

# SOUND & COMMUNICATIONS

Volume 38 Number 11

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## FACTORIES AND OFFICES

New definitions are changing the quality of installations. While the economy limps along, installation innovation keeps the coffers full. Audio, display, multimedia, and teleconferencing are all avenues for jobs. And where are those jobs? **36**

## BUSINESS MUSIC — ENDANGERED

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##### • San Francisco's AES

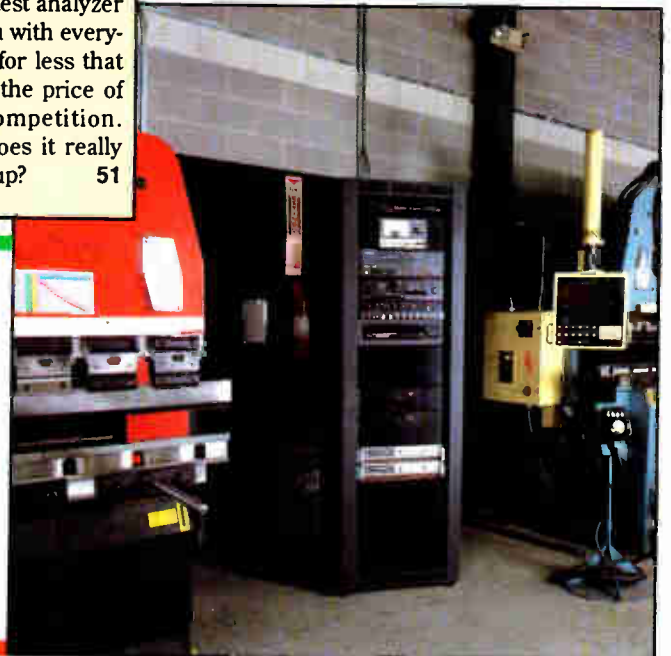
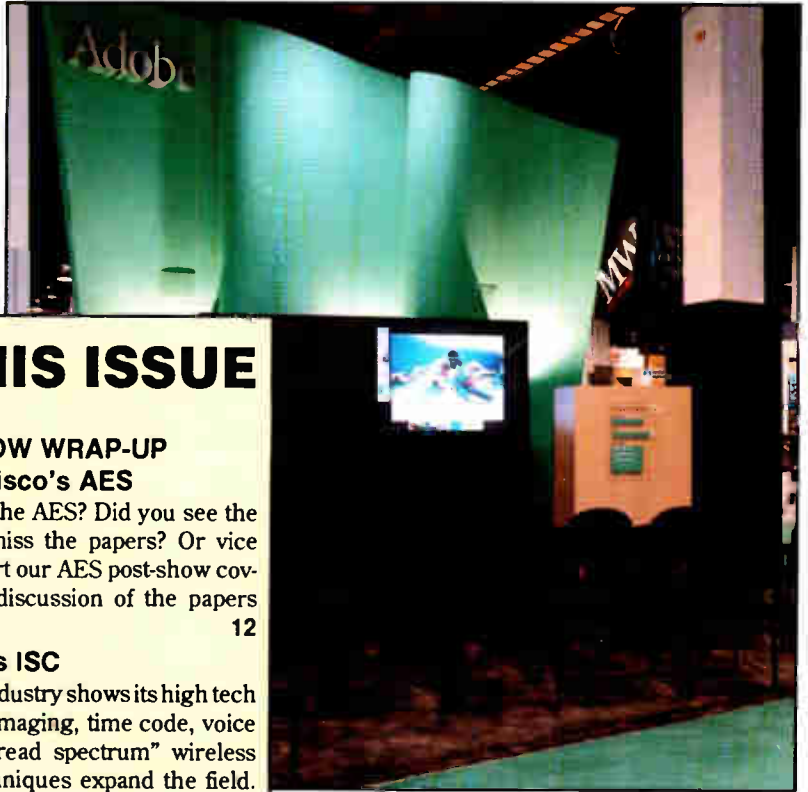
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##### ATI's Acoustic Analyzer

Audio Teknology Inc.'s LMS is a new computer-based acoustical test analyzer that promises to provide you with everything but the kitchen sink for less than twice the price of its competition. But does it really stack up? **51**



# Is There A Point When Out Of Control Becomes Complete Control?



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*By Beverly A. Knudsen*

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*By Edward J. Foster*

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# NEWSLETTER

## **KLIPSCH AND AUDIO ANIMATION IN VENTURE**

Klipsch and Associates and Audio Animation have entered into a joint venture focused on Klipsch Professional Products. Klipsch home entertainment products are not involved in the venture. A separate company, WWR Technology, Inc. has been formed. Klipsch will continue manufacturing the professional product line. Audio Animation assumes primary responsibility for managing the development of the business, including acting as primary interface with dealers, manufacturers representatives and customers.

## **NUMARK PRODUCTS AVAILABLE**

Numark products are once again available, as new leadership of the company has taken control of manufacturing, delivery and quality. Numark Industries, the company growing out of the purchase of Numark Electronics by Jack O'Donnell (formerly vice president of Stanton Electronics), has its headquarters in East Providence, Rhode Island.

Manufacturing is underway in a California production facility solely owned by Numark Industries, where raw parts inventories are in stock and where worldwide shipments are being originated. Company president Jack O'Donnell said, "We are responding to market demand, have opened our production facility in California, and are proud of our revitalized company and its products." Numark will be exhibiting at the LDI show, the Consumer Electronics Show, and the NAMM Winter Market.

## **NSCA SCHOLARSHIP SUBMISSIONS INVITED**

The Bud McKinney Scholarship sponsored by the National Sound and Communications Association is open for submissions from "promising young people considering a career in electronics." Those entering the competition must have worked part time or full time for a contractor-member of NSCA. The winners will be sponsored by NSCA as guests of NSCA Expo in Orlando, with all expenses paid including access to the educational sessions. Submissions should be sent to NSCA headquarters as soon as possible. Announcement of the winners will be made in March. Bud McKinney was the first President of the NSCA. The scholarship was formed in his honor.

## **ALTEC TO SUPPLY WINTER OLYMPICS**

Altec Lansing has been selected to manufacture professional sound systems for eight stadiums now under construction for the 1994 Winter Olympic Games in Lillehammer, Norway. The indoor and outdoor venues will also use products from University Sound, as well as the Intelix audio control system. Altec Mantaray Horns, 299 Pascalite drivers, 515 woofers in bass horn cabinets and Alpha series loudspeakers will be used in four indoor arenas. Altec Anniversary Series amplifiers, programmable equalizers, electronic crossovers, the 1742A signal delay, AL-series microphones and Interface mixing consoles will also be used. University Sound Musicaster 100s will provide audio for all outdoor events. The Olympic Press Center will use Altec loudspeakers, microphones and mixer/amplifiers.

## **INFINITY LAUNCHES NEW DIVISION**

A new marketing group has been formed within Infinity Systems, Inc. The Integrated Systems division will focus on "the emerging environmental and lifestyle product categories, including both speakers and electronics." John Stiernberg has been named Director of Integrated Systems. Stiernberg was previously Infinity's Director of Marketing and Sales (Home Audio Products). He was with dbx and Bose before that. In making the announcement Hank Suerth, executive vice president of Infinity indicated that linkages with other Harman International companies will be explored. While the initial thrust will be the U.S. residential systems market, the group will evaluate and pursue additional business opportunities in commercial sound, multimedia, and home studio recording.



# NEWSLETTER

## **NSCA ATTENDS NAWIC**

A reciprocal relationship has been established between the National Sound and Communications Association and the National Association of Women in Construction. NAWIC invited a representative of NSCA to attend its convention in New Orleans in September. Miriam Evaslin of Pro-Tec Electronics, a member of the board of NSCA, attended the NAWIC convention and delivered a presentation to NAWIC's board on the work of NSCA. Lines of communications have been set up, and NAWIC is planning to exhibit at the next NSCA Expo. The construction group is a 37-year-old organization that places emphasis on professional education. The group publishes a dictionary of construction terms which has received good reviews in sound contracting circles.

## **APOGEE SOUND AND LUCASFILM SHOW SPEAKER**

Apogee Sound, Inc. and the THX Division of LucasArts Entertainment have announced the introduction of a loudspeaker monitoring system which they say is especially suited to mixing and evaluating sound accompanying film and video programming. The Apogee Motion Picture Theatre System One, designed by Lucasfilm THX, is a triamplified system for left, center and right screen-associated loudspeakers, and includes a subwoofer for the lower audible octaves.

## **ALESIS LICENSES ADAT TO FOSTEX**

Alesis Corporation has announced a licensing agreement with Fostex which allows Fostex to bring an ADAT digital multitrack recorder to market in the first quarter of 1993. Russell Palmer, president and coo of Alesis, said, "A significant part of this agreement includes the sharing of engineering resources between the two companies."

## **SAMSON PROVIDES PRESIDENTIAL WIRELESS**

The second presidential debate, which featured the informal "electronic town meeting" format, made use of Samson UHF wireless systems, the company has announced. Initially, all three candidates were asked to wear two beltpacks, one as backup. When they balked at wearing two systems because of the bulkiness, Samson UHF systems were chosen. The entire RF environment for the event was monitored by the White House Communication Agency. A \$38,000 Hewlett-Packard spectrum analyzer and a demodulator were used to focus in on potential problems. Erskine-Shapiro Theatre Technology in New York supplied the wireless systems. Laurence Estrin, president of Best Audio and general manager of special events for Maryland Sound, was in charge of audio for all four debates. The wireless systems "worked wonderfully," according to Estrin.

## **AMX MOVES TO NEW HEADQUARTERS**

AMX Corporation has moved into a new 25,000 square foot corporate headquarters in Dallas, more than doubling the space of its previous location. The new address for AMX Corporation is 11995 Forestgate Drive, Dallas, Texas 75243. Scott Miller, president of AMX, said, "Our growth over the past three years has been phenomenal, and we desperately needed to expand our office and production space." Scott and Ros Miller founded AMX in 1982. AMX Corporation is a privately held company that employs more than 100 people.

## **COMPUTERLAND VIDEOCONFERENCING SERVICE**

ComputerLand Corporation, the computer reseller and multivendor network integrator, has announced a new videoconferencing downlink and television production service, ComputerLand Connect. Each ComputerLand Connect communication site accommodates between five and 35 people and is equipped with full videoconferencing equipment. A trained site coordinator is on hand.





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## TRADE SHOWS

# SAN FRANCISCO HOSTS THE 93rd AUDIO ENGINEERING SOCIETY CONVENTION

By Edward J. Foster

**Even the weather cooperated. Except for a little Bay Area fog and drizzle on opening morning, the 14,538 attendees at the Audio Engineering Society's 93rd Convention had a great time at San Francisco's Moscone Convention Center, the venue for this fall's gathering.**

And although the number of attendees fell about 10-percent shy of a record, they seemed a happy lot as they perused exhibits and attended seminars, workshops and technical sessions for the first time ever in San Francisco. The number of exhibitors set a new convention record at 301, and, according to AES reports, companies were very pleased with the location and the quality of attendee at their booths.

The 21 technical sessions, 11 workshops and one all-day seminar on Silicon in Audio spanned the five convention days (October 1-4). Sandwiched here and there throughout the days were Technical Committee meetings on Signal Processing, Transmission, Acoustics and Sound Reinforcement, Subcom-



*San Francisco's Moscone Center was the site of the 93rd AES Convention.*

mittee and Working Group meetings (wherein AES standards are thrashed out) in just about every audio area imaginable, forums on Techniques and Archiving and a couple of "special events" on Bay Area contributions to audio engineering and the status of professional audio in Latin America. In short, it was a full plate that it was impossible for any one person to consume.

Perhaps the hottest item on the technical agenda (at least as far as this writer is concerned) was perceptual encoding (A.K.A. low-bit-rate coding and data "compression"). In addition to a workshop devoted to the subject, there were

a slew of papers, not only in the Digital Signal Processing Sessions (of which there were four!) but also in the Psychoacoustics Session; a related field on which perceptual encoders are based.

On the last day of the convention, a second section of the Digital Innovations in Audio Technology Session was held. Apparently, this was a last-minute decision because the session was not listed in the Society's advanced notification of the convention. The extra session gave Sony and Philips a chance to strut their stuff on MiniDisc and DCC (Digital Compact Cassette) respectively. Each presented three papers. The Sony folks

---

*Edward J. Foster is the proprietor of Diversified Science Laboratories in West Redding, Connecticut.*

presented MiniDisc: A Disc-Based Digital Recording Format for Portable Audio Applications; ATRAC: Adaptive Transform Acoustic Coding for MiniDisc; and,

## THE 21 TECHNICAL SESSIONS, 11 WORKSHOPS AND ONE ALL-DAY SEMINAR ON SILICON IN AUDIO SPANNED THE FIVE CONVENTION DAYS.

Mastering for MiniDisc Software (the latter prepared by Sony's Digital Audio Disc Corporation subsidiary). The Philips camp chimed in with The DCC Standard; Making a Digital Cassette; and, DCC Thin Film Heads. Philips' Gerry Wirtz, the lead spokesperson for

DCC, presented the first paper, Ed Cumings of Capitol EMI Records (an early DCC supporter) the second, and Seagate Technology's Barry Rossum and Philips' Peter Sygall the third. Seagate, best known for its computer hard disks, is supplying the special thin-film heads for DCC.

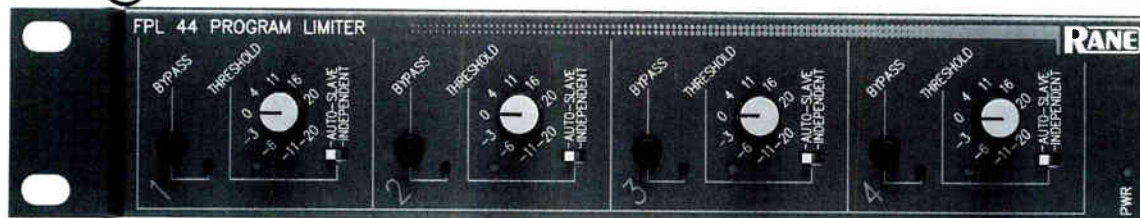
Sound & Communications readers would find a number of papers of special interest. Three from the Psychoacoustics Session that struck my notice are: Subjective Perception of Speech Loudness and Intelligibility at 50dB(A) Ambient Noise Level of a Speech Hall: Modelling Approach by Said, Dimon and Jaafar (Preprint 3348), The Detection Thresholds of Resonances at Low Frequencies by Olive, Shuck, Ryan, Sally and Bonneville (Preprint 3350) and The Effects of Loudspeaker Placement on Listeners' Preference Ratings by Olive,

Schuck, Sally and Bonneville (Preprint 3352). From Session C (Interfacing Digital Equipment) you might take a look at Future Directions for Sound System

## PERHAPS THE HOTTEST ITEM ON THE TECHNICAL AGENDA WAS PERCEPTUAL ENCODING.

Architectures by Bob Moses of Rane Corporation (Preprint 3363) and, from Session E (Adaptive Filters) Adaptive Filters for Loudspeakers and Rooms by Genereux (Preprint 3375) which addresses the topic of correcting loudspeaker response in actual acoustic space by using digital-filter techniques.

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Testa Communications' AES-TV News was seen on the convention floor.

On a similar topic (but addressing loudspeaker distortion) is Gao and Snelgrove's paper Adaptive Linearization of a Loudspeaker (Preprint 3377).

Those interested in loudspeaker measurements would be well advised to check out three papers from the Measurement Session: Simulated Free Field Measurements by Struck and Temme of Bruel & Kjaer (Preprint 3397), Aspects of MLS Measuring Systems by John Vanderkooy of the University of Waterloo (Preprint 3398), and The Analytic Impulse and the Energy-Time Curve: The Debate Continues by D.B. Keele, Jr. (Preprint 3399). On the matter of loudspeaker design and application were Design and Theory of a New Midrange Horn Driver by Bie of JBL (Preprint 3429), Efficient Loudspeaker Parameter Estimation — An Extension by Blind, Phillips and Geddes (Preprint 3430), Development of a Compact Dipole Loudspeaker by Linkwitz

**ALL OF THE PAPERS  
IN THE ACTIVE  
CONTROL OF SOUND  
FIELDS SESSION  
SHOULD BE OF  
INTEREST.**

(Preprint 3431), Asymmetric All-Pass Crossover Alignments by Hawksford (Preprint 3452), Logarithmic Spaced Analysis Filter Bank of Multiple Loudspeaker Channels by Zolzer and Fliege (Preprint 3453), and Sound Radiation Analysis of Loudspeaker Systems Using Nearfield Acoustic Holography and the Application Visualization System by Burns (Preprint 3454).

All of the papers in the Active Control of Sound Fields Session should be of interest to those Sound & Communications readers working in sound reinforcement. Check out A Study of Periodically Time-Variant Electroacoustic Reverberation Enhancement and Public Address Systems by Svensson, Kleiner and Dalenbach (Preprint 3378), Wave Front Synthesis, A New Direction

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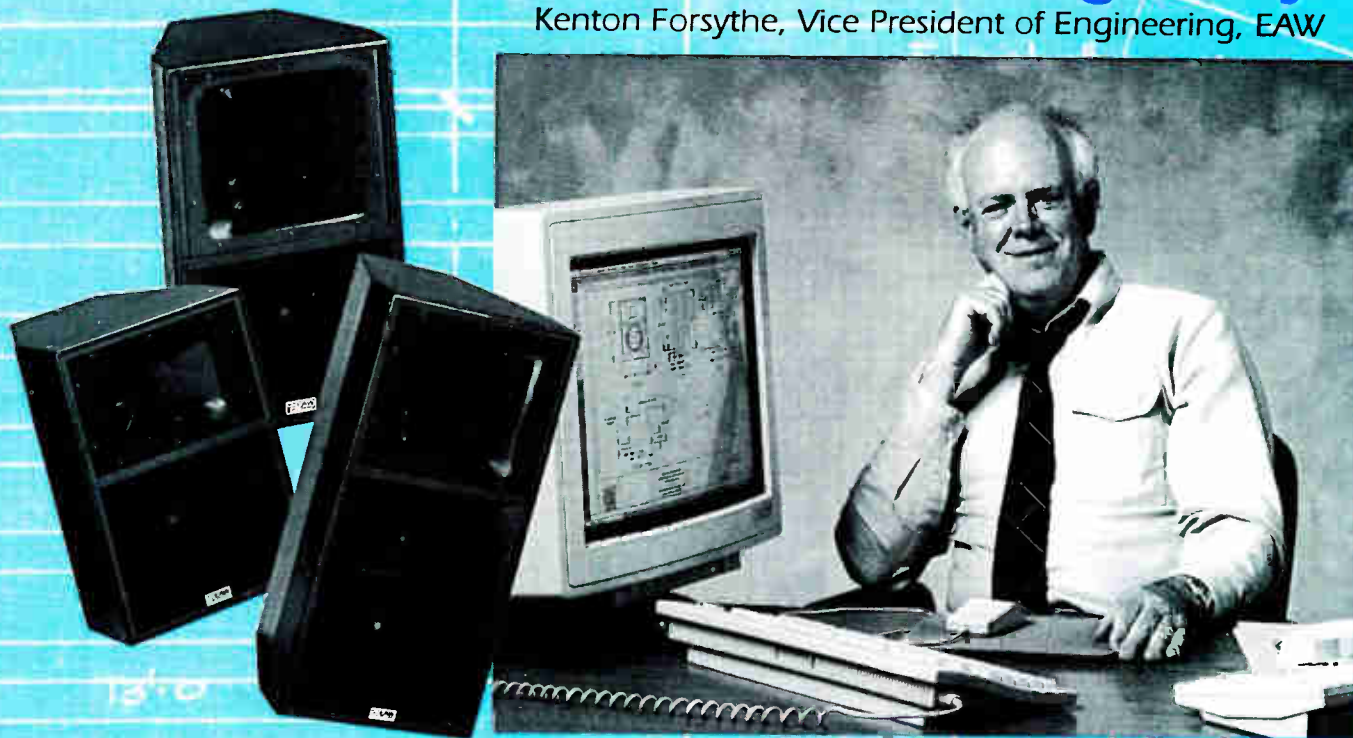
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# "It's no longer necessary to sacrifice musical fidelity for vocal intelligibility."

