B and 12 816B bass cabinets; four 9444A/SA and six 9666A amplifiers; and 20 515-8GHP.

The Alumni Hall at the Naval Academy includes 36 Altec 409-E 8-inch coaxial ceiling loudspeakers; 14 Altec 9444SA power amplifiers, and Altec 1753A equalizers and Altec 1631A active crossovers. A variety of control and signal processing equipment is used in two control rooms, including Altec power amplifiers and equalizers.

The central cluster in the Utah Jazz Arena/Delta Center uses Altec 816 and 515 drivers.

BSS Varicurve at Universal Amphitheater

Southern California's Universal Amphitheater recently upgrades its sound system to include a pair of BSS FCS-926 digitally controlled parametric equalizers. The amphitheater upgraded its sound system from a 3-way to a 4-way system, designed to eliminate the need of its users to supplement the house equipment.

The amphitheater may have as many as 150 different performances each year, each with its own sound engineers. With many individual performances, the BSS FCS-926's flexibility made it a

logical choice. "With the Varicurve 926 I'm able to store my house curves and provide visiting engineers the option of storing their own setups for future use as well," says Jeff Cox, house engineer, who was contracted by the amphitheater through Maryland Sound. Engineers who pass through the hall regularly can be assigned a memory slot on the unit and recall it immediately.



Turbosound Flashlight at the University of Wisconsin.

University of Wisconsin Installs Turbosound

The new Turbosound Flashlight system was recently installed at Camp Randall Stadium on the University of Wisconsin campus in Madison. It will be used as a public address system for announcements and statistics during the school's Big Ten Conference football games.

The voice reinforcement system consists of 11 Turbosound Flashlights TFS-780H speaker cabinets, housed in two recessed enclosures. The system is controlled by the Turbosound LMS-780 Loudspeaker Management System. Eight JBL Model 6290 power amplifiers, previously owned by the University, are used to drive the speakers.

Altec Lansing Targets International Sound Market

Altec recently announced eight installations around the globe featuring Altec equipment. Sanrio

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World Radio History

Puroland, Tokyo, Japan; Tsawwassen Ferry Terminal, Vancouver, Canada; Athens Concert Hall, Greece; Mexico City International Airport, Mexico; The Stadium in Stade, Germany; Wembley Stadium, Royal Lancaster Hotel and Royal Festival Hall, all in London, England.

In Sanrio Puroland, a \$630 million indoor theme park, Altec 920 loudspeakers are used to provide overhead background music and sound effects in the Discovery Theater and in the Fairyland Restaurant Theater.

The Tsawwassen Ferry Terminal installed Altec Vari-Intense VIR and VIT horn systems.

In London, the Royal Lancaster Hotel Ballroom sound systems include over 200 ceiling loudspeakers, eight Anniversary Series power amplifiers, and a separate system for fire evacuation using mixing/power amplifiers.

Wembley Stadium installed a multi-purpose sound system with several Altec components, including 409 ceiling loudspeakers, 299 compression drivers, 1753 $\frac{1}{3}$ octave equalizers, and 32 1631A single-channel crossovers. Mantaray horns in the facility include 27 MR64B constant directivity horns, nine MR42B's, eight MR11542's, 30 MR11594A's, and a MR94B horn.

The Stadium in Stade uses Altec customized enclosures consisting of two 405-8H 4-inch loudspeakers.

In the Athens main concert hall, Altec 9444A power amplifiers provide 70V-line feeds to the auditorium loudspeaker circuits. Other components include four Altec MR594 horns and bass units and Altec 8-inch coaxial ceiling loudspeakers.

EMI Signs Contract With Nikkodo

EMI Music Publishing Worldwide, New York, has concluded a \$10 million deal with karaoke software manufacturer Nikkodo

U.S.A., Inc. The agreement allows top-40s tunes from the EMI music library to be made available on karaoke laser disc, CDG and VHS formats.