Kenton Forsythe, Vice President of Engineering, EAW



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in Electroacoustics by Berkhout, DeVries and Vogel (Preprint 3379), Modern Sound Control Technology in Large Auditoria and in Small (Reference) Listening Rooms by Steinke (Preprint 3380), Fifty Years of Sound Reinforcement: Precautions for Sound Field Synthesis by Veneklasen (Preprint 3381), Electronic Architecture: Toward

a Better Understanding of Theory and Application by Jaffe and Scarbrough (Preprint 3382), Room Impression, Reverberance, and Warmth in Rooms and Halls by Griesinger (Preprint 3383), and Acoustic Feedback Control Using a Modulated Loudspeaker Array by Elko and Goodwin (Preprint 3384).

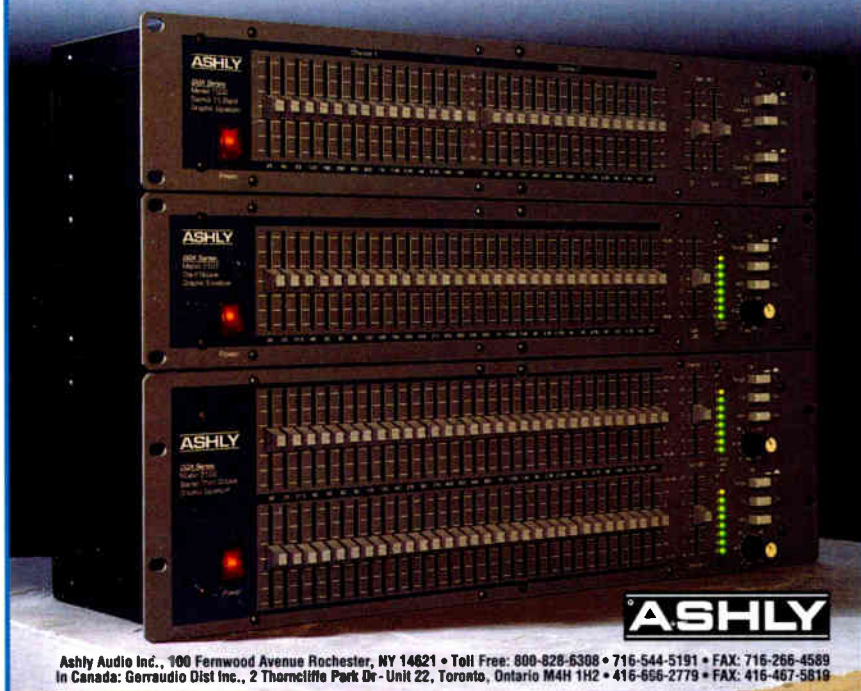
Undoubtedly, there are other papers

that you'd be interested in — nearly 125 were presented! But, my shopping list is long enough as it is. Preprints are available from the Audio Engineering Society, 60 East 42nd Street, New York, NY 10165- 2520, individually or in complete sets.

Of course, technical papers are just part of an AES Convention. There are also the exhibits. It's impossible to cover them all or even to outline what was new at each.

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**IF YOU'VE NOT  
BEEN TO AN AES  
CONVENTION,  
YOU'RE MISSING  
AN IMPORTANT  
PART OF YOUR  
PROFESSIONAL  
LIFE.**

[Sound & Communications will be covering AES new-product introductions throughout the next few issues.]

If you've not been to an AES Convention, you're missing an important part of your professional life. Whether you're into technical sessions, exhibits, or both there's nothing quite as all-encompass-

**THERE'S  
NOTHING  
QUITE AS ALL-  
ENCOMPASSING IN  
THE AUDIO FIELD  
THAN AN AES GET-  
TOGETHER.**

ing in the audio field than an AES get-together. I hope this article may have whetted your appetite. The next full-scale AES Convention in the United States will be held in New York from October 31 to November 4, 1993. Meanwhile, if you'd like to check out what's left of the crumbled wall, the AES will be gathering in Berlin next March from the 16th to the 19th. ■



## UHF's time has come.

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

### 1. UHF gets better reception.

Yes it does, in the sense that UHF operates at the higher frequency range of 902-952 MHz. There is a lot less *traffic* up in that bandwidth. And, more importantly, less RF interference and noise.

### 2. New UHF technology has recently been made available.

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

### 3. UHF sounds better.

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

### 4. More frequencies are available.

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

# EIGHT THINGS YOU SHOULD KNOW ABOUT UHF

### 5. Samson UHF offers more microphone options.

The all brass UH-4 hand-held transmitter is available with an incredibly wide variety of the industry's most popular mic elements. The streamlined UT-4 belt pack transmitter comes equipped with a broad range of high quality lavalier microphone capsules.

### 6. Samson UHF antennas set new standards.

Custom made so they are acutely sensitive to our bandwidth, Samson's high efficiency cellular antennas can be either front or rear-mounted. Because they are positioned at a 45° angle to the front panel, several UHF systems can be cascade-mounted in a single rack with all antennas in the clear.

### 7. UHF is more expensive.

**Until now.** Because of robotics assembly techniques and surface-mount technology, Samson was able to make UHF a realistically priced option for a whole new class of users.

### 8. Write for a free Samson UHF White Paper.

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

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\*In case you were reading too fast, we wanted to remind you that this ad is about UHF, not VHF wireless. ☺As long as you are reading our ad this closely, we thought we'd tell you who they are: Yukinaga Koike, Doug Bryant, Takao Horichi, Susumu Tamura. †dbx is a registered trademark of Carillon Industries.

Circle 202 on Reader Response Card

# SECURITY SHOWING: THE INDUSTRY TAKES A BITE OF THE BIG APPLE

By Ronald J. Rosen

**1992 marked the International Security Conference Expo East's 25th Year, held in New York City's Jacob Javits Convention Center, August 24th to the 27th.**

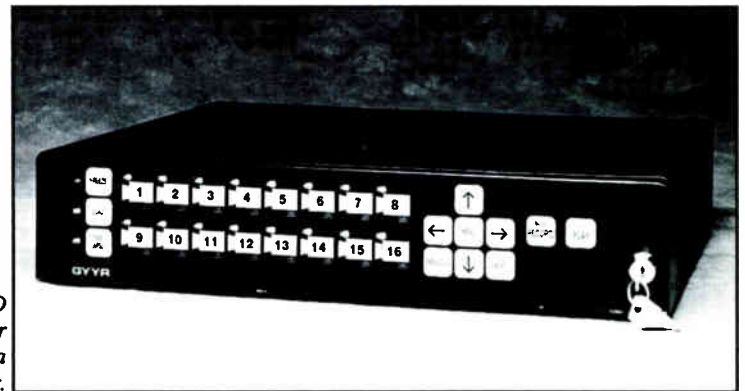
The growth of the security industry is evidenced by the fact that the first Expo East, held in 1960, found 90 companies displaying their wares to approximately 2,000 visitors. This year over 8,500 attendees were offered more than 300 exhibitors to visit.

In addition, 34 workshops and seminars were held throughout the four day period covering such diverse subjects as "Essentials of Market Planning," "Securing Industrial Plants and Warehouses," "CCTV Application and Design," "Safe And Secure Schools," to mention only a few that might interest the sound contractor as much as they do the alarm installer.

Which segued conveniently in to the entire issue of the sound contractor becoming involved in, or at least becoming aware of, the cross-pollination of these two industries. The sound contractor visiting ISC Expo East would find such familiar names as Aiphone, Bogen, Nutone, TSK, Winsted and West Penn Wire among the exhibitors. Noting that

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*Ronald J. Rosen is a sound contractor and freelance writer who lives in Somerset, New Jersey.*



*The DS-16CD digital switcher with 16 camera inputs from Gyyr.*

the upright rack console appearing at the Bogen booth looked suspiciously like a school sound console, I could not help but question its presence. According to Dave Chambers, Bogen's V.P. Of Marketing, this console is an expanded version of the SI-35 desk-top Intercom/Program control center, configured in an upright rack. Chambers states, "As long as we are able to offer the engineer-oriented, high end systems to our engineered sound accounts, we should be able to continue to offer this product at the low end through our distributor accounts." Apparently, if a manual school system consists of one program channel plus intercom and therefore is able to utilize the three position (Intercom-Off-Program) switchbanks, it can be sold through the alarm wholesaler; the addition of a second program channel would make it available only through the Engineered Sound Contractor, as is the case with the microprocessor based Bogen MultiCom system.

A fine line to tread, but since Bogen Communications had had this program

in effect for some time, it would appear to be a viable way to increase market base.

All of which serves to validate the theme that the distinction between the various low-voltage systems is becoming increasingly blurred; just as the alarm contractor is eyeing the industrial/institutional sound market as a way to survive in a questionable economy, the smart sound and communications contractor might do well to diversify in to intrusion alarm (particularly if he already offers CCTV or card access).

Speaking of CCTV, ISC Expo East featured a separate Closed Circuit Television Manufacturers Pavilion. In this exhibit no less than 44 different brands of cameras were shown, together with every conceivable peripheral such as lenses, mounts, monitors, pan/tilt mechanisms, multiplexers and switchers.

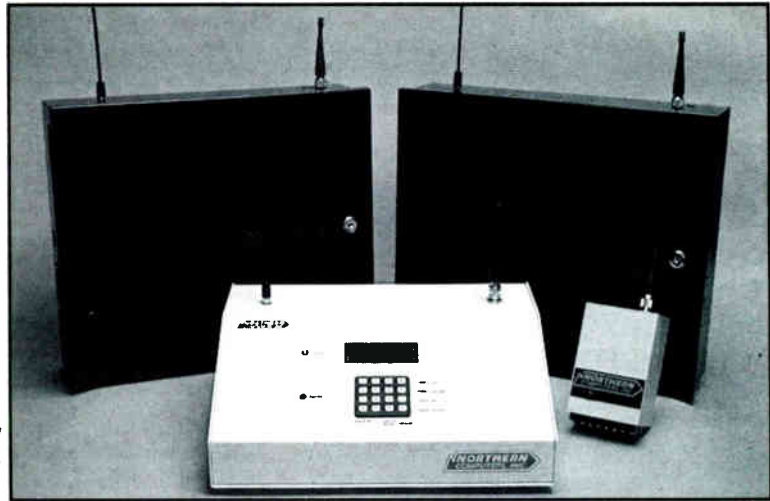
Similarly, this was a big year for manufacturers of Access Control Equipment, with 57 system manufacturers on display.

Among the products introduced at the CCTV Pavilion were Aiphone's Video Sentry 10, a video door unit enabling the operator to "scan" the visitor 76 degrees

vertically by 122 degrees horizontally; American Dynamic's Digi-Split, providing time-base corrected digital imaging, allowing two camera display on one monitor without the use of external sync; CCTV Corporation's SD-100 smoke detector camera; and Javelin's PC based control system featuring touchscreen manipulation and hierarchical control. Of particular interest is the DVST (Digital Video Storage and Transmission) system shown by Dedicated Micros USA, Ltd. Winner of the industry award for innovation at the IFSEC '92 Exposition held in London, this technology features picture transmission systems that transmit high resolution color images over phone lines at unprecedented speeds; digital recorders that store images at superior quality, and a 400 page multi-channel frame-store.

Installation of an alarm system in an

*SpreadCom, Northern Computers' wireless spread spectrum access control product.*



existing building being as labor-intensive as an intercom or sound system, there is apparently no shortage of entrepreneurs who have devised a better tool to do the job easier and/or faster, and have brought said tool to market. Few installers will travel without Diversified Manufacturing's "D'versabit," a flexible drill bit available up to six feet in length, that with the aid of a special tool can be manipulated within walls to accomplish complex installations.

An amazing assortment of specialty

installation tools are offered by Labor Saving Devices of Lakewood, Colorado; devices that look as though they belong in a medieval torture chamber, and bear such unlikely names as "Creep-Zit," "Grabbit," "Wet Noodle," "SlingA-Line" and "Extenzit" are actually marvelous tools for pushing, pulling or otherwise getting that stubborn wire to go through a hung ceiling, up a wall or under a carpet, or wherever. Obviously not limited to the alarm industry!

Technology advances rapidly in the



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security industry. A visit to the National Alarm Museum exhibit shows alarm devices dating back before the turn of the century, many pioneered by Edwin Holmes, bearing the Holmes Protective Systems logo. From cast-iron boxes, brass telegraph alarm bells, fearsome-looking knife switches and galvanometers, we step a few aisles and several light-years away from these artifacts to the booth of Master-Voice of Los Alamitos, California.

Master-Voice features an integrated, voice-activated automation system reminiscent of Star Trek. This particular demonstration unit was named "Lee-Anne," and a conversation between the salesman and this device went something like:

"Lee-Anne"

"Hello" (Soft, sultry feminine voice).

"I'm Home"

"Yes, Master" (Decidedly male chauvinistic system.)

Lights go on, alarm system shuts off, drapes open, radio tunes in, air conditioning or heat comes on.

"Lee-Anne"

"May I Help You?"

"Telephone"

"Okay, Master"

"Call The Office"

"Yes, Master"

Office is dialed, hang-up is accomplished by again commanding this every-man's fantasy.

Telephoning can also be accomplished via voice recognition by enunciating each digit; a two- or four-user unit is available.

I did not ask if a male-voiced version was available for "the woman who has everything," but regardless, Master-Voice is to be congratulated for an outstanding example of voice-actuated technology.

Speaking of technology, almost every alarm control panel manufacturer at ISC



*Javelin Electronics' Quest.*

1992 offers a wireless option, whereby a difficult wiring job between sensor and control panel can be obviated by the use of a miniature wireless transmitter (or sensor with built-in transmitter) — and corresponding receiver, either a part of, or outboarded to, the control panel.

As in the past, most use frequencies in the 300 MHz range, but such manufacturers as Voyager Security Systems are

## An ISC Perspective

As Ron Rosen has noted in his ISC report, the distinctions in the sound and communications contracting business are getting increasingly hazy. Factors such as a recessionary economy are forcing contractors to broaden their horizons. However, technology in the security field has progressed to the point where pc-based systems, high resolution and wireless products are the norm.

Examples of new technology in the security field included Javelin's pc-based CCTV system. Known as Quest, the system consists of an expandable full matrix switcher integrated with alarm relay controls, housed in a pc-based master controller. Each modular switcher card controls 16 cameras by four monitors. The capacity of the system allows for up to four switcher cards that can be configured in numbers ranging from 64 cameras by four monitors to 16 cameras by 16 monitors. Each alarm relay card contains 32 alarm inputs and four user-definable relays. The system is mouse

driven and is designed so that it can be programmed by non-security personnel through its on-screen text directions and multiple help screens.

Javelin and its sister company, Northern Computers, are both part of the ATAPCO Security and Communications Group which also includes the familiar Atlas/Soundolier as well as Millbank Electronics Group. Northern Computers' focus at ISC East was its use of wireless technology in its access control systems. SpreadCOM is a line of wireless access control and alarm point monitoring products that incorporate Spread Spectrum technology; a way of enabling signals to be spread along the bandwidth rather than operating on one signal. Communication can occur at distances over 2,000 feet. The product can incorporate either a PC-based system or a desktop control unit.

Panasonic emphasized systems integration for its line of CCTV equipment. This systems approach was documented in its addition to the Proteus line. The

WV-BS204 is an integrated camera device that combines a 1/3-inch CCD black and white camera, 10X zoom lens, pan/tilt mechanism, camera housing and multiplex receiver in a self-contained unit. The device connects to a remote control and allows for multi-camera systems applications because of its compatibility to the Proteus Systems 200 and 300.

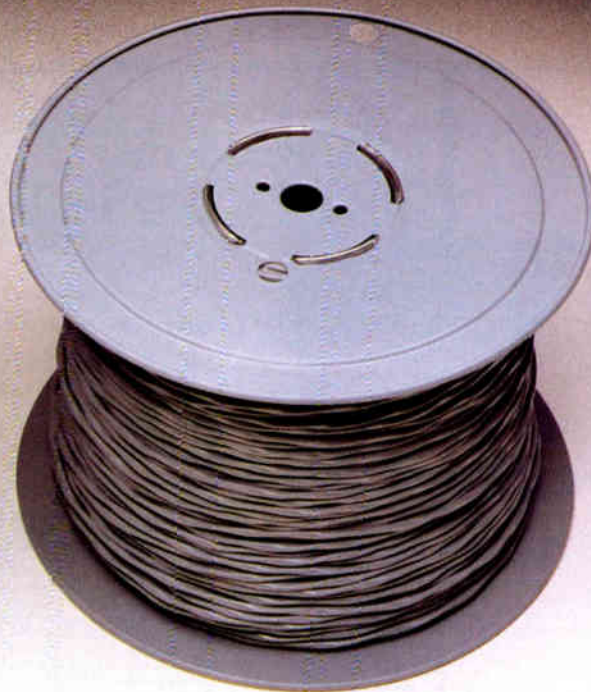
Gyyr was there with a number of products including a digital switcher, the DS16-D, that allows closed circuit video security system users the ability to view up to 16 camera views while recording in full-frame mode. Gyyr also introduced what the company claims is the industry's first 24 hour timelapse video recorder with 400 lines of resolution, known as the TLC 1824.

In the three days of ISC there were many offerings that might make a sound contractors' life easier. It's a market that is more high tech than you might think, with many familiar participants.

—Steve Jacobs



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World Radio History



offering systems utilizing 900 MHz "Spread Spectrum" technology. According to Voyager, Spread Spectrum was formerly a classified method of communication reserved for NASA and the U.S. Military, and has only recently been declassified and made available to the public sector. As opposed to 300 MHz narrow band transmission, Spread

Spectrum spreads the data over multiple frequencies, and receiver and transmitter are synchronized with each other via an encryption code. Using this method, the potential for interference is practically non-existent, and since the F.C.C. allows one full watt of power for Spread Spectrum, range and reliable transmission are increased.



Panasonic's integrated camera, the WV-BS204

Spread Spectrum wireless technology is also introduced this year by Northern Computers for its line of access control systems, under the trade name "SpreadCom." Northern's new line of wireless products can be integrated with a traditional hard-wired access system for difficult installations where it is impractical or not cost-effective to pull cable, trench or disturb black-top or concrete.

**ALMOST EVERY  
ALARM CONTROL  
PANEL MANU-  
FACTURER AT ISC  
1992 OFFERS A  
WIRELESS OPTION**

According to Northern Computers, they are the only company currently offering Spread Spectrum technology for access control.

Manufacturers of alarm controls, devices, passive infrared motion detectors, contact devices, accessories and a variety of central station and professional services exhibitors were in abundance at ISC Expo East, too numerous to list within the scope of this article.

Even if you are not in the alarm business and have no intention of entering it, a visit to an ISC Expo affords the sound contractor an overview of many products that find application in his other fields of endeavor, and makes for an interesting and worthwhile day. ■

I asked our dealer  
**"How do we  
install a 209 lb. monitor?"**



**"Your best bet is the Jumbo Mount from Peerless," he told me.**

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

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

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

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4	18	32	49	66	83
5	19	33	50	67	84
8	20	34	51	68	85
7	21	35	52	69	86
8	22	36	53	70	87
9	23	37	54	71	88
10	24	38	55	72	89
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 1 Contractor—Engineered Sound/Acoustical  
 2 Contractor—Interconnect/Intercom  
 3 Contractor—Fire/Alarm/Safety  
 4 Electrical Contractor  
 5 Pro Audio/Studio/Reinforcement

E Architect/Designer  
 7 Engineering/Acoustical Consulting  
 8 Maintenance/Service  
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 M Manufacturer  
 O Other \_\_\_\_\_

**3 Your purchasing authority:**  
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 B Recommend/Specifier  
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**4 Intensity of your product need:**  
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205	219	233	250	267	284
206	220	234	251	268	285
207	221	235	252	269	286
208	222	236	253	270	287
209	223	237	254	271	288
210	224	238	255	272	289
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210	224	238	255	272	289
211	225	239	256	273	290
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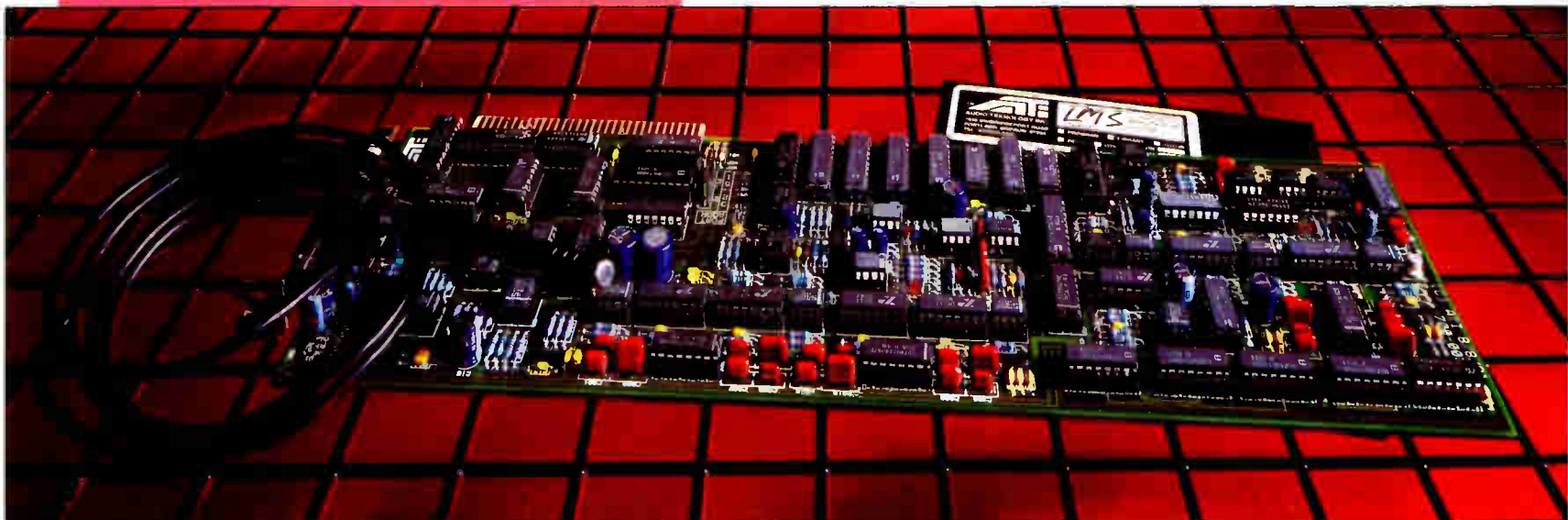
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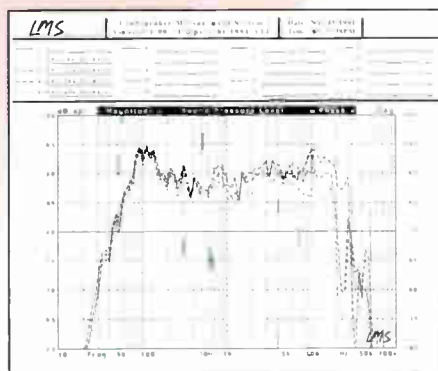
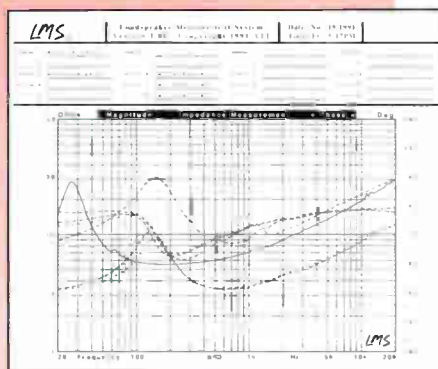
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World R. Circle 204 on Reader Response Card



# INSTALLING THOSE REALLY BIG JOBS

By Dr. Wilhelm Wokka III

*Dear Dr. Wokka,*

I have taken your advice and done everything you said about getting those really big glory stadium and arena jobs. What a lot of work! But you know what? I landed a big one at the National Sports Stadium in Washington, DC — 150,000 seats! It's for an expansion team of NFL stars that owe big favors to big politicians in DC, and some that owe too much back taxes to the IRS and the city of Philadelphia. What a hoot! Don't print this, by the way.

Anyway, you are a genius, and as a result of your advice, I have the contract in hand, signed, sealed and delivered. I really fooled the competition too— came in \$300,000 under the nearest bidder. A few red faces in that meeting, I'll bet. But now I'm overwhelmed because I have to design and install the job, and it's monumental. I mean, it's a big job. Where do I get all the wire and amplifiers, and even men to do it? Where do I get speakers? How do I meet the +/-3 dB from 20 to 20,000 Hz specification set by the local electrical workers' union? Where do I get a psychiatrist?

Doc, I'm in a bad way here. I'm totally overwhelmed and the director of operations for the stadium is leaving angry messages for me to get started. My lawyer is no where to be found. What do I do? You're my only hope.

**Don Dervish**

**Audio Anaesthetists**

**Semi Lotus Valley, California**

*Dear Don,*

How many times must I remind both

you and the readership: You cannot refer to a great man of science as "Doc," and even worse, "genius." This is my last warning. You must respect this lofty station in life. You almost had no one to turn to.

Well, enough brutality for this month. I must voraciously and selfishly swallow my pride and my well-deserved anger and serve my subjects in a big way. Having taken my advice and won one of

**HAVING TAKEN  
MY ADVICE AND  
WON ONE OF  
THOSE BIG  
PRESTIGIOUS  
STADIUM JOBS,  
YOU ARE NOW  
WONDERING HOW  
YOU ARE GOING TO  
PULL IT OFF**

those big prestigious stadium jobs, you are now wondering how you are going to pull it off, having never done one before and not having a clue as to how to do it. Well, brother in the Church of the Living Sound, let me tell you the astounding truth: No one ever does.

I will now reveal the hidden and astounding truth about this business. Everyone, every so-called (and self-called) "big" contractor and acoustical consultant all did only one big stadium job in their lives. Only one. And, it was at the very start of their "big" careers.

You know why? The reason is that they all failed miserably because no one can be taught how to do a big stadium sound system correctly, and no one ever

will. Not only that, but no one will tell anyone else their experiences because they are all jealously competitive with one another and are never willing to reveal the awful truth about these fiascos. No one will ever admit this, especially to the arena and stadium industry.

So why do they all do this, knowing that their work is doomed to failure? *Because that's how you start your own contracting and consulting business, that's why.* Do one big job and it's over a year until the lawsuits start, so anyone has a whole year to say they did this-and-that big stadium. Of course, this is a big calling card and you can't imagine the awe this generates in the minds of the local church, heavy metal band or high school sound crews. It never occurs to them that you can't make out the announcements in these huge acoustical cesspools.

So, to get started making the big bucks, all you have to do is one big job. The "bread and butter" work this generates more than pays for the legal fees in the first year. By then, the stadium management has given up trying to sue and someone else is starting to install the next system in the stadium. More likely, the stadium and sports franchise management has all been replaced and your insignificant part of it has fallen through the cracks.

Of course, everyone in the business knows that these stadiums are impossible places to install sound equipment anyway. First of all, the acoustics are totally prohibitive for any sound system to work properly. I mean, it's a guaranteed kazoo every time. These places are just too big. Second, any equipment installed outdoors will be totally useless in a year. The magnets will rust and the

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*Dr. Wilhelm Wokka III heads up the Philadelphia Medical College of Musical Knowledge, 106 Penn's Landing, Philadelphia, PA 19001. Dr. Wokka is a pseudonym. Really!*

speaker boxes will be reduced to a pile of soggy oatmeal, or be taken over by local termites.

Of course, the manufacturers all know this and actually make sure this will happen, so that they can sell more equipment. They actually special-order this stuff with special termite-attracting additives in the flakeboard and try to pass it off as wood with special sonic qualities; and they are all on the "acceptable equivalent" list, so they merely take turns in blowing equipment into big outdoor stadiums. They all cooperate too, so they all make out.

But you know who really makes out on big stadium jobs? The lawyers, that's who. Did you know that there is a whole business network of lawyers that feed off this business? Some represent the stadiums, some represent the contractors, some represent the trade unions

and some represent the manufacturers, and they are all part of a big club that is assured of a lot of work in court. They all talk together. It's a big game, but everyone works and sells equipment and services. Sound complicated and sinister? Look. It's only business. Nothing personal, as they say in the ads. So let me explain it all simply.

1. Know now that a successful sound system is totally impossible in a large stadium job. They will not work no matter what you do, with the exception of installing a sweet 1600 Pleniovonic Epitaxial Hyponovavic system. But this is besides the point. This system will work, but will totally destroy a lucrative and dependable business system now supporting many Americans who would normally be out of work struggling on the streets as musicians or some other such undesirable.

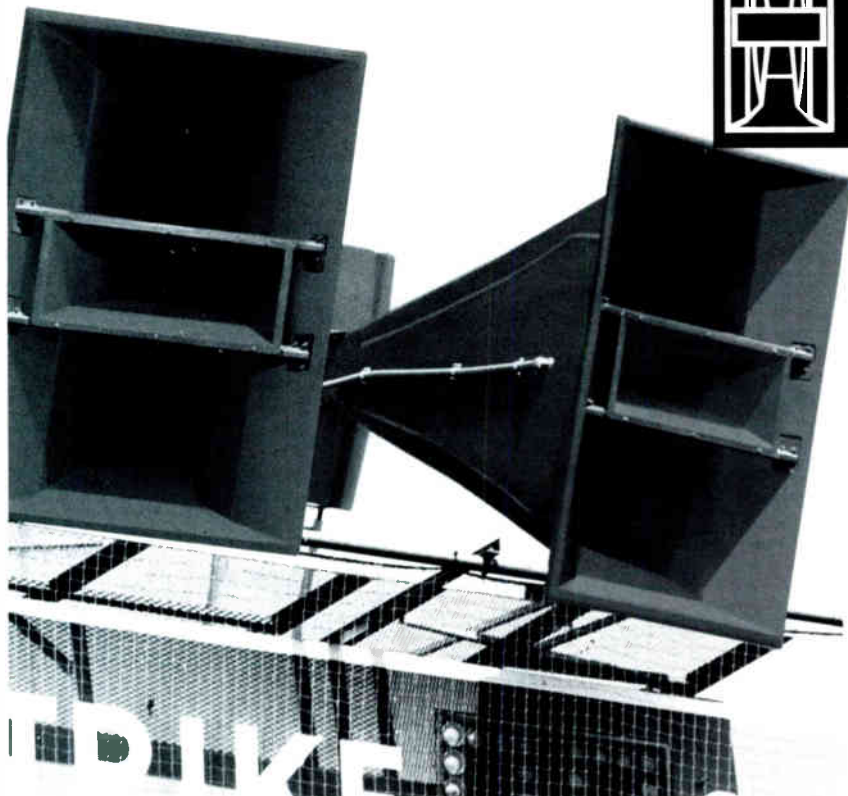
2. In a year the system, whatever it is, will be useless having been ravaged by the elements, and will have received a steady years' worth of complaints. Be prepared for this.

3. Use my advice set forth in the October issue of *Sound & Communications*, and get one of these jobs, at any cost and by any means possible.

4. Use the prestige and awe inspired by this job as a calling card to launch your business into the big time, and get countless other smaller "bread and butter" jobs.

5. Hire a vicious lawyer in the stadium business and sleep soundly at night while a win-win business mechanism makes money for others and takes your trouble away. These lawyers are easily found in the Yellow Pages under "Legal Services—Outdoor Stadium Sound Systems". It's all out in the open, so it's no big deal. All the shady stuff takes place behind closed

MH6040C (60" X 40") shown with optional N/DYM® 1/2MT manifolded compression driver system.



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doors, just like in your own business.

What I'm trying to say here is: Don't expect to make large-venue installations a part of your business. They aren't a part of anyone else's either, as they will lose you money, be impossible to do correctly and be the biggest hassle of your career. It will, however, be worth it. Your first and last big-time installation will be your stepping stone into big-time contracting and consulting. Your installation is doomed to failure by the very nature of the installation's environment, but it is the life blood of the industry. Look. Think about it. Is there a stadium in the world where you can understand the announcements? Forget it. Welcome to the real world, pilgrim. Now let's get on to the business of the installation.

#### THE INSTALLATION

Hire local people to do the job. Typi-

cally, you will hire members in local trade unions, like electricians, steel workers, riggers, carpenters, etc. You will find them also in the Yellow Pages, or

### DON'T EXPECT TO MAKE LARGE-VENUE INSTALLATIONS A PART OF YOUR BUSINESS. THEY AREN'T A PART OF ANYONE ELSE'S EITHER

the operations director of the stadium will tell you how to get in touch with them.

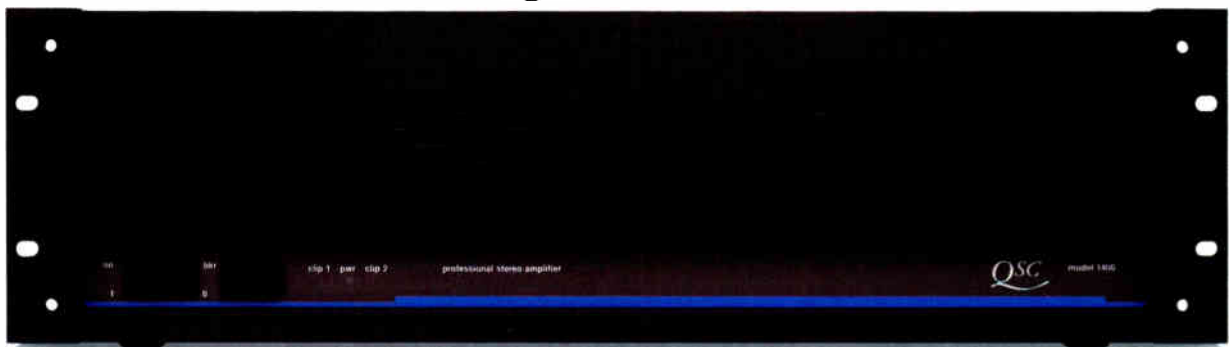
Call a meeting of all the "shop stewards" and explain who you are and what

you want to do. Of course, they do this every one or two years in this stadium, so the meeting is a mere formality. Show them your drawings and calculations, by all means, and distribute copies, the more complex the better. They will write all over these and update the bill of materials in your meeting. This is all part of the plan.

Invite them all to contribute to the design. This will endear you to them. Of course, the changes they suggest will result in slightly more cost to the stadium, but the good will it will generate will be well worth it.

Then, have a meeting with the executive staff of the stadium and explain that if they pay for the outside work done by the trade unions the job will appear to cost less. This will endear you to the executives also. Not only that, they will be happy to find a new use for the money

# Industry Standard.



AMPLIFIER MODEL	8 OHM*	4 OHM*
MODEL 1200	100 Watts	150 Watts
MODEL 1400	200 Watts	300 Watts
MODEL 1700	325 Watts	500 Watts

\*20 Hz to 20 kHz, 0.1% THD



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that is saved over the "cost reductions" you propose. Normally, this money is funnelled to the homeless or some other charity, possibly one that is favored by the trade unions or the local team's player's union. The accountants at the stadium are well aware of this kind of change in the cash flow and can adjust the books accordingly.