As a result of the EMI/Nikkodo contract, music and lyrics from top-40 bands including, Technotronic, Queen, Bon Jovi, Simply Red, C+C Music Factory, Nirvana, Wilson Phillips, and New Kids on the Block will be available on karaoke laser disc, CDG, and VHS formats. Production of video and music tracks for the initial 280 song titles will be completed at EMI subsidiaries throughout the U.S. and Canada. Manufacturing of the laser discs and CDG formats will be done by Nikkodo U.S.A., Inc. Nikkodo will market the finished karaoke products worldwide. Initial shipping of product is scheduled for Spring/Summer 1993.



(L to R) Robert Flax, executive vice president of EMI Music Publishing Worldwide, Roger Kurobe, president and CEO of Nikkodo U.S.A., Inc., and Martin Bandier, chairman and CEO of EMI Music Publishing Worldwide.

IDI Symposium of Imagemakers Techniques

Members of the film and entertainment industry converged on the New Image Devices 10,000-square-foot facility to listen to international experts and industry representatives discuss new technology and techniques in Imagemaking. The symposium,

at the end of 1992, was created by the New Image Devices as an 'educational gift' for the production industry in South Florida.

The two-day symposium featured industry names such as Bill Hansard, Garrett Brown, David Samuelson and David Earl and technical representatives from manufacturers like Sony, Arriflex, Cartoni Tripods, Chapman and Power Vest.

Electro-Voice Systems Installations

Electro-Voice equipment has recently been used on several sound system installations throughout North America.

E-V HP9040 horns with DH1A drivers were installed as part of 14 clusters in Boston's Logan International Airport. In addition, 21 E-V S-40T compact speakers are used in the terminal's baggage claim area.



Jerry Holway on the Skyman at the New Images Devices International's expanded facility in Miami.

Teknik DN360 equalizers, two DN410 parametric equalizers and a DN500 dual compressor.

At Webster Hall, a three-level club in New York City, Sound Dymax installed: on the top floor, 10 MTL-4A systems, four MTH-2/94A's, and several clusters containing E-V TL606DW low-frequency systems; on the middle level, four clusters with TL606DW systems, HP940 horns with DH1A drivers, and HPT-94 horns with DH-3 drivers; and in the basement level, four MTL-4A systems and four E-V S-1503ER 3-way systems.

The Canadian Broadcasting Company is using E-V Delta-Max speaker systems for the in-house sound system in a new television broadcast studio in Toronto. A total of 22 Delta-Max DML-1122A systems are suspended from a lighting grid located above the studio audience. Four DML-2181A systems for low-frequency reinforcement are placed above the grid and out of sight lines.

Six E-V MH6040 Manifold Technology horn-and-driver systems were recently installed at Tiger Stadium on the campus of Louisiana State University in Baton Rouge.

Crown Com-Tech, Macro-Tech and Computer Control Systems

Crown Com-Tech 400 amplifiers were recently installed as part

Sound Dymax, Inc., Mississauga, Ontario, recently installed E-V speaker systems and components at two nightclubs. The World, located in Mississauga near the Toronto International Airport, features 10 E-V MTL-4 systems, eight MTH-2/94A systems and eight TL15-2's. Sound Dymax also installed two E V S-1202ER speakers, three Klark-

of a new audio system at Chicago's Civic Opera House. A total of eight Bose 402 speakers and four Bose Acoustic Wave Cannon subwoofers were used, completely hidden from view.

A total of 12 Crown Macro-Tech 1200 amplifiers were installed to power a new audio system at Boston Symphony Hall. The Crown MA-1200s power a variety of Meyer Sound Labs processed speaker systems. Seven Meyer UPA-1B speakers make up the central cluster, which can be moved depending upon the desired room configuration.

8th Day Sound Systems, Inc., an international touring sound company based in Cleveland, Ohio, is using three Crown IQ computer control systems for major tours. They use IQ to con-

trol a combination of Crown Macro-Tech 3600VZ, MA-2400 and MA-1200 amplifiers that power customized Turbosound TMS-3 speaker systems. IQ allows 8th Day to control an entire system, through the Macro-Tech amps equipped with P.I.P.-IQ interface modules, from a Macintosh computer located in the front-of-house mix position.

REP NEWS

Crown Names Reps

Pacific Star Enterprises, Honolulu, has been named the Crown sales representative for the state of Hawaii. Crown has also named Starin Marketing, Inc., Chesterton, Indiana, the sales representative firm for Northern Illinois and Eastern Wisconsin

territories. Both firms will be distributing Crowns full line of amplifiers, microphones and computer control products.