Actually you, the contractor, just have to sign a few papers and let the business system take care of itself. The stadium and the trade unions will give you things to sign, labelled "standard contract" or some such wording. Just sign them and your troubles will be over. There will be more of these as the project continues, mostly having to do with overtime. Your signature will only be that you witnessed the overtime work. As an executive on the sound system project, feel good that you are signing things and

enjoy feeling important.

As the revised hardware and equipment list grows and the installation proceeds, make sure they hook up the bass

**AS AN EXECUTIVE  
ON THE SOUND  
SYSTEM PROJECT,  
FEEL GOOD THAT  
YOU ARE SIGNING  
THINGS AND  
ENJOY FEELING  
IMPORTANT**

to the bass amplifiers and not to the treble amplifiers. This kind of thing has to be checked, since a loudspeaker is just like a toaster oven or a light bulb to the people doing the installation. However, the fact that you have let the trade

unions and the equipment manufacturers have a hand in the redesign of the system, with the full blessing of stadium management, means that you can probably go home and be assured that the job will be done without your help.

**MEETING THE TEST  
SPECIFICATION**

Once the system is installed, you must assure the new owners of the system that the "test spec" is met. By now, the amount of equipment in the system will have almost doubled, giving you the best chance of doing this. To meet the test spec, you must aim the loudspeakers properly and then adjust them, using a real-time analyzer and a calibrated microphone. The test spec will probably read something like "... capable of xx dB maximum SPL, with a variation of no more than xx dB from xx to xx,xxx

# Future Standard.



AMPLIFIER MODEL	8 OHM*	4 OHM*
EX 800	175 Watts	275 Watts
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Hz . . .". So, the more speakers and amplifiers, the better your chances of meeting this spec are.

First, aim the speakers at the nearest reflecting surface, like the steel beams in the ceiling. The speaker system will already be high in the ceiling because the architect does not want it to spoil his artistic vision. Aim some of them directly up at the ceiling, and generally try

for as much reflected sound as possible. This will appeal to the sound consultant, who knows that orchestras depend on reflected sound for proper tone balance, and thus so do announcements and "the charge" played on the stadium's Suzuki organ.

Next, pick a day for the test when there is no one in the stadium, and preferably pick a time in the construction of

the stadium before seats are installed. In general, go for as much reverberation and reflection bounce as you can, and meeting the spec will be a piece of cake. If you do all this correctly, you can be assured of totally uniform sound in every seat. Both the sound consultant and the stadium manager will be thrilled to see from the curves that it sounds good everywhere.

The consultant will probably bring his or her own portable, computerized real-time analyzer to take measurements. Volunteer to run the tests for him. Consultants don't like the indignity of carrying equipment, and yours will undoubtedly be happy to let you do this. Now, you actually control the test. This way, if you run the tests real loud, you can do things like going "psssss" with your voice and "helping" the real-time analyzer on the high end without him knowing, and so on.

**USE THE TACT  
"IT MEETS THE  
SPEC, SO IT WILL  
SOUND GREAT" TO  
AVOID MAKING  
ANNOUNCEMENTS  
OR LISTENING TO  
MUSIC UNTIL THE  
VERY LAST MINUTE**

A great technique can be learned for doing this in all ranges, saving the time and money of running further tests that are, after all, a meaningless legal formality. With enough reflection and reverberation in the stadium, however, you will be almost completely assured of success the first time. This will be your toughest challenge, but with a little preparatory thought, you will sail through with flying colors.

Use the tact "it meets the spec, so it will sound great" to avoid making announcements or listening to music until the very last minute. Of course, once it is turned on, everyone will complain. Your

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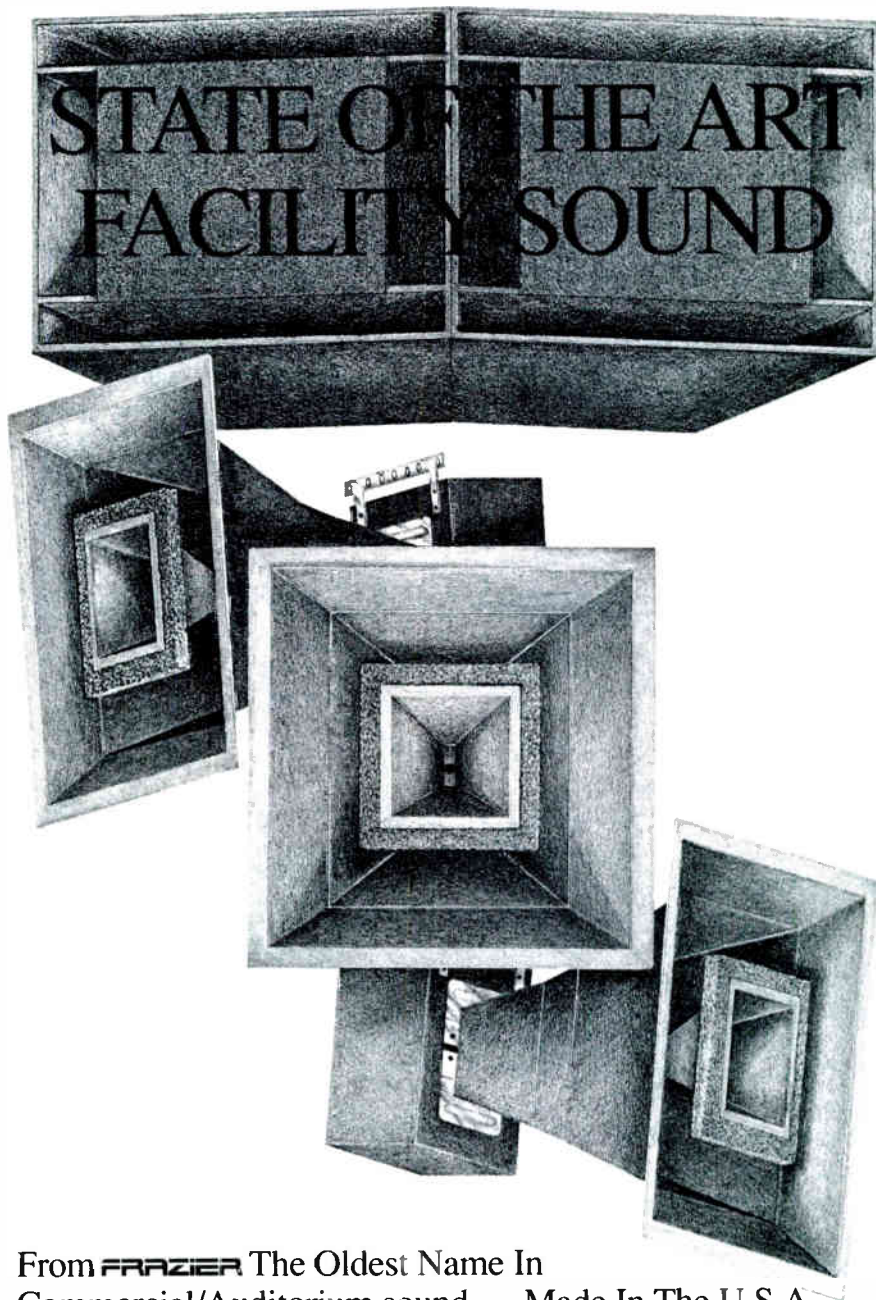
original tact will carry a lot of weight. The stadium management will observe that it really didn't sound worse than the last one, so this must be as good as it gets. This will hold off legal action for a while.

It is inevitable, however, that complaints from season ticket holders, team owners, players and players' wives will eventually get through. Take it upon yourself to call a meeting of the trade unions, the acoustical consultant, the manufacturers' representatives, the stadium officials and yourself to help solve the problem. Of course this will take several months to come together, what with "busy schedules," vacations, other meetings and phone tag being what they are.

The first meeting will result in a massive "it's not my job" finger-pointing ritual and shoutfest. The consultant will say you didn't install it properly. You and the manufacturer will say the design is bad. Then the consultant will blame the design faults on the trade unions. Then the trade unions will threaten strike and other nasty things, and so on. The meeting will take way too long and soon everyone will have to leave. Memos will be proliferated all around. If you are smart and clever, you can schedule several more of these meetings.

Eventually, however, the lawyers will get involved, but this will all take at least a few years. By then, the system will be half inoperable due to neglect or the elements. At this point, a manufacturer will announce the repackaging of some other 1940's product as a "new technology" and the stadium, undoubtedly with new executives, will be convinced to buy a new sound system. So the cycle will repeat itself. By then, you will have a totally successful sound contracting business and still be able to hold up the stadium as your claim to fame. ■

*EDITOR'S NOTE — As astute readers might suspect, Dr. Wokka's views are purely his own and in no way reflect the opinions of this magazine.*



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# Tips on Clubs

## *Speaker Layout and Installation*

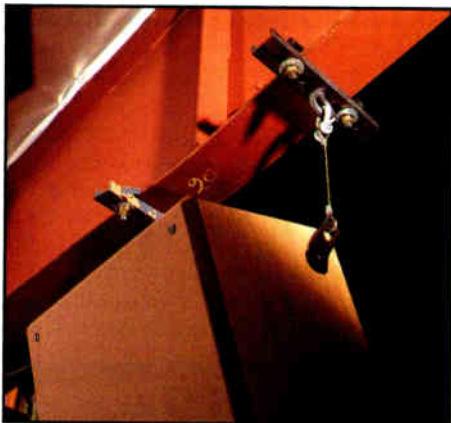
BY MIKE KLASCO

**T**he popularity of CDs, with their extended deep bass and wide dynamic range, has greatly enhanced the appeal of subwoofers. The latest crop of subharmonic synthesizer processors from Audio Control and Furman bring mere woofers to their knees, requiring the addition of subwoofers. During the recent NSCA show in California, I visited with Yamaha and they demonstrated a couple of very interesting projects they have been working on. Yamaha has applied a number of layout and installation tips and techniques from pro concert sound to club use that I think will be of interest to sound installers.

Subwoofers, aside from improving your sound quality, also offer some layout advantages. One speaker layout solution that works well for clubs is to hang compact full range speakers, while keeping the subwoofers on the floor. With the deep bass handled by the subwoofers, the full-range speakers can be much smaller and lighter. Remember that the full-range speakers must be "line of sight," that is, you should be able to see into the center of the mid and high frequency speakers from the dance floor. If the full-range speakers are too low to the floor, they will blare into the faces of



*Examples of SMI hardware hanging Yamaha speakers.*



the dancers nearby, and will sound muffled to dancers further away.

If you are using a subwoofer on the floor, then you might want to consider stacking the full-range speakers on top of the sub. Of course the subwoofer

must rest upon a solid, level surface. A powerful subwoofer can generate enough acoustic output to make it creep, or cause the full-range speaker to creep, resulting in it falling off! Some speaker manufacturers use stacking corners on their subwoofer cabinets so that they mate with the stacking corners on their full range enclosures (Yamaha's Club Series is one example, and JBL's SR4700 series is another). If your cabinets do not have stacking corners, then a webbing ratchet-strap can be used to tie the enclosures together. These straps are available at hardware and auto supply stores and are typically used as cargo restraints in light trucks. Strapping a system together in this way is a common practice among touring sound companies.

You must know what you are doing when you hang speakers. Although large clubs are typically installed by experienced contractors, there are still many field technicians who are more comfortable working inside the speaker enclosure than hanging it from the rafters. I have seen too many instances where speakers are hung by a bicycle chain through the speaker's carrying handle! Most of the portable speakers have two (or more) handles, and the load on the handle is intended to be fairly short term (just for dragging the speaker in and out of the job). When a speaker is perma-

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

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**Walter Murch—Film Editor and Music Mixer, LucasArts/Skywalker Sound**

"If the phrase *noise floor* is in your vocabulary and you would prefer that it was not, get a Behringer single ended noise reduction unit to the top of your *got to have one* list." **Robert Scovill—Sound Engineer/Mixer, Rush/Def Leppard**

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nently hung from the carrying handle, the potential for disaster is great.

If the speaker box is particle board and not plywood, a number of guidelines should be followed. The best approach is to build a "tray" or swing to sit the speaker on. The tray is then hung from the ceiling. The speaker must be fastened to the tray with screws so it does not vibrate off the tray. One manufacturer of metal tray hardware is Peerless. They make a number of devices intended for large screen televisions that can safely hold a few hundred pounds, enough for most compact pro speakers. If you are waiting for me to tell you how to properly attach this assembly so it does not fall down, then you are not equipped to be doing this project and should be looking for someone to help you!

If you intend to bypass the tray and

fasten directly into the speaker, absolutely do not use wood screws into a particle board box. Over time, the vibration from the speaker will cause the particle board material to come apart and the screw will not safely hold the speaker box.

To properly hang the speaker enclosure you must remove the woofer, the front screen, and drill into the enclosure. The hardware should have large washers and machine screws (stove bolts are a good choice). Let me stress the importance of nuts, bolts and washer and absolutely not using wood screws!

The best choice is when the manufacturer offers or recommends an installation kit. Unfortunately, the professional rigging hardware systems for touring sound are unbelievably expensive, more costly than most of the speakers used by

clubs. Actually, the Aeroquip rigging hardware that is typically used in concert systems was originally intended for use for helicopter hauling! Obviously there must be a safe, cheaper, and more down to earth solution to hanging speakers.

Like all manufacturers, Yamaha wanted to be able to recommend safe ways to suspend loudspeaker systems, including their inexpensive Club Series. This means that the enclosures are built of particle board (also known as fiber board) and do not have integral hanging hardware. Yamaha also wanted to compare the strength of its fiberboard cabinets to plywood construction cabinets.

To allow for safe and relatively cheap installation, Yamaha suggests hanging kits from Sound Manufacturing that can easily be field-retrofitted into the enclosures by the sound installer. One kit

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includes a large steel backing plate that is attached to the inside corner of the enclosure. This structurally ties the cabinet top panel and the side panel together, providing strength to the cabinet joint and allowing for installation of the external mounting hardware.

To determine what methods were safe, Michael MacDonald of Yamaha and Stan Miller of Sound Manufacturing went to an independent testing lab in southern California. The lab performed a series of tests to determine the strength of various enclosures and rigging appliances offered by Sound Manufacturing (SMI). By way of introduction, Stan Miller is a rather famous character in pro sound, having been the owner of a large concert sound company for many years and a consultant to Altec, JBL, and many other firms.

A straight vertical pull test was used with only a plate on the top of the cabinet (the single point flat fixture SM-86 fitting). The box was in horizontal position pulling from opposite sides at mid-points. The first signs of stress were at 600 pounds, and at 750 pounds the joints failed on the Club Series box. The cabinets failed at over five times the weight of the cabinet, which exceeds the recommended safety factor for hanging speakers.

Even more impressive was the test with the FM-88 "L" plate attachment fittings. These are the brackets that tie together the cabinets side and top panels. A straight vertical pull test with one box from upper and lower points of a single side was tried. At 1,000 pounds the upper and lower attachment fittings began to bow due to stress of the inter-

nal "L" brackets. At 2,500 pounds(!) the particle board failed near the bottom joint of the box. Perhaps the most surprising results were that another popular speaker cabinet using plywood construction had its joints fail at a lower stress load.

Still, all the cabinets were new, and if you have dragged your boxes around for a while or if you have left your speakers out in the rain or live in an area that has an extremely damp climate (moisture weakens the fiber in the particle board), the strength of the cabinet may be questionable for hanging. While Yamaha, like other loudspeaker manufacturers, does not recommend that end users suspend fiber board speakers, they did want to know how they would perform should they be flown. ■

## 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."

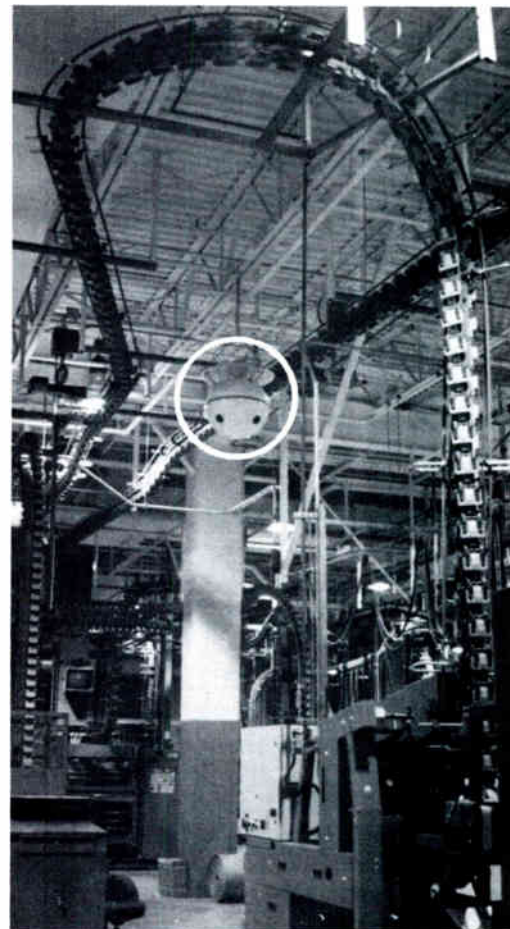
The installer, Bernie Lory has also put two Soundsphere #2212-2 speakers in the stacker area to improve the efficiency of that portion of the operation. He is planning to use more Soundsphere loudspeakers at this site to solve other operational problems.

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# Factories and Offices Defined

*How A Number of Factors Create New Definitions for Existing Markets*

BY BEVERLY A. KNUDSEN

**A**re office installations off, factory sales flat . . . or are sound contractors cashing in on corporate business, making fortunes in factory sales?

The answer is: *It depends.* Success or failure in these environments hinges on geography, economy, and the aggressiveness and flexibility of individual contractors.

"Rather than installing systems, we've been removing systems from corporate board rooms," says Evan Williams, General Manager at the Riverview Systems Group, Inc. in San Jose. "Due to our location — the middle of Silicon Valley — we're seeing a lot of manufacturing divisions closing up and moving to the Midwest and Southwest, where it is cheaper to operate."

Dick Karbowski, owner of Advanced Communication Services, Inc., in New Berlin, Wisconsin, agrees there's been an influx of business in the Midwest. "People are moving back here; they realize this area offers a lot in terms of a technical labor force that wasn't true in the past," he states. Nevertheless, Karbowski says factory and office installations are the slowest part of his business, though he's more optimistic about factory sales than he's been in the past. "Things appear to be 'on hold' now, waiting for the results of the Presidential election. Until Election Day, people aren't making decisions — to expand, spend

*Beverly A. Knudsen is a freelance writer in the New York area.*



PHOTO BY OSCAR AND ASSOCIATES INC.

*Riverview's corporate booth for Adobe at August's MacWorld show. Riverview believes that corporate theater at trade shows gives the company the opportunity to demonstrate multiple systems to potential clients.*

money, and so on; things are in limbo."