Hughes Designates Two Sales Organizations

Hughes Audio Intelligibility Systems, Rancho Santa Margarita, CA, has signed West-Tech Marketing of Culver City, CA, as a manufacturers' representative to cover the Southern California, San Diego and Southern Nevada marketplace. Hughes has also signed an agreement with GerrAudio Distribution of Toronto naming that company the sales representative for Hughes throughout Canada. "These two sales resources will greatly enhance the presence of our Voice Intelligibility Processors through-

out two very significant geographic areas," says HAIS sales manager Mike Schleider.

TOA Names Rep of the Year

At a recent sales award ceremony hosted by TOA, St. Louis, Missouri-based Rancilio Associates received honors for posting sales figures 357% above established quotas. North Coast Marketing, Erie, Pennsylvania, was named most improved rep firm. The "quota buster" distinction was handed to Perigrine Southwest of Houston, Texas for exceeding their quota by 169%. Richard Krochmal, TOA national sales manager, issued the three awards based upon MI sales of TOA's line of professional music and entertainment products.

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."

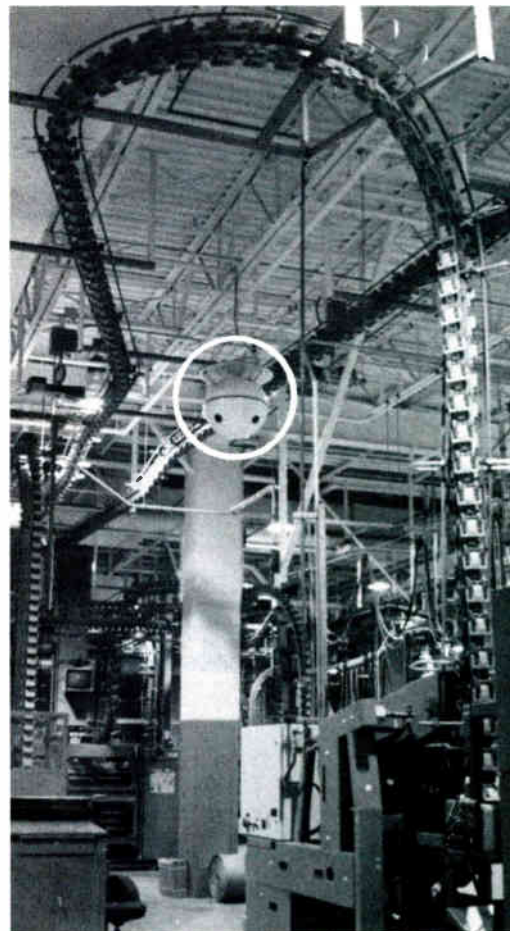
The installer, Bernie Lory has also put two Soundsphere #2212-2 speakers in the stacker area to improve the efficiency of that portion of the operation. He is planning to use more Soundsphere loudspeakers at this site to solve other operational problems.

Write or call direct for further information.

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Sharp Video, dbx Preamp

From Sharp Minds

Sharp Electronics Corporation has introduced a line of professional videocassette recorders and a line of professional color video monitor/receivers.

The XA-410, XA-405 and XA-400 model VHS VCRs feature an improved mid-drive chassis system with features. These models' capabilities include HQ Picture Enhancement, BNC-Type video in-out connectors, tamper proof function, remote in-out pause jacks that allow the pause command to be looped through from VCR to VCR for duplicator use, 3-wire AC power and full auto play function. In addition, the units feature automatic head cleaning, auto tracking control, OSD with menu guidance, and 181-channel direct cable PLL quartz synthe-

sized tuner. The new line ranges in price from \$420 to \$450.

Two professional color monitor/receivers are also available from Sharp. The 20-inch XM02010 features a tinted, Linytron Plus picture tube with flat and square design for minimum reflective glare. Several audio and video input/output jacks (including S-Video) allow for direct connection with a variety of external equipment. The unit boasts a multi-function TV/VCR remote control. The XM-2010 also has a built-in MTS decoder, front firing speakers, on-screen display and 181-channel, direct cable tuner. The 20-inch model has 400-line resolution.