The relative strength of factory sales varies city by city, even within the same state. In Arlington Heights, Illinois, manufacturer representative Burt Ziskind reports that "Not nearly as much office space is being leased as in the past, and there's certainly less expansion than in other years. In contrast, the factory business is holding its own." But in Peoria, Al Schoedel, Service Manager at Stan Byerly Sound Systems, notes an opposite trend. "Some plants are closing in this area, while office business —

particularly in doctor and lawyer offices — is pretty good. In general, there isn't much factory work here except in closed circuit TV." Fellow Illinois contractor Bernie Wikel, of Industrial Communications Systems in Alsip, agrees that "one area of the office market that is growing is law firms." He claims that his company "gets its share of factory sales," but admits "there has been a little less business there in the last three to four months." Many contractors report that factory work is primarily retrofitting, with projects on-going; in contrast, con-

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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.

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



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porate sales often involve the installation of a totally new system.

But while contractors have little control over geographic, economic and political factors, they have the power to influence sales by being aggressive, and —just as important — being flexible and versatile in what they offer clients.

### BASIC PAGING & BACKGROUND MUSIC AREN'T ENOUGH

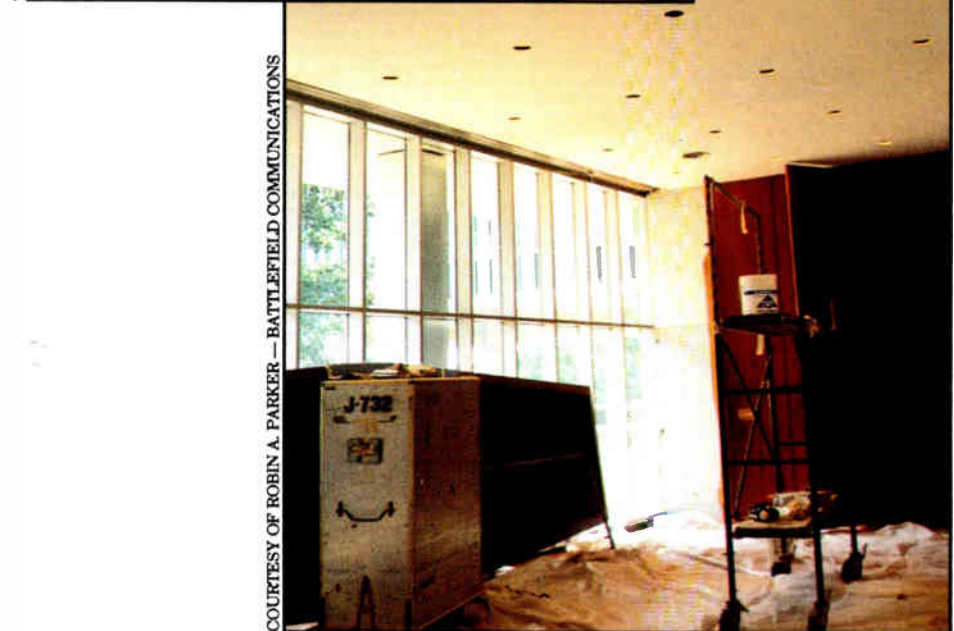
“Years ago, most systems in a factory or office were simple and straightforward. Today it’s not unusual to have a half-dozen different features incorporated in a system. Clients are flipping more and more over the features, rather than the basic system,” reports Bernie Wikel. “We don’t need more mics or speakers, we do need more control equipment and front-end equipment now.”

**“We don’t need more mics or speakers, we do need more control equipment and front-end equipment now.”**

Two recent installations by Industrial illustrate this point. The first, a factory job, required a solid-state programmed system to make automatic announcements every two hours in both English and Spanish. At the second, Continental White Cap, the installation of an emergency alert system involved both phone and lighting systems. The system requires that a person dial a pre-determined number into the phone in the case of a medical emergency, which will connect to the foreman’s office. That call automatically triggers strobe lights, which alert employees who have been trained in first aid. They then dial a second number, and hear the message left at the foreman’s office to learn what has occurred and where to report. “The client wanted to eliminate the cost of



*Before and after. These photos show an installation by Battlefield. At left are the rough-in of backboxes. At right, after masking, before paint.*



keeping two full-time nurses on staff,” says Wikel. “If he could save \$80K a year on salaries, he was agreeable to spend \$40K on a system.”

Stan Byerly Sound Systems created business by taking advantage of the opportunities offered by the new “modular approach” taking in many modern offices. “To save money, many offices are using modular partitions rather than walled offices,” says Al Schoedel. “This has created privacy problems, with everyone overhearing others’ conversations.” The solution, says the contractor, is a “white noise” system installation, requiring a generator, amplifier,

third octave equalizer, and speakers mounted above the ceiling tiles. “You need to apply stringent specifications to keep the white noise balanced from area to area,” says Schoedel, who reports that these systems have become quite popular in the Peoria area.

But while some systems mask sound, others reproduce sound with great fidelity. “We pitch systems that deal with the full frequency spectrum, for increased clarity and understanding,” says J.L. Lagestee, owner of A/V Systems Now in San Dimas, California. “Considering these recessionary times, we do quite well with ‘sound reinforcement’ type systems —

# UNIFIED ELECTRONICS



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The accessory modules offer a variety of functions, including a remote volume control, an audio-controlled relay and a tone generator. They can also serve as independent components using an optional accessory chassis.

Further enhancing the Unified Electronics line is the soon to be released MX-8 eight channel mixer. The MX-8 offers the same expandability of the 2000 Series without the integrated power amplification.

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rather than standard public address systems." Lagestee estimates that 80 percent of his factory/warehouse business comes from clients who are fed up with the bad sound and lack of intelligibility of their existing systems. Because of this, he says business is better than it was a year ago in these environments.

## MAKING MONEY IN MULTIMEDIA

As its name implies, A/V Systems Now is into both audio and video system sales. "If you accept that people comprehend 70-percent more visually than audibly, you should push video. We also encourage clients to talk about their full media needs," states Lagestee.

To create the optimum system for each client, Lagestee uses some manufacturer lines not among those most commonly associated with the sound installation business. When A/V Systems Now installed multimedia systems in the training rooms at Century 21's Region 5 corporate offices in Ontario, for example, the equipment included Mitsubishi monitors and VCRs, a GE video projector, Peavey Electronics audio system, HM Electronics wireless mics and Da-Lite video screens. Lagestee says he "cross-matches across lines" as well. For example, products from Peavey Electronics' separate Musical Instrument and Architectural Acoustics lines might be used in the same installation.

Manufacturer reps also comment on the growing demand for multimedia systems. Roy Pass, of Pass Associates in Potomac, Maryland, represents the Atlas/Soundolier and Cornell Electronics lines in the mid-Atlantic states. "What's new in office installations? We're seeing more requests for multimedia systems. Clients want more fidelity in sound, using in-wall speakers, and they are also looking for combined audio/video systems not only in board rooms, but in conference rooms and executive offices."

To generate new business, however, you've got to do more than keep abreast of the trends and know what clients want. To be truly responsive you often

have to be willing to "take the plunge" and enter a totally new area of business.

## TAKING ON TELECONFERENCING

"We're fairly new in the area of teleconferencing," says Robin Parker, Project Manager at Battlefield Communications in Ashland, Virginia. The company has completed just two such system installations to date. Battlefield got these jobs, says Parker, on the basis of its reputation for sound system expertise.

The most recent job was a phone teleconferencing system in the executive board room at Reynolds Metals. According to Parker, there were two requirements: "They didn't want to see anything . . . and they didn't want anything to be seen." Since invisibility was the consideration on the job, Battlefield used B.E.S.T. panel speakers, which were installed in the sheet rock ceilings. In addition, an Altec Lansing automatic mic mixer, Countryman mics, a telephone interface and amps were used. The conference mic was buried in a

**80 percent of his  
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their existing  
systems.**

piece of marble that was valued at more than a quarter of a million dollars. "We had a lot of very nervous people watching us bury that mic!" says Parker.

As often happens when you try something new, there's a lot you learn as you go along. "For our first teleconference system, we built our own telephone interface — we didn't know we could get one ready-made," says Parker. "That one is working fine, but now we know they're available to us."

On the Reynolds job, appearance was of primary importance. "They didn't want boxes hanging from the ceiling. They wanted us to pay close attention to the details so that the job was done in an aesthetically pleasing way."

In the case of Dick Karbowski's recent teleconferencing system installation, the problem wasn't "making it fit in beautifully," but rather "making it fit in, period." Union Pacific hired Advanced Communication Services to install an elaborate conference system in one of its rail cars. The rationale behind this decision was to afford the ultimate in security for Union Pacific conferences. "We put in 30 mics — the Shure automatic mic system — and 18 speakers in a tremendously confined space," explains Karbowski, who describes the job as "challenging." His company had previously worked with Union Pacific,

installing systems in some of the railroad's luxurious dining cars.

#### HOW DID YOU GET THE JOB?

Both Battlefield and Advanced Communication Services got their teleconferencing projects based on prior work and reputation. But every contractor has his or her own method for attracting new clients. One of the more unique strategies belongs to the Riverview Systems Group, Inc. "A large part of our business is 'corporate theater' — temporary installations at corporate trade shows," says General Manager Evan Williams. "That connection is now manifesting itself in permanent installations."

Williams believes these trade shows give Riverview an unusual opportunity to demonstrate multiple systems to potential clients — many of whom later make a decision to buy. Riverview, whose

corporate booth for Adobe has won awards, uses this temporary, portable design to give clients an idea of what they can deliver. "It often clinches the deal. We'll get a call from someone who'll say, 'I'd like something similar to what we saw at the trade show in Phoenix for our CEO's board room.'"

Other contractors use more traditional means of getting office and factory business. "We did a survey and learned that about 65 percent of our business comes from referrals," says J.L. Lagestee. "The rest is from standard advertising in industry periodicals and the yellow pages, rather than from any particular marketing ploy." Word of mouth, referrals from electrical technicians, and advertising are the mainstays of many contractors. Since January, however, new business is coming from an unusual source — national legislation.

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**THE ADA — WHAT IT MEANS FOR YOUR BUSINESS**

Many believe that the Americans with Disabilities Act has the potential to create a considerable amount of new business for sound contractors. The law addresses the rights of the hearing-impaired in any public assembly group of substantial size.

Not everyone, however, is optimistic about its implications. "Do you under-

**"All the Act has generated to date is confusion."**

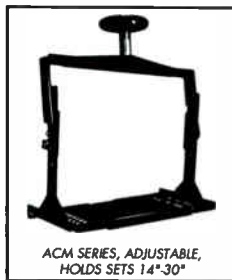
stand it?" asks Bernie Wikel. "All the Act has generated to date is confusion." Wikel does not believe that systems designed for the hard-of-hearing will take off for awhile.

Dick Karbowski says he hasn't seen

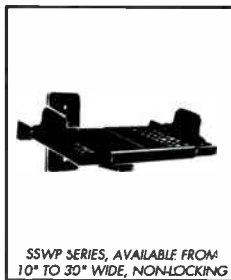


*A/V Systems Now's installation of a projection system at Century 21 real estate region V corporate offices in Ontario, California.*

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any effects of the legislation yet — “It’s not too widely known. It needs public relations work behind it” — but looks forward to it being a big factor in the future. J.L. Lagestee also reports no impact yet, stating, “It’s not like the big changes that were made in the construction industry, for example, when they were required to put in ramps for the disabled on many public buildings.”

Taking a more positive viewpoint is Robin Parker, who says there’s already been a reaction from his clients. He hasn’t seen it generate inquiries from offices or factories, however, but from schools. “What’s typically been happening is that a school calls an electrical installer who says he’ll have to tear up carpet and floor boards to install a system. The schools then call us in a panel and we say we can be in a box — a Sennheiser unit with 40 headsets — and do no damage.”

Representatives of sound enhancement products are already seeing an upswing in sales. “I’ve seen significant increases in Telex’s sound enhancing equipment sales,” reports Burt Ziskind. “I can say with assurance it is due to the passage of the American with Disabilities Act.” In Rockville, Maryland, Carey Kress numbers the makers of an infrared system, Sound Associates, among his lines. “Until the last few months, business had been somewhat slow on that line. Now things have picked up, with systems sold to the Kennedy Center and a local movie theater.”

While most contractors thought it likely that the Americans with Disabilities Act would have the most impact on schools, churches and theaters, Stan Byerly Sound Systems sold two Williams systems—a transmitter that hooks up to the public address system, plus individual pocket receivers with ear plug and volume control — to a local funeral parlor chain.

It may well be that this is one of those factors — like economic conditions and national politics — where only time will tell the full story. ■

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## INSTALLATION PROFILE

# THE SHOEMAKER DOES HAVE SHOES: A “BACKGROUND MUSIC” SYSTEM AT A FAMILIAR FACTORY

By Daniel Sweeney

**When Middle Atlantic Products decided to put in a background music system, they weren't really thinking of easy listening.**

Middle Atlantic Products is a familiar name to most of us as the manufacturer of equipment racks and mounting hardware for the professional audio industry. Although Middle Atlantic's wares are all in the nature of hardware accessories and have nothing to do directly with music reproduction, as it happens, the staff are as much headbangers as metal benders, and none more than the president himself, Bob Schluter. So when the work force asked for a background music system, Schluter complied by installing an arsenal of high output transducers and amplification which would not be out of place in a small arena.

In truth, a fairly substantial system would have been needed simply for paging functions let alone for some of the uses that Middle Atlantic has put it. With 3,000 feet of floor space and the competition from a factory assembly line — remember this is old fashioned, rust belt heavy industry, not board stuffing — any sound system has to struggle to be heard. But Middle Atlantic's lineup is fully equal to the task.

The “background” system is actually two systems, a main ensemble and an

*The main system is supplemented by four Community VBS415 subwoofers.*



auxiliary, each occupying roughly half of the factory, and separated by the assembly line itself.

The main system consists of four Community Light and Sound RS880 two way loudspeakers supplemented by four Community VBS415 subwoofers. Powering the system are two hulking Crown Macro-Tech 3600VZ amplifiers — one allocated to the RS880s and the other to the subs. Other equipment includes a Crown PSL-2 preamplifier, a Sony CD player, a TEAC cassette deck, and a Technics tuner. A

Leader LAG-26 audio generator is used for fine tuning the system.

The “auxiliary background system” belies its designation even more than does its sibling. Main speakers consist of TAD components (TL-1801, TM-1201, and TD-4001) in custom Gabriel Sound cabinets, two mighty horn-loaded Intersonics SDL-5 subwoofers, and triamplification provided by a Crown Macro-Tech 3600 on the subs, a Macro-Tech 2400 on the TAD eighteens, and a McIntosh MC2200 for the mids and



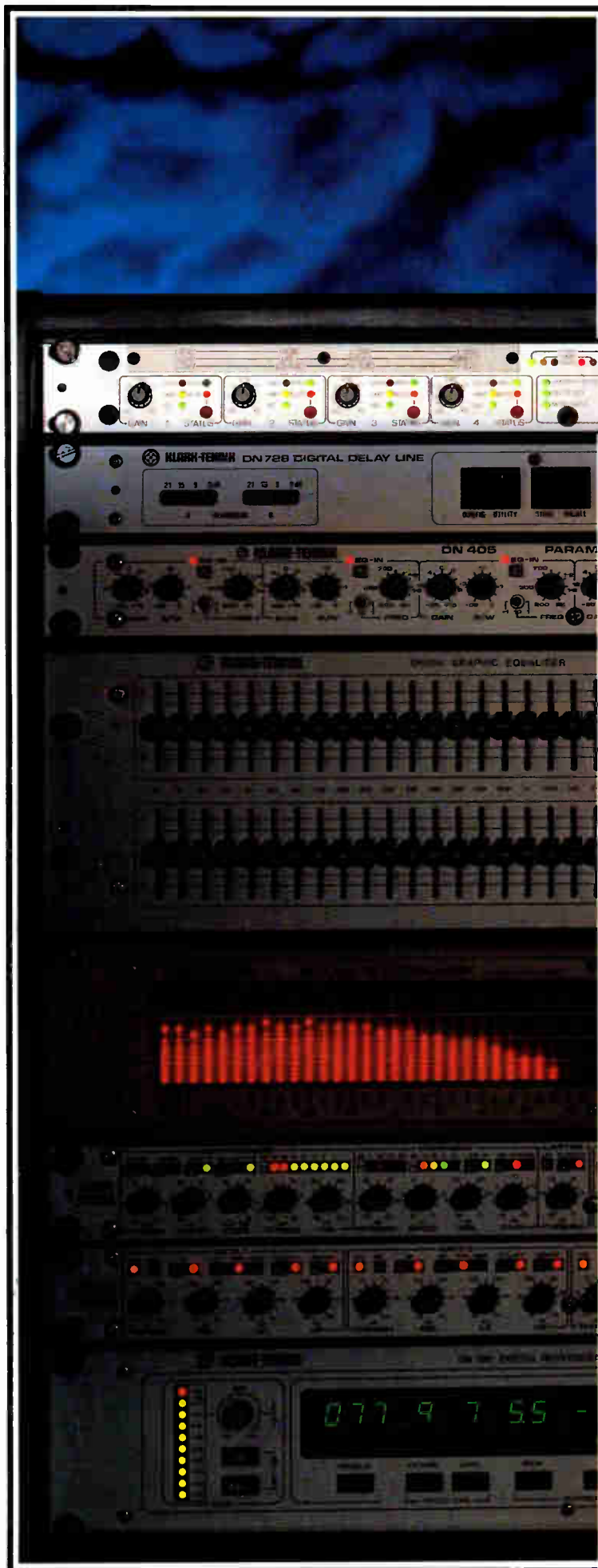
*Powering the main system are two Crown Macro-Tech 3600VZ amplifiers — one allocated to the RS880s and the other to the subs. Other equipment includes a Crown PSL-2 preamplifier, a Sony CD player, a TEAC cassette deck, and a Technics tuner. A Leader LAG-26 audio generator is used for fine tuning the system.*

*Daniel Sweeney is freelance writer living in Burbank, California.*

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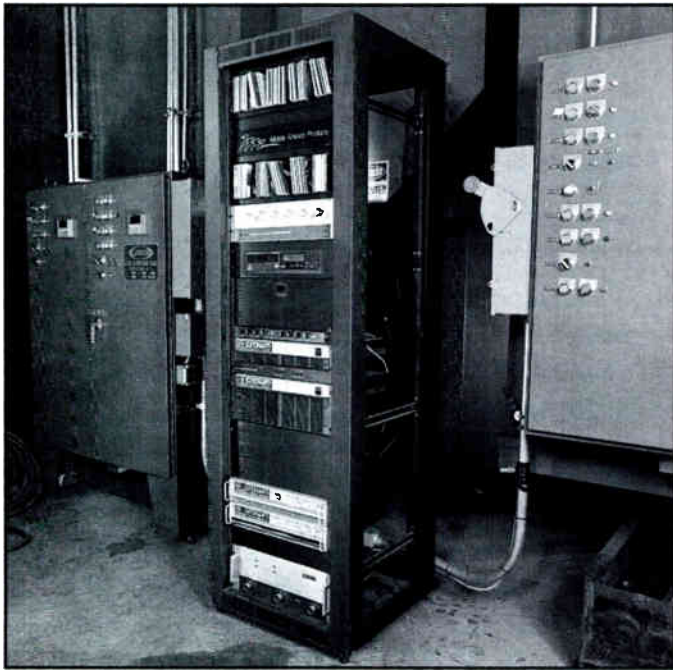
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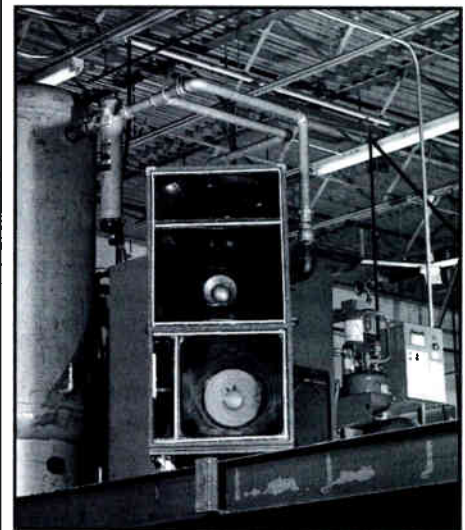
The auxiliary system is powered by a Crown Macro-Tech 3600 on the subs, a Macro-Tech 2400 on the TAD eighTEENS, and a McIntosh MC2200 for the mids and tweeters.

tweeters. The signal source is a Panasonic SL4300 CD player, but a Pro-Co DBT-1 line level transformer permits signal distribution from the three signal sources in the main system.

Both systems are flown on flying hardware manufactured by Middle Atlantic itself. The main system is readily removable, and is frequently used to provide portable sound reinforcement at company recreational affairs.

President Schluter also relates that the staff won't always wait for company events, and that sometimes people bring in musical instruments during work hours and plug right into the main systems. (What do they play, one wonders — work chanties?)

Schluter himself has extensive prior experience in sound contracting, but he did not have access to a CAD/CAM program for plotting coverage patterns and room interactions, and admits to having had to overcome fairly severe problems with low frequency standing waves. His solution was to forklift the subs around the shop until the systems sounded right.



Main speakers for the auxiliary system consist of TAD components (TL-1801, TM-1201, and TD-4001) in custom Gabriel Sound cabinets.

Schluter calls the systems works-in-progress and indicates that both have built up gradually and may be further augmented in time. One scarcely dares to speculate what lies in the future. ■

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# BUSINESS MUSIC — GOING, GOING . . . GONE!

By Mike Milligan

**The term “business music” should be on the endangered species list. Why? On the horizon, if you squint, you’ll see where both consumers and businesses will be subscribers to the same companies for “pay radio.”**

For years, businesses settled for the “one size fits all” instrumental channels. Or, if they wanted special programming, they used commercial tape players with subscriptions to tape libraries.

Neither of these were ideal, but because of the existing technology (or lack of it), those were your choices. FM subcarrier band delivery (SCA) of “elevator music” offered marginal sound quality, with no other music format choices available to the subscriber. Tape players required maintenance, tapes wore out and constantly needed changing, plus tape libraries were too repetitive. An SCA-delivered channel retailed for about \$30 per month, including royalties, and tape systems were slightly higher.

Even though there’s been the introduction of random play commercial CD players, their usefulness escapes me. The sound quality is much better than tape systems, but repetitiveness is still a huge problem. It’s a lot like trying to

make a cake without flour, then mixing exactly the same ingredients in a different order, hoping it’ll turn out better. Hey, it’s still gonna be a lousy cake!

Now, there’s satellite delivered music programming (DBS), featured by market leaders like Muzak, AEI and 3M. Subscribers can choose from several different music formats, without the repetitiveness, and enjoy superior sound quality. DBS receivers can be programmed to automatically switch to different formats. And, if the subscriber wishes, commercials can be inserted (“in-store advertising”) to generate enough revenue to cover the expense of paying for programmed music. Plus, data

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OUT BETTER.**

and video can be received over the same equipment.

Surely, this is the answer, right? Wrong.

Receiving the DBS signal requires a Ku band satellite antenna and receiver, which costs much more than SCA or tape equipment, driving rates up to about \$45 per month. And, the small Ku band dishes have trouble receiving signals under heavy cloud coverage, which can sometimes create annoying outages to subscribers.

Alas, no national agency has emerged as the leader of in-store advertising. It’s no fault of the in-store advertising concept, a proven winner. It just appears that instead of coming together to form one large in-store advertising group, music companies are insistent upon using their own in-house agencies to sell ads, none of which are setting the woods on fire. What other reasons are keeping in-store advertising from reaching its full potential?

First, there’s perceived value by advertisers. In radio, programmers decide on how many commercials are bearable to hear per hour, then use supply and demand to establish their commercial rates, not cost per thousand people reached. If they can only get a nickel per spot, then *that’s what they get!* There are enough businesses already on line to show sales results. Rate increases should come when advertisers can be shown they are justified.

Next, there’s in-store advertising revenue sharing. While some music companies share in-store advertising revenue between the retail store, ad agency, and music supplier, it’s how that split works that troubles me. It costs a music company the same to deliver a three dollar commercial as it does a thirty dollar commercial. Flat fees should be established to deliver the commercials, with the remainder of revenue going to the retailer, less the agency commission.

Last, let’s examine the hesitancy by music companies to take advantage of current technology. Using new digital message repeaters, nationally sold commercials can now be easily mixed with ads sold by the stores themselves, much like a satellite programmed radio sta-

*Mike Milligan is General Manager of Background Music Company in Phenix City, Alabama.*



tion which has national ads with room to insert local ads. Many retail grocery chains make quite a profit exclusively from ads they sell to regional vendors, like bread, soft drink, chip, and dairy suppliers. Music used to be an expense on a retail customer's P&L. With a combination of local and national ad dollars, music can now be shown as a source of income!

New cable music companies, like Digital Cable Radio (DCR) and Digital Music Express (DMX), target residential subscribers first, business subscribers second. By reducing the cost of receiving equipment and using new digital technology to deliver their signal over your local cable system, these companies are now providing dozens of commercial free channels to homes and businesses at a very reasonable price. Geez, then this must be the answer, right? Wrong again.

Cable doesn't reach all businesses, and the cable company who may reach your business might not have a music program service available. And, additional services like "dayparting," in-store advertising, data and video are not available. Plus, there's no ability to lock out some channels. A subscriber may return to his empty restaurant during the "Senior Citizen's Lunch Buffet" as the busboy jams to the last few bars of the Metallica marathon on Channel 16. He just knew you wouldn't mind.

For residential subscribers, it's the first time that "pay radio" is affordable enough to consider. Most cable music companies charge between \$5 and \$20 per month for their residential service (more for businesses because of higher licensing fees from ASCAP and BMI). A great product, at a great price. What more could you ask for? Flexibility, that's what.

Most people, when not working, listen to music *in their cars*, not at home. Teens make up the overwhelming majority of people listening to radio in the evenings. Maybe Junior gets enough allowance money to subscribe so he can listen to the "2 Live Crew" channel. Then again, maybe not. Consumers and business owners are a finicky bunch, and rightly so. Cable music services have only about a ten to fifteen percent penetration rate in the markets they serve. Businesses who subscribe to music companies make up only about twenty percent of licensed businesses. So why are homes subscribing to cable TV at about a fifty percent rate? Simple. Cable customers demand a quality product, to be used how they wish, and at a low price. That's what they get.

Well, where's the answer for music subscribers? Straight ahead.

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**N**ew from Galaxy Audio, the Hot Spot PM is destined to become the loudspeaker of choice for installations requiring a small high performance voice and music system. Featuring two five-inch drivers, the Hot Spot PM series approaches the efficiency of a horn while delivering superb intelligibility over a frequency range from 150Hz to 15kHz. The PM's wide range of versatile options make it an appropriate choice for virtually every compact speaker installation.

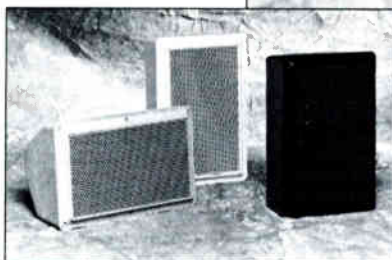
- Model PM: 120 watts power handling capacity with nominal impedance of 16 ohms.
- Model PM-B: includes swivel wall/ceiling bracket.
- Model PM-70/100: 70 or 100-volt versions with selectable taps from 3.5-50 watts for use in distributed systems.
- Model PM-F: available in black, white, or paintable primer gray.
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- All models feature rugged ABS enclosures with metal grille.
- 3-year warranty.

For additional information and literature about the Hot Spot PM series or the entire line of Galaxy products, contact your local representative or Galaxy Audio directly at (800) 369-7768.

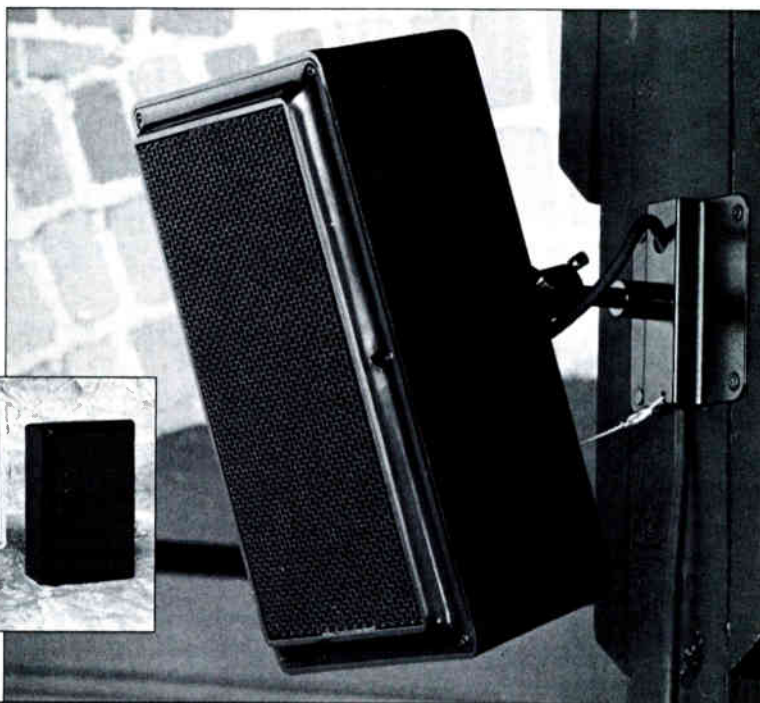


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New digital technology is here. Work is already underway by some forward thinking people on delivering dozens of digital channels to your business, home, or car. "Pay radio" is not a pipe dream. *It will happen soon.*

If the "pay radio" converter/decoder box cost stays around a hundred bucks or less, look out. You'll be able to enjoy "pay radio" in your car, going to work. No commercials, no talk. Just non-stop digital quality music. And, if you live in rural areas or small towns where niche formats like jazz, classical, heavy metal, funk, alternative and reggae aren't commercially available, think of it! Small markets should have proportionately higher penetration rates than big cities.

If these guys have their thinking caps on, they'll also make the box portable. Imagine "Mom and Pop" single store

owners listening to "pay radio" in the morning while getting dressed, taking the box to the car, listening as they drive to work, then taking the box into the office, and home again. Just plug in your antenna and RCA jacks. All those channels in digital quality, all that flexibility for around ten to fifteen bucks a month. Incredible! Where do I get mine?

Suppose a business music supplier in a small town of 200,000 people provides music to 300 of the local businesses at around \$35 per month. That's \$10,500 per month in gross sales. Now picture the income of twenty to fifty percent of the 100,000 potential "pay radio" customers in the area at \$10 per month. That's \$200,000 to \$500,000 per month in gross sales. As you can see, "pay radio" sales will easily dwarf "business music" sales.

Music companies must realize that they should not exclusively be in the business of business music, or residential music. While DBS, cable, tape and other music delivery methods may be suitable for some applications, they won't cut the mustard when it comes to providing "pay radio."

Music companies should be in the business of providing music programming and related services to *any* subscriber who will pay their asking price. Whatever technology gets the job done at the right price is the winner. The amazing thing is that the people who have developed this new technology are *not* one of the companies who have the most to lose . . . it's market share.

Be prepared to see the term "business music" vanish into thin air. I'd bet all my quadrophonic Bay City Roller eight track tapes on it. ■

## 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.

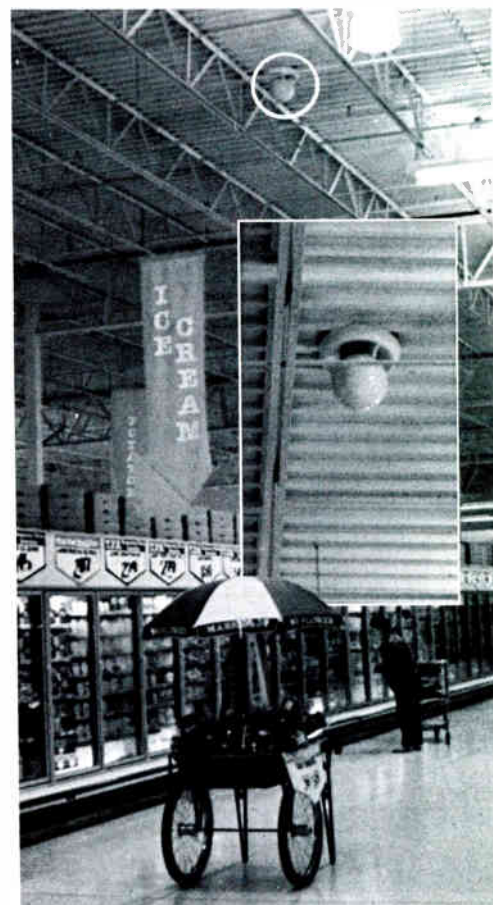
Scott Miller, Manager of Pro Sound at Muzak of Minneapolis, notes that the Cub Foods executives selected parchment-colored #110 Soundspheres to meld with the ceiling color and felt that the shape and color were highly compatible with the contemporary interior design esthetic.

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# The LMS Analyzer System

*Does it Stack Up?*

BY MIKE KLASCO

**A**udio Teknology Inc.'s LMS is both the newest and least expensive computer-based acoustical test analyzer available. First shown at the October 1991 AES, the LMS circuit card, software, and mic sell for \$1,195.

The LMS promises to provide you with frequency and phase response, impedance, RT60, distortion, and many other measurements that are offered by other computer-based analyzers that cost more than twice the price. And at first glance, the LMS system is about the price of a standalone  $1/3$ -octave real-time analyzer like the Audio Control. How the LMS stacks up against other analyzers will be the focus of our examination.

ATI may be a familiar name to some of our readers as they are known for building the Paragon, a state-of-the-art \$95,000 touring sound mixing board. Priced more down to earth is ATI's popular and respected LEAP speaker design software, a very sophisticated and powerful program.

Because the LMS analyzer is both simple to operate and relatively cheap, it will be extremely appealing to many sound contractors. A few years ago, a product manager who was having his

"baby" reviewed, commented that many people only read the first and last few paragraphs of a review and look at the graphics. So, if you want the bottom line on the LMS, my conclusion is that it is far more useful than a  $1/3$ -octave real-time analyzer, but lacks some of the speed, freedom from rejection of extraneous noise, and analysis power of its

**It is far more useful than a  $1/3$ -octave real-time analyzer, but lacks some of the speed and freedom of its more expensive competition.**

more expensive competition, such as the SYSid, MLSSA and TEF systems. Before going on, I should point out that I liked the LMS enough to buy one for a friend, who has been using it for about four months and is very happy with it.

The unit has been a moving target. From its introduction just a year ago, LMS has gone through three major software upgrades. The initial unit was underpriced at \$895, although no short-cuts were taken in construction or mate-

rials. Software release 2 brought the price to about \$1,000, and the most recent release of LMS 3.0 has stabilized the price at \$1,195; still quite a bargain. My final review version was 3.05. There is no sense in my dwelling on what was left out in earlier releases and the rapid filling out of the capabilities of the program represent an enormous effort on the part of the developers of LMS.

Essentially, the LMS is a swept sine wave analyzer, similar in concept to the old General Radio chart recorders of thirty years ago. With the "GR," a sine wave was swept and a sound pressure level meter (and chart recorder) registered the level. With the LMS, tracking band-reject filters attenuate extraneous out-of-band noise. But gating has been added, which allows pseudo-anechoic (room independent) measurements, which is more like the Neutrik system. Aside from measuring speaker frequency response and impedance, you can acquire acoustical and sound system data such as absolute sound levels, noise floor measurements, RT60 and polar plots. Since the LMS resides in the computer's buss, saving data to disc, printing out hard copy, calculating and post processing are all part of the package. As with the SYSid, MLSSA and TEF analyzers, many post-processing functions can be calculated after the data has been acquired.

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





LMS Main Menu/Control Panel.



LMS Post Processing Window.

A hidden cost benefit of the LMS system is the inclusion of a calibrated mic and preamplifier. The mic is an electret condenser with an integral preamp. While a typical calibrated mic costs more than the entire LMS system, clever techniques by the LMS developers has made a viable "disposable" instrumentation mic possible. A coded correction software file is matched with each unit, which the user installs when the system is first setup. Certainly there are differences between a calibrated mic with an inexpensive capsule that is corrected by software compared to a instrumentation mic with painstakingly selected materials, precision fabrication and extreme construction tolerance. Freedom from drift due to time, humidity, and so on are a few considerations. But the LMS system is compatible with Bruel & Kjaer and other instrumentation mics through the line input, and you always have the option to upgrade when you can afford to. In addition, you can send your mic back to ATI for software re-calibration (for a fee). ATI promises +/- 1 dB tolerance for its mic, with maximum levels of 125 dB.

Many sound contractors make and load their own speaker boxes. LMS offers many features that are especially useful for designing speaker systems, including determination of Thiele-Small parameters, display of up to 20 different

curves at one time, interface with box design and crossover design programs, time differences between drivers, impulse response and more.