The 27-inch model XM-2710 has all the features of the XM-2010 plus 650-line horizontal resolution.

Circle 1 on Reader Response Card

JVC DAT Recorder

The JVC XD-P1-Pro DAT recorder's design allows it to be used as either a snap-on A to D converter or the MU-Z1 digital output microphone module. Full time is supported and absolute time is written on all recordings.

Applications for the unit can be music mastering, news gathering, interviews, press conferences, sampling for sound effects and live recording. The package includes the main unit, battery module and charger, MU-Z1 digital output microphone, windscreen, microphone pistol grip with table stand adaptor, analog to digital module, digital mic cable, dc cord, mini stereo to two RCA cables, wired re-

preamp stages in a mixer.

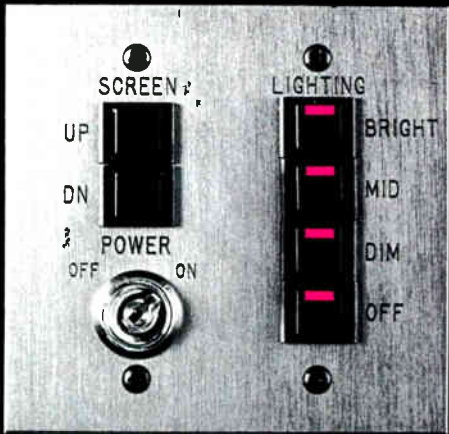
The 760X features gain trim, polarity reverse, 48V phantom power and overload indication. The 1-rack high, ½-rack wide unit fits on or alongside other equipment, and comes from the factory with the hardware necessary for mounting in a standard EIA 19-inch rack. The 760X is available for a suggested retail price of \$349.

Circle 3 on Reader Response Card

Crestron VideoTouch

Crestron Electronics, Inc. has introduced the VideoTouch touch panel. The VideoTouch combines realtime video and color touch panel control. Its applications include videoconferencing, training rooms, boardrooms, conference centers, and high tech "smart homes." It features smooth tran-

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remote control, standard battery BN-R602, four "AA" batteries. QMI is the national representative for the JVC XD-P1-Pro.

Circle 2 on Reader Response Card

dbx Introduces Dual Mic Preamp

The dbx model 760X provides two channels of microphone preamplification. Typical applications include direct-to-DAT or sampler recording, field recording and use as a performance upgrade for existing microphone



sition from one subject to the next, the ability to control and view your presentation through a lecturn-mounted VideoTouch while the audience watches a big screen, and the ability to view multiple camera locations while having complete control of camera positioning, audio and source selections on the same screen.

Circle 4 on Reader Response Card





9300 Series Digital Storage Oscilloscopes

LeCroy Test & Measurement/New York Division, has announced two new capabilities for the 9300 Series digital storage oscilloscopes and a new family of 1 GHz digital storage oscilloscopes and FET probes.

Built-in 1.44 MByte floppy disk drive and built-in high resolution printer are new options for the 9300 Series. Both of these options may be added or retrofitted to any of LeCroy's 9300 Series DSOs. The 3.5-inch floppy disk drive is DOS compatible, and stores instrument setups and acquired waveforms. Since the setups may include extensive Pass/Fail tests, the floppy can store libraries of such tests. These may be shared with other scope users to ensure that all important tests are made in the same way, with the same limits. The floppy drive complements LeCroy's existing memory-card based storage, which is also DOS compatible. The built-in graphics printer provides screen dumps in under 10 seconds.

Circle 5 on Reader Response Card

Macro-Tech Addition

Crown has introduced the latest addition to its Macro-Tech line. The Macro-Tech 36 x 12 amplifier combines two amplifiers into one unit. The MA-36 x 12 offers all of the features found in the Macro-Tech series. Both channels of the MA-36 x 12 have



separate power supplies, allowing each to be treated as a separate amplifier.