One of the popular high-end programs used to calculate box characteristics is LEAP, also from ATI. Data exchange between LEAP and LMS is straightforward (as well as with other software programs and analyzers including TEF, MLSSA and Audio Precision). This is helpful not only for determination of Thiele-Small parameters, but also computer-aided-crossover design. I was sent a review copy of LEAP 4.1, which is copy protected with a hardware lock. It is my feeling that software can be buggy enough without intentionally looking for

problems. ATI feels differently, and in previous versions of LEAP (in my humble opinion) had gone overboard with copy protection. I was told that release 4 had all the problems solved, but when I tried to run the program, the "count-down clock" had inadvertently been triggered at the factory and the program was dead. ATI insists this was a fluke that could only happen with a reviewer's copy.

## OPERATION AND FUNCTIONS

Learning and operation is made simple by the use of Quickset files. These are templates that instantly preset all the functions for a specific operation such as impedance, frequency response, polar



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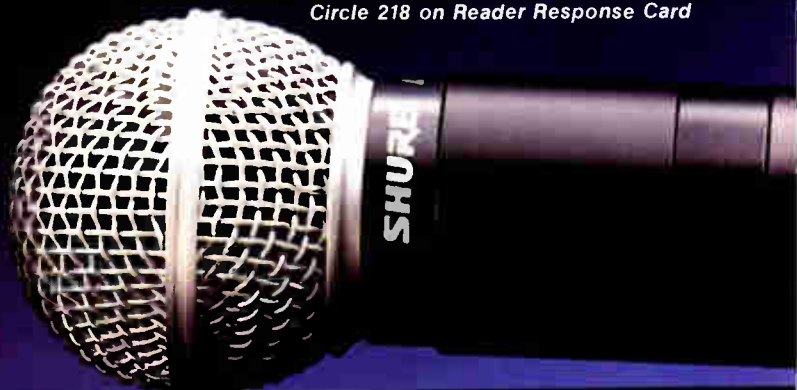
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response, and so on. Once you have loaded the Quickset file, everything is at the default settings. You can then easily tweak any setting for your specific needs.

The bandwidth is 10 Hz to 20,000 Hz in the speaker test modes, although the user has a number of selectable bandwidth options (and you can easily define your own bandwidths from 10 Hz to 100,000 Hz). As the oscillator sweeps, you may note that it occasionally stops and settles. This is essentially like using a manual oscillator and switching the X100, X10, X1 selector. When the levels line-up, the sweep automatically continues. If the levels do not line up within a preset time period (due to extraneous noise), the system will annotate this.

If you make speaker measurements, you are probably familiar with the nearfield techniques for under 200 Hz and the truncation or gating for the rest of the band. The problem is showing a composite of the entire frequency range in one printout. LMS has a good solution by allowing a low frequency sweep file to be spliced onto a wide-band graph. A second sweep that covers the remaining bandwidth is then superimposed.

The polar plotting capability is impressive with true circular plots, each showing up to eight frequencies. Polars can be plotted both manually (by moving the mic or speaker) or by interfacing the LMS card with an automated turntable.

LMS can calculate group delay curves from the phase curves. LMS cannot actually measure phase, but instead calculates it. This works fine for minimum phase drivers (just about everything but a speaker with a whizzer cone!), but is not so straightforward for speaker systems with crossover networks.

The color scheme on the parameter screens is garish, the fellows who developed LMS should stay out of the decorating business (I also have been given this same recommendation). Since the colors are programmable, you can do your own redecorating.

But far more important than the color scheme, is that the operation of LMS is

smooth, the software and hardware operation is free of bugs, and the system has a wide range of useful functions, a world beyond that of conventional  $1/3$ -octave analyzers. LMS will give the sound contractor the ability to make noise floor measurements and take the reverberation time of a space. After installing the speakers you will be able to calibrate the equalizer and crossover networks, including even making precision adjustments on parametric equalizers and continuously variable crossovers. Even an out-of-phase tweeter will be apparent with the high resolution of the LMS. For both the commercial and residential sound installer, the LMS gives him a powerful tool for selling his customers on the need for professional installation and setup.

### INSTALLATION

The LMS card fits into any XT, AT, 386, 486, etc. with a hard disc, and that can accommodate a full size slot. Most any video standard is accommodated up to VGA resolution. The LMS card is self-calibrating, and this is an entirely automatic operation that takes a few minutes. The use of a math coprocessor is optional, but LMS will speed up quite a bit on its many post processing operations when this IC is installed. LMS software installation was painless and mostly automatic. You can be up and running in an hour.

The interface to the rest of the world is through a multi-pin socket located on the rear of the board. An interface cable plugs in and fans out to three XLR connectors. These are for the mic, a line input, and the oscillator output. Since the mic has an internal preamp/line driver, up to 250 feet of cable can be used in between mic and analyzer.

### DOCUMENTATION, EASE OF USE, AND HELP

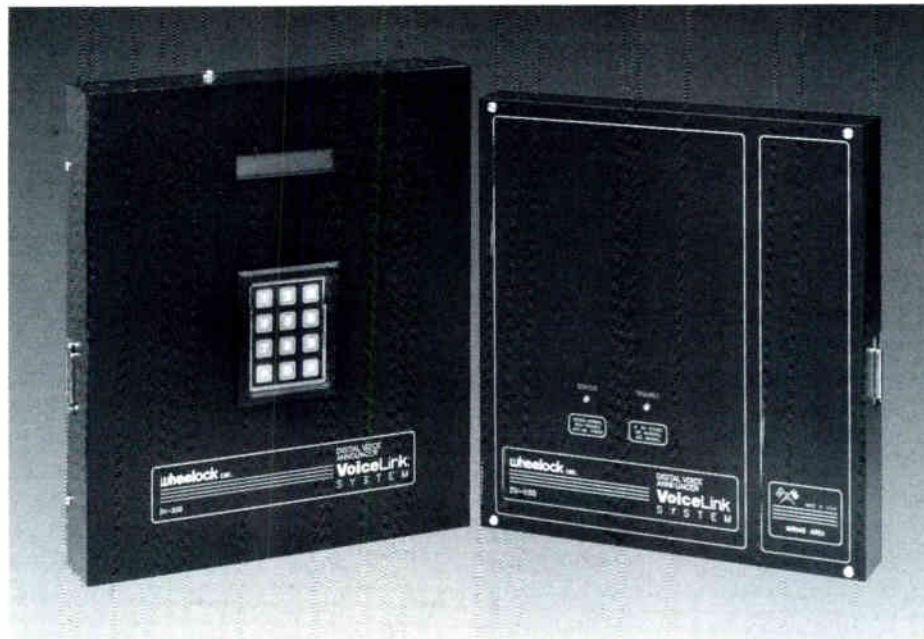
The documentation was excellent, with the manual having a Fast Start, Overview, Application Notes, and many other relevant sections. Support is by phone, fax, and a computer bulletin

board. While LMS does not have contextual help within the program, it is the easiest program to operate of all the computer-based analyzers, although you must have the manual handy; although many capabilities of the program are not obvious from just looking at the menus. I think this is because many new capabilities were added so quickly and still need to be integrated into the program more clearly. Still, let me say that most users familiar with only a  $1/3$ -octave analyzer are taking good measurements in a day. The gated swept sine wave technique requires the operator to have an understanding of the relationship of distance, time, and wavelengths, but this is the physics of acoustical measurements, common to any stimulus-response analyzer, not just the LMS.

### WHERE DOES LMS FIT IN?

The LMS system is reminiscent of the IQS 401, the first computer-based FFT analyzer specifically designed for audio, introduced ten years ago. I must hasten to add that in every way the LMS is technically and functionally superior. The IQS was a plug-in board and software package that cost about \$1,200. It was first developed at Acoustic Research, ran on a super-minicomputer and was eventually re-engineered to work for the Apple II (not to be confused with the Mac II) and commercialized by IQS. Although they sold over 400 systems in the early 1980s, IQS and for that matter, the Apple II, are gone now. Without going into more of the historical details, the lasting benefit of the IQS was that it was a powerful acoustical training tool for a generation of audio engineers — a function that I believe the LMS is destined to take over.

Today most sound installers have access to a  $1/3$ -octave analyzer, but these devices lack adequate resolution to properly calibrate electronic crossovers, parametric equalizers, and cannot work in the time domain: such as for phase response, reverb time measurements and pseudo-anechoic measurements. The least expensive acoustic



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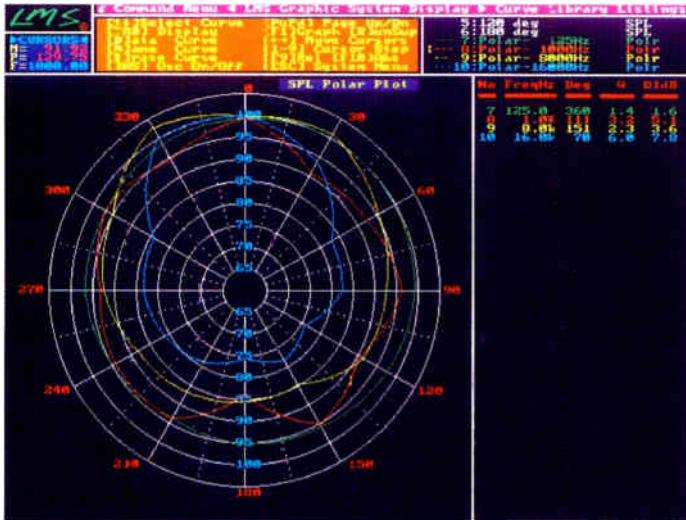
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Polar Plot Display.

analyzers, such as the MLSSA and SYSid cost about \$3,000, and still require at least another \$2,000 for a calibrated mic, preamp/power supply (like the Josephson C550 pack age at \$550),

and a computer system.

Of course you cannot directly compare the \$1,200 for the LMS with the same price for an Audio Control 3050 1/3-octave analyzer. The Audio Control

is a self-contained battery operated portable that you can easily carry around. Sure you can buy a battery operated portable computer that has room for a full size board, or a "belly pan" underchassis accessory like the Wonunder. But the least expensive off-the-shelf full slot portable I can think of is from Toshiba and costs over \$3,000. The combination of the Wonunder and a compatible portable computer is over \$2,000. You will not get away with a complete system for under \$3,500. This is still a great bargain, but no longer in the \$1,200 category of the Audio Control. If you are very strapped for cash, you could pick up a used, but complete, 286 desktop system for a few hundred dollars and be operational (but not very transportable) for not much over \$1,500. For developing and testing speaker systems, this desktop configuration will

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work fine, but don't think of dragging all this stuff around from job to job.

I found the best compromise between the lightweight and completely portable computers and the high resolution monitors working from a desktop computer was the shoe-box transportable. The model I put together has a very high contrast VGA plasma screen, actually viewable in direct sunlight, with a 486 cpu. The whole thing weights less than 20 pounds and has a soft carrying case. When I am in my lab, I can connect a 800 x 600 resolution monitor, and the keyboard is pretty much full size. I still need AC power, but even with a battery operated portable, you still are stuck with an umbilical cord anyway for the stimulus signal with LMS, MLSSA, SYSid, and TEF. Of course with a portable 1/3-octave analyzer, you only need to have a pink noise generator feeding the sound

system and off you go with your analyzer — free of any connecting cords.

In direct comparison with MLSSA, SYSid and TEF, the LMS is not quite in the same league, especially in speed and extraneous noise rejection. Although I have not had extensive hands-on experience with the TEF 20 yet, I can say that the MLSSA and SYSid are astonishingly impervious to spurious noises. Lawn mowers, cleanup crews, helicopters, and air conditioning systems are no match for the synchronous averaging techniques and the powerful and high crest factor stimulus test signals used by these test systems. TEF is well known for the same robustness to spurious noise. For wide-band testing TEF, MLSSA and SYSid can take accurate measurements in a few seconds, although high resolution low frequency testing may require 30 seconds or more.

With the LMS, a medium resolution sweep takes 30 seconds, and a high resolution sweep about two minutes. If you have traveled an hour or two to get to the job, so what if the measurements take a few moments longer! But if you have to do many repetitive tests and you have worked with the more expensive analyzers, the LMS will feel painfully slow. For production line testing LMS does offer automatic operation. A more important concern is the lack of repeatability of the results in the presence of high extraneous noise. LMS uses a swept test tone as the stimulus signal and on the analyzer end, has a band-pass filter get rid of spurious noise. This works fine for noise that is not at the same frequency of the test signal, but wideband noise from air conditioners and other sources can contaminate the results, especially below 100 Hz. With the LMS



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# DRIVE THE WHITE LINE



MODEL 140



MODEL 4240A



MODEL 4400



MODEL 4500



MODEL 4660



MODEL 4675



MODEL 4700



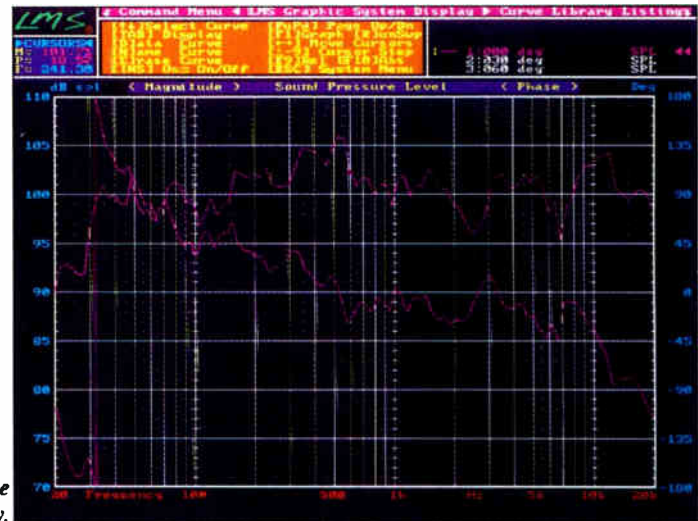
MODEL 5000

EQUALIZERS CROSSOVERS  
DELAYS ANALYZER

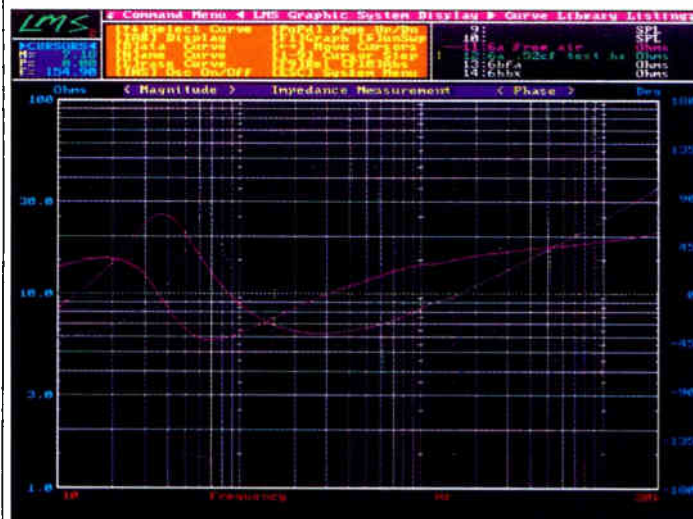


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you can increase the test signal level, or use the high resolution mode, but I found consistent results were still elusive under certain conditions. Under the same conditions the SYSid and MLSSA had no problems, as I was able to simply increase the number of synchronous averages of the test cycles. Synchronous averaging improves extraneous noise immunity 3 dB each time the number of averages is doubled and the LMS system does not offer this capability. LMS does have an averaging utility, but first the user must acquire each curve (at 1/2 minute to two minutes a pop), then proceed to average the curves. A reality check is necessary here, as the noise rejection problems were in oddball cases.

One situation was a listening room of a speaker factory in Korea, directly behind the room was an enormous generator for the cone factory. The entire room shook and reverberated. So if you happen to have a cone factory directly next to your jobsite: watch out!

## CONCLUSION

For testing in high-end residential sound systems, recording studio installations, churches, movie theaters, night clubs, and many other commercial jobs, I recommend the LMS as the next logical step up from a 1/3-octave analyzer. But if you can afford the extra few thousand dollars, consider investigating the more expensive acoustic analyzers. ■

Circle 272 on Reader Response Card

## NEWS FROM AROUND THE INDUSTRY

# Soundolier Line Debuts; Daytona Speedway Upgraded

### Soundolier New Product Line

Atlas/Soundolier has formally announced its new consumer electronics brand to serve the home theater and custom audio/video installation markets. The complete line of Integrated Home Electronics will be identified under the Soundolier name. Daniel Ferrario is the Consumer Electronics Director. The new line will be shown at the winter CES in January. The Thundra subwoofer system will be shown along with new volume control modules and electronic switching accessories. The company will also be adapting its Ambiance multi-room distribution system to fit the Soundolier line, in addition to a variety of accessory components, updated devices, and control systems. Earlier this year, Atlas/Soundolier introduced the Aura-Style in-wall loudspeakers. These items will also be classified under the Soundolier brand name.

### Peavey Equipment at Daytona

Peavey Architectural Acoustics equipment has been installed to upgrade the Daytona International



Isaac Addison, head engineer of Sunstate Electronics, and IPS-800 amps used at Daytona.

Speedway's sound system. Sunstate Electronics in Daytona Beach, which has been servicing the Speedway, chooses the equipment. Sunstate used IPS-800 amps. Multiple IPS-800s were installed in the garage area of the infield which provides multi-zone paging to various areas. The decision was made to replace the entire infield system with IPS-800s, ending with 14 of them. The IPS-800 was bridged into two Peavey Automatch transformers in series. The original design was a 210 volt distributive system.

### Intelix System Chosen

An Intelix Mind Control System has been installed to handle all of the emergency paging system duties at the Gentilly II nuclear power plant in Quebec. The previous relay matrix system used for emergency paging had begun

by plant engineers. Also included are 16 microphone and line-level inputs, again with their signal path determined by plant engineers. High quality signal compressors provide a constant signal level to the matrix, and to each subsequent zone. Twelve of the individual zones have independent outputs, allowing for supervision of critical signal paths and power amplifier circuits. The Mind Control System hardware and software are designed and produced by Intelix, a Mark IV Audio product line; they allow for control of room characteristics to be combined into a specialized and all-inclusive system.

### AMX On "Space Shuttle"

AMX's Axxess system and control panels have been installed in two full-scale space shuttle orbiter replicas, one at the U.S.