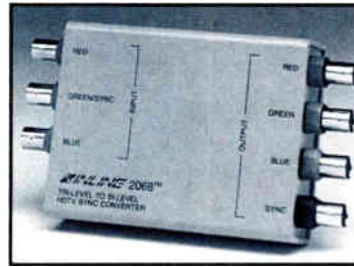
Channel 1 provides power to bass cabinets, offering the same specifications as one channel of the Crown MA-3600VZ. Channel 2 is ideal for driving horns or other high-frequency transducers, offering the same specifications as one channel of the MA-1200.

The MA-36 x 12 includes Output Device Emulation Protection (ODEP), which simulates the unit's output transistors, detecting and compensating for overheating and overload. The MA-36 x 12 is P.I.P. (Programmable Input Processor) compatible, which allows the amplifier to be tailored to a specific application and provides input flexible architecture for new technology as it develops. It is also compatible with Crown's IQ computer control system, which can monitor as many as 2,000 amps from a personal computer in a remote location.

Circle 6 on Reader Response Card

Tri-to-Bi Sync Converter

Inline has introduced the IN2068 HDTV Tri-level to bi-level sync converter. It converts the tri-level sync produced by HDTV equipment to a bi-level sync compatible with most of the currently available monitors and projectors. The IN2068 operates with sync on green or separate composite sync. When sync is on green the



IN2068 removes the sync from the green channel and outputs it on a separate connector. The IN2068 retails for \$620.

Circle 7 on Reader Response Card

Speaker Design Software

Hyperformance SoftSystems has announced the availability of SpeakerCAD, a loudspeaker design software package for IBM PC/ATs and compatibles. SpeakerCAD allows a loudspeaker designer to create custom design

speakers. It features a graphical user interface use and mouse control. Design tools that allow the user to change variables ranging from the speakers physical appearance to its acoustic performance are included.

Two driver databases allow the user to select drivers for their designs or have the computer select them based on the current design parameters. Two space databases provide space measurements, such as hatchback or trunk room, which can be used as guidelines for the maximum cabinet size. Users have a choice of designing either closed or ported loudspeakers, depending upon the application and choice of driver.

SpeakerCAD performs a frequency response analysis of the loudspeaker, giving the user a

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graphical display of the loudspeakers performance. For comparison purposes, a user can select two different brands of drivers and analyze them at the same time. A passive electronic crossover design function rounds out the loudspeaker design process.

SpeakerCAD also provides other features including, metric/imperial conversion, clock and screen saver functions. Users can print their designs or they can save them for later use.

Circle 8 on Reader Response Card

'93 T-Berd

Telecommunications Techniques Corp. has announced the DS1 Timing Slips Option for its T-Berd 310 Sonet/DS3/DS1/DS0 Communications Analyzer. The option enables the T-Berd 310 to

perform DS1 timing slips analysis from DS1, DS3, and Sonet access points. The timing slips measurement identifies timing problems, a hard-to-find source of intermittent errors during installation and maintenance of transmission equipment, by comparing the timing of two in-service or out-of-service T1 circuits and identifying frequency differences. Both the T1 under test and the T1 reference signal can be dropped or accessed from Sonet, DS3, or DS1 levels.



At a Sonet network element, timing slips can identify the loss of the reference clock, a cause of excessive output payload jitter. The slips measurement can be used in combination with the T-Berd 310 DS3 jitter analysis features. DS3 access means DS1 timing slips can now be performed in thru-offices where no DS1 access exists. DS1 timing slips verify that T1 equipment is slaved to the network, such as testing a channel bank for loop-timed operation.

Circle 9 on Reader Response Card

Carlsbro Cobra

From Carlsbro, the Cobra PA100 mixer/amp features four channels with separate EQ facilities and XLR balanced line inputs, FX and reverb select switching on all channels, tape record/playback on channel 4, an active switchable FX loop, Accoutronics reverb, master volume, presence control and an output for headphones.

Carlsbro has also released the X100 mixer/amp. The X100 features three separate controllable inputs, one of which is a balanced line for microphone input. It also boasts tape record/playback function, an active switch-in FX loop, and master controls for bass, treble and volume.

Circle 10 on Reader Response Card

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

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LITERATURE

CSI Handbook; Panduit Bulletin

New Handbook From Computer Systems, Inc.

Art Crawford, Computer Systems, Inc. consultant and instructor has released a new book, Simplified Handbook of Vibration Analysis, Volume 1. This book provides an introduction to the theory and practice of vibration analysis, beginning with a history of vibration diagnostic practices and technology.

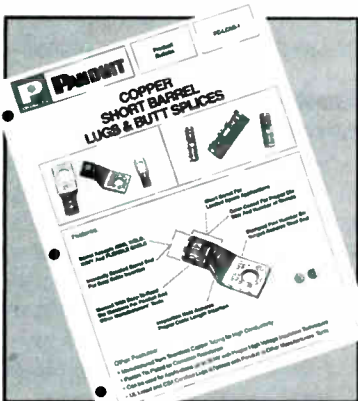
Volume 1 contains chapters devoted to Phase, Field Balancing, and Shaft Alignment. Also included in the book is a discussion of transducers, providing the reader with an understanding of the applicability and limitations of these data acquisition devices.

Circle 11 on Reader Response Card

Panduit Releases Product Bulletins

Panduit is providing two new bulletins that describe new products free of charge.

One Bulletin describes copper short barrel lugs & splices for limited space applications. Featuring an enlarged barrel diameter to accept AWG, WELD, Navy and Flexible cable, the new line has an internally beveled barrel end for easy cable insertion and a punched inspection hole to assure proper cable length insertion. Part number and stud size are stamped on the tongues, as is Navy cable number. For free bulletin PC-LCAS-1, contact product manager, Power Connectors, Panduit Corp., 1333 Schoolhouse



Road, New Lenox, IL 69451.

A line of products, designed for horizontal wiring from the telecommunications closet to the workstation outlet with UTP cable, is described in the second free bulletin available from Panduit.

Included in the line are Pan-Jack modular jacks for high density wiring of faceplates and surface boxes, Data-Patch 24-port patch panels in TIA T568A and T568B configurations with either 110 or Krone type insulation displacement connectors on the back, Data-Patch patch cords per EIA/TIA TSB-36, and Mod-Com modular patch panels.

Circle 12 on Reader Response Card

Technology futures Releases New Reports

Video Communications: Forecasts of Markets and Technologies is Volume 5 of an eight-volume series focusing on forecasts for new television services. Volume 6 is entitled Telecommunications for Television/Advanced Television: Forecasts of Markets and Technologies. The Telecommunications Technology Forecasting Group is sponsoring the series to quantify the demand for new telecommunications services and the effect on the public telecommunications network. The entire series may be purchased for \$4,995 or individual reports may be purchased for \$995 each.

Circle 13 on Reader Response Card

CALENDAR

Upcoming Events

MAY

The Society for Imaging Science and Technology: Boston, Massachusetts. Contact: (703) 642-9090. May 9-14.

Fiberoptic Splicing and Termination Workshop: Washington, D.C. Contact: (508) 347-8192. May 10-14.

American Jail Association's Annual Conference: Portland, Oregon. Contact: (301) 790-3930. May 16-20.

Multimedia '93: Toronto, Canada. Contact: (416) 660-2491. May 26-29.

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.

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.

SEPTEMBER

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.

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

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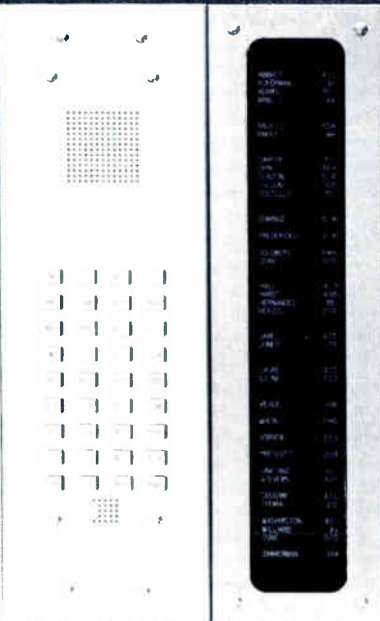


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PEOPLE

Shure and BEC Appointments

Shure Fills Marketing Positions

Shure Brothers Inc. has recently appointed two new managers to assist the company's marketing efforts.

Brian Hall has been assigned to the position of market development manager and will join expanding Shure's share of the sound contracting market. Hall joins Shure after serving three years with Motorola, most recently as product planning manager, land mobile radio products.



Hall

Steve Johnson has been appointed to the position of product line manager, wireless products. he will spearhead Shure's expansion in the wireless market. Johnson was also previously with Motorola where he served as product planning manager, cellular subscriber group.



Johnson

BEC Hiring

BEC Technologies, Orlando, FL, has hired several new employees. Newly appointed to the position of technical services manager is Eric Lemay, who assumes overall responsibility for product servicing and manufacturing quality control. One of the co-founders of BEC Technologies, Lemay returns to the company after four years active duty in the U.S. Navy where he was assigned to work on the Aegis command and control systems.

Other recent personnel additions include shop supervisor Ken Godfrey and office manager Anne

Gibson. All three new positions are at BEC Technologies headquarters and manufacturing facility in Orlando.

Phonic Ear Reorganizes

Phonic Ear Inc. has announced several changes to its sales and marketing management team. Rick Steighner has assumed the new position of vice president of sales for domestic operations. Steighner will now oversee the customer service department as well as the domestic territory sales manager.

Rick Pimentel, vice president of marketing, will add a global scope to corporate marketing, directing all marketing activities in the U.S. and abroad. Graham Twomey will continue as international managing director, with emphasis on sales management in all areas outside of the U.S.

Edgerton Goes to HME

HM Electronics has appointed James Edgerton to the position of customer service manager. Edgerton previously served as operations and services manager at Gregg Communications Systems. Edgerton will be based out of HME's corporate headquarters in San Diego, CA. He will be responsible for the management of all customer service operations.



Edgerton

Switchcraft Names Ad Manager

Switchcraft has named Barbara C. Higgins advertising manager. Prior to joining Switchcraft, Higgins was an account executive for both Sutter/Martin Inc., an advertising agency in Buffalo Grove and Edutrain, the company's training division. Her accounts included Hitachi America and Motorola.

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	Wednesday \$100.00 <small>(Exhibit, 6 Sessions & 1 Workshop)</small>	Thursday \$75.00 <small>(Exhibit, 3 Sessions & 1 Workshop)</small>	
<input type="checkbox"/> FULL EXPO PASS (4 Days)	Register by June 11 \$135.00 <small>(includes sessions, workshops, exhibits and all special events)</small>	Register by Aug. 6th \$175.00	
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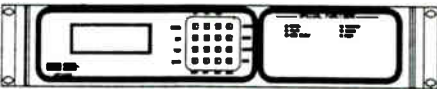
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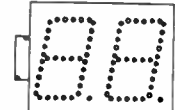
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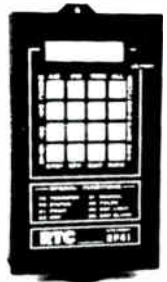
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Microphones	SHURE	ELECTRO-VOICE	AUDIO-TECHNICA
Mixers	TOA	SOUNDCRAFT	ELECTRO-VOICE
Video (VCRs Projectors Etc.)	SONY	PANASONIC	MITSUBISHI

* Indicates tie

... IN LAST SIX MONTHS

**P
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	FIRST PLACE	SECOND PLACE	THIRD PLACE
Speakers	ATLAS/SOUNDOLIER	JBL	BOSE
Power Amplifiers	TOA	QSC	PEAVEY
Audio Tape Players	PIONEER	TEAC	CARVER
CD Players	PIONEER	CARVER	TECHNICS
• Signal Processors	• RANE	• SYMETRIX	ASHLY
Microphones	SHURE	ELECTRO-VOICE	AUDIO-TECHNICA
Mixers	TOA	SOUNDCRAFT	ELECTRO-VOICE
Video (VCRs Projectors Etc.)	SONY	PANASONIC	MITSUBISHI

* Indicates tie

SURVEY METHODOLOGY

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

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Here it is in Black and White . . .



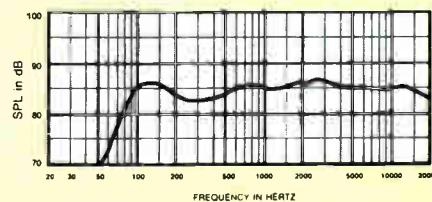
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