Space shuttle orbiter replica.

to show signs of age and needed replacement. Security Information Systems (SIS) of Quebec chose the Mind Control System. SIS handled much of the design work, as well as installing the system. The emergency system includes four different alarm signals, supplied by redundant signal generators. These alarm signals are triggered by contact closures and routed to various output zones, which are predetermined

Astronaut Hall of Fame/U.S. Space Camp in Titusville, Florida, and another at Expo '92 in Seville. Each replica stands 57 feet high, 122 feet long, has a wing span of 78 feet, and houses a multimedia theater in the shuttle's cargo bay, which seats more than 70 people. AMX products control the synchronization of various media, and simplify the running of the complex show. Renaissance Entertainment & Creative Services

of Orlando produced both shows, and Consolidated Media Systems of Winter Park, Florida, evaluated and installed all equipment. AMX was able to program the equipment by computer and modem, thus allowing for any last minute or future reformations of the programs. Scott Miller, president of AMX, said, "This unique application of AMX products reflects the adaptability of our technology to a broad range of situations."

### BASF Supplies DCC Tape

BASF, involved in developing the tape formulation for the Philips Digital Compact Cassette, has begun supplying DCC duplicating tape to major U.S. duplicators, including Capitol, Cinram, Sonopress and WEA. According to BASF vice president Daniel Malcorps, "Following close cooperation with Philips, BASF has started regular business with the record companies. . . Key to the superb quality of BASF DCC Maxima tape is its backcoated digital chrome tape, a formulation with extremely fine chromium dioxide particles specially optimized for the demands of digital recording."



BASF DCC tape

### Console Sale

Writer/producer Mike Chapman has purchased an Allen & Heath Sigma mixing console, according to the company. Chapman is using the 56-input Sigma in his home stu-





dio, linking it to two Otari MTR-90 24-track tape machines.

### AEI Launches New CD Service

AEI Music Network Inc. has announced the launch of its CD-I proprietary format compact disc business music service. Calling the 1990s the "Digital Decade," Michael J. Malone, chairman and CEO of AEI, said that the ProDisc CD music service would be available for commercial clients through authorized AEI Music affiliates in 1993. Among the features of the ProDisc player that is part of the service are back-plate features including bass and treble controls,

mono and stereo outputs, and a 25-watt amplified output. AEI's investment includes source material, recording equipment, pre-mastering equipment, and mastering equipment, along with duplication and broadcasting equipment. The AEI library will contain 250 four-hour music programs. Each proprietary disc will be encoded to expire between 12 to 18 months from its issue date.

The ProDisc includes ReMix software which allows the unit to recombine individual songs into a different program order each time a disc is played. Rather than random access, the software uses as many as 25 elemental classifica-

tions of a song to determine where in a specific program map the song should appear.

### Syn-Aud-Con Workshop Planned

The 1993 Live Sound Reinforcement Workshop will be held January 12 through 14, 1993 at Chapman University in Orange, California. The event, just prior to the NAMM Winter Market, is co-sponsored by Synergetic Audio Concepts and Pro Sound News.

### RCS Supplies Sound

RCS Corporation has recently provided live audio reinforcement for Arlo Guthrie and George Clinton and the P-Funk All Stars. The Arlo Guthrie show was at the Meadow Ridge Amphitheatre in Uniontown, Pennsylvania. Gary J. Jurist acted as assistant house

engineer and John Kosinski as monitor engineer. Equipment included a Ramsa house console, Soundcraft monitor console, Crest and Carver house amplifiers, Ashly monitor amplifiers, and proprietary speakers for the house and monitor.

### Theme Parks Using IED

Innovative Electronic Designs has announced the use of the company's UDAPS 2000 Series systems in several new theme parks. Knott's Berry Farm, Camp Snoopy, and the Fiesta Texas Theme Park are providing computerized control of their CD and DAT audio machines for program and background music playback. Park personnel can create multiple audio scenarios for numerous situations. The IED systems provide park-wide paging as well.

## Hearing Assistance + ADA = Opportunity

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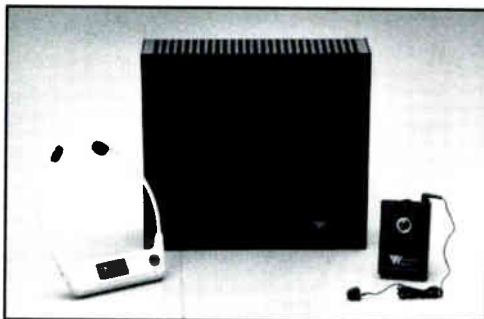
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### Denon Announces New Tuner

Denon has announced a new component tuner which receives both AM stereo and FM stereo broadcasts. The new tuner, The TU-680NAB, has been developed in cooperation with the National Association of Broadcasters to bring full reception-standard compatibility to NAB-member broadcasters, who will use it to monitor transmission quality. The TU-680NAB is compatible with the AMAX AM standards, which mandate a wider tuning-band range. The AMAX certification was developed jointly by the NAB and the EIA. The tuners suggested price is \$600.

### Notre Dame Gets New Center

System installation at the new DeBartolo Center of the University of Notre Dame is being performed by Sound Engineering of Livonia, Michigan. Design work was done by Bob Kehl of Kvernstoen, Kehl & Associates of Minneapolis. The installation is being directed by project engineer Chuck Oslanci of Sound Engineering. The \$350,000 audio system is dominated by Electro-Voice speaker systems and microphones. The DeBartolo Center will include a total of 34 classrooms, many of which will feature teleconferencing, speech reinforcement and music playback capabilities. Six of the classrooms will have

a capacity for 100 students, with stereo playback clusters suspended from the ceiling and located to both sides of video screens. The largest room in the facility is designed to hold 450 students and will have four clusters (two speech, two stereo playback).

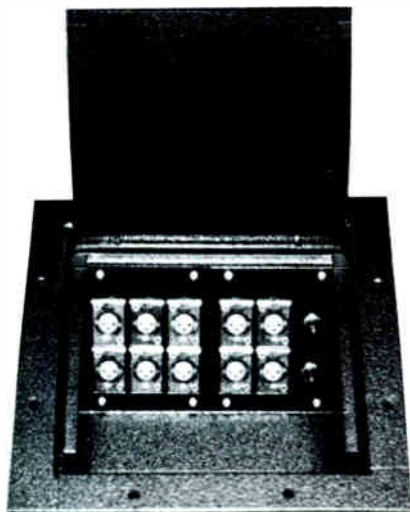
### Panasonic Broadcast Enters Laserdisc Market

Panasonic Broadcast & Television Systems Company has entered the laserdisc market with the introduction of the AG-LD30 industrial multi-laserdisc player. The new player features an RS-232C computer port, Laserdisc barcode capability, RF modulator output, S video output, two digital audio channels, three-inch and five-inch audio CD capability and CD video capability. The IBM



driver conforms to Microsoft Windows 3.1 specifications for Media Control Interface device drivers for both a videodisc and CD playback on the LD player. The suggested price is \$895. The player is available through Panasonic Broadcast's professional video dealer network and through Value Added Reseller and System Integrator channels of distribution.

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# THE INS & OUTS

ROLLS has 3 new rack units the RA62HA headphone amplifier, RM81 and RM83 mixers. The RA62RH will power 6 pairs of headphones with six 1/4" headphone outputs, 1/4" stereo input on the front, right and left 1/4" inputs on the rear, and 6 bypass jacks. The front panel controls

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

The controls are 8 VOLUME and MASTER VOLUME. There is a channel muting feature for remote muting of any or all channels. The RCA jacks can bridge several RM81s or RM83s together. All this at a cost of \$200, \$290, and \$290.



#### RA62HA Features

- 6 Headphone outputs with level controls
- Up to one watt output per jack
- Stereo/Mono switch and Pan control
- DC to 30KHz response for accurate sound

#### ROLLS RM81 MIXMAX Features

- Aux/Buss INs and pre-fade OUTs

- 8 XLR mike inputs and phantom power switches
- 8 1/4" jacks that can be jumpered to either line in or line outs
- Wide range tone controls on each channel

#### ROLLS RM83 MIXMAX 2 Features

- 8 stereo inputs and RCA bridging jacks, stereo outputs

- Standard 19" X 1.75" EIA rack chassis
- 8 mute pins for remote muting of any or all channels



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November 1992 63





Spinal Tap

### Shure and Spinal Tap

Shure Brothers has announced that it provided support to Spinal Tap's "25th Anniversary" Tour with microphones and wireless systems to cover all sound reinforcement

applications. The tour used Shure Beta 58 microphones on vocals, Beta 57 microphones on guitar amplifiers, an assortment of mics on drums, and the L Series LS114 wireless systems on specific guitar applications.

### URS Consultants Completes Restoration Designs

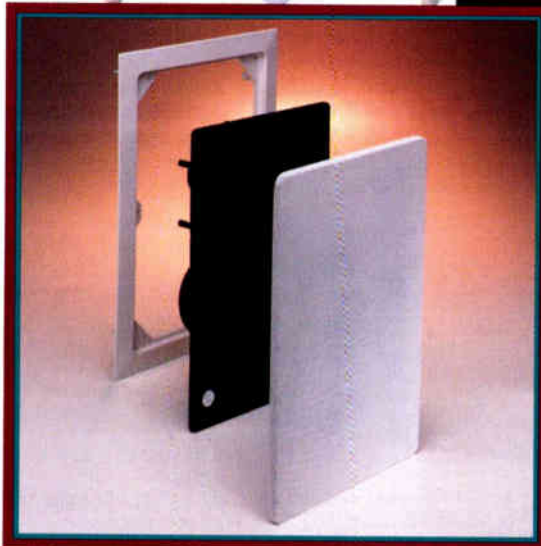
URS Consultants, Inc. has completed final architectural and engineering designs for a major restoration and expansion of the Glendale Civic Auditorium. The \$12 million project is slated for completion in 1994. Built in 1936, the Civic Auditorium is a focal point for the Glendale, California community. The current project will add a two-story addition and a new parking structure. Inside, the renovation will add some 14,000 square feet. Other amenities will include enhanced acoustics and a new sound system for the restored auditorium, new lighting, electrical, and plumbing systems, and improved traffic circulation. "The Auditorium was designed in the architectural vernacular of 19th century California," says project manager L. Michael McKay, AIA, of URS Con-

sultants. "We've worked hard to preserve its original character."

### Fairlight Returns to America

Fairlight has re-established its presence in America with a new Los Angeles office and the appointment of Phil Robinson as Northern American Sales Manager. In another move to consolidate its position in the U.S., the company has added to its technical support facilities through Digital Support Group, whose factory trained technicians provide a 24-hour service for Fairlight users throughout North America. Fairlight's marketing manager, Andrew Bell, said, "Our major investment in people and facilities in Los Angeles reflects Fairlight's long-term strong commitment to the American professional audio industry."

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# Planning For The New Year?

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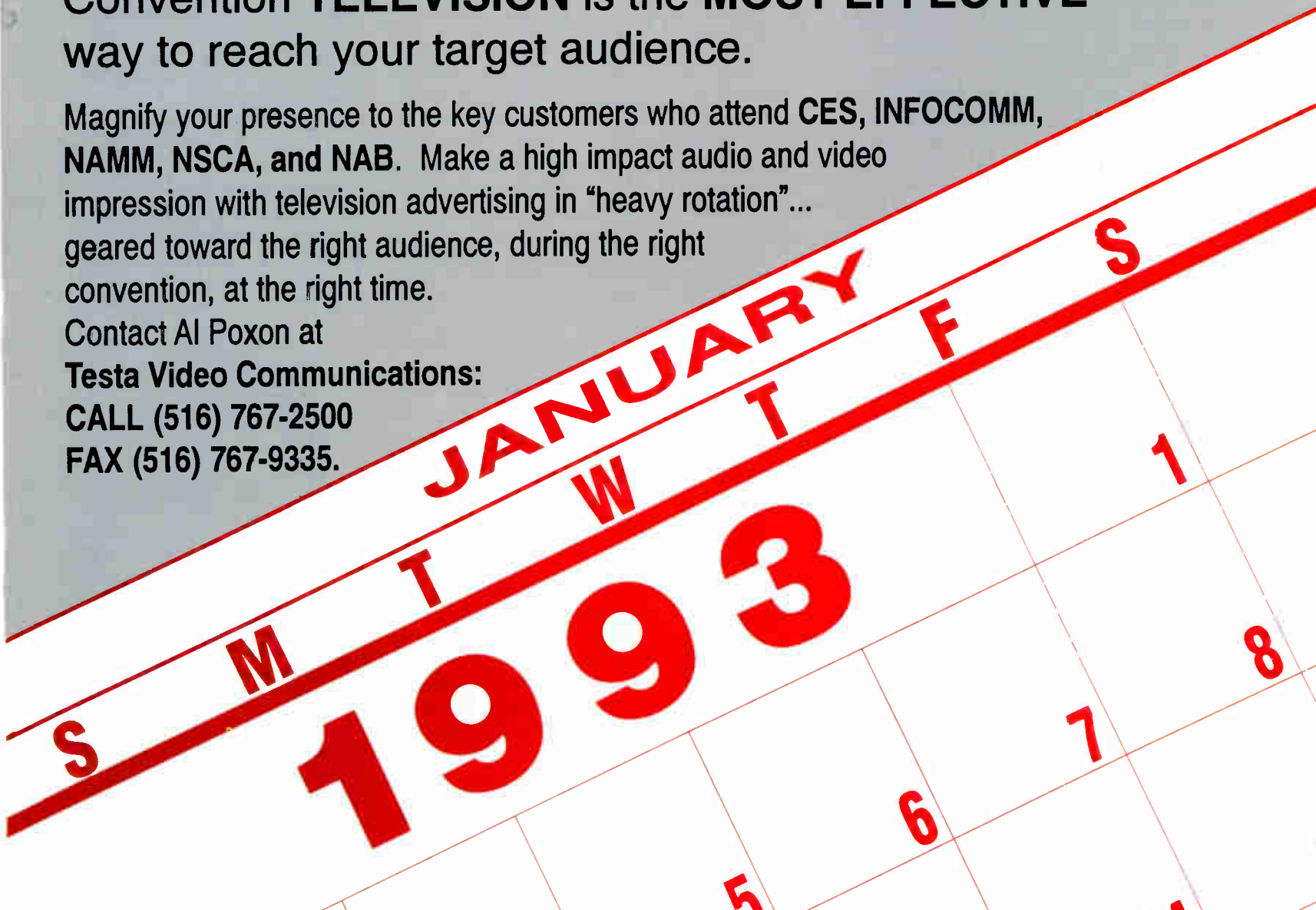
# TELEVISION

<p><b>CES-TV NEWS</b>  at the Consumer Electronics Show  January 7th-10th, 1993  in Las Vegas  June 3rd-6th, 1993 in Chicago</p>	<p><b>NAMM-TV NEWS</b>  at the National  Assn. of Music Merchants  January 15th-18th, 1993  in Anaheim</p>	<p><b>NAB-TV NEWS</b>  at the National  Assn. of Broadcasters  April 19th-22nd, 1993  in Las Vegas</p>
<p><b>INFO-TV NEWS</b>  at INFOCOMM  January 14th-16th, 1993  in New Orleans</p>	<p><b>NSCA-TV NEWS</b>  at the National  Sound and Communications Assn.  April 2nd-4th, 1993  in Orlando</p>	<p><b>AES-TV NEWS</b>  at the Audio  Engineering Society  October 12th-15th, 1993  in New York</p>

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## Acoustic Research Debuts Sound Reinforcement System

Acoustic Research, the division of International Jensen, Inc. has announced the debut of the new Pro-Art sound reinforcement system at the Tanglewood Music Center in Lenox, Massachusetts. High and midrange frequencies for a Tanglewood performance of the Kronos Quartet were handled by six Pro-Art 2 full range systems. The Pro-Art 2 is a compact, full-range, two-way system which incorporates two eight-inch midrange/woofers and a one-inch liquid cooled, horn-loaded compression driver mounted into an acoustic suspension enclosure. Low frequency performance of the Pro-Art 2 systems was augmented by the addition of four LR 48 bass enclosures. Mark Waker, director of marketing for AR, said, "We've concentrated on low distortion, pattern control, transient performance, and neutral tonal voicing. Most systems of this type cross at 1 to 2 kHz. The Pro-Art 2 crosses over much higher, which provides improved transparency and openness. For this reason, we've opted for two relatively small eight-inch drivers."

The Pro Art System, including these and other new AR professional products will be available, according to the company, in mid 1993.

## REP NEWS

### First Choice Named

First Choice Marketing has been named the sales representative firm for Crown in the northwest United States. First Choice president Tony Tudisco and his staff will be covering a territory that includes Oregon and Washington, as well as western Idaho and western Montana. Prior to founding First Choice in 1990, Tudisco was vice president of sales and marketing for Sennheiser Electronics Corp. A supporting member of the National Sound and Communications Association, Tudisco has more than 24 years of experi-

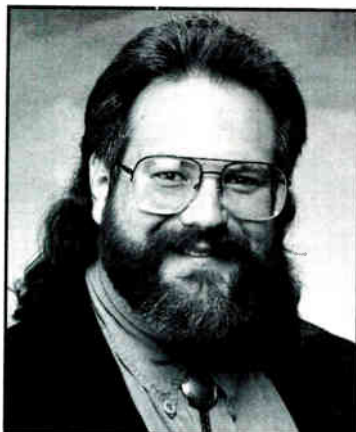
ence in professional and consumer electronics.



Tony Tudisco

### Erikson Expands

Montreal-based Erikson Pro Audio has been appointed the Canadian manufacturer's representative for Atlas/Soundolier. Erikson Pro Audio has branch offices in Vancouver and Toronto. According to an Atlas/Soundolier announcement, the new affiliation will "emphasize Erikson's commitment to expanding marketing activities in the commercial, institutional and industrial activity segments of Canada." Erikson Pro Audio is a division of JAM Industries, the parent of Erikson Music, Coast Music, Korg Canada and Martin Canada Lighting.



Martin Miranda

### Rose Marketing for S&S

S&S Industries has announced the appointment of Rose Marketing to manage the company's na-

tional sales force, open foreign markets, and provide ongoing consultation services. Rose Marketing was recently formed by George Rose, who was previously national sales manager of LP Music Group and Numark Electronics, and vice president of sales and marketing of Rhythm Tech.

### Visual Information Appointed

International Space Optics, S.A., manufacturers of Rainbow CCTV lenses, has announced the appointment of Visual Information Marketing Services of San Leandro, California as its representative for northern California and northern Nevada. The firm is headed by John Spofforth.

### Bag End Reps

Mark W. Wieger has joined the rep firm of Irwin Ensemble Marketing of Hamilton, Ohio and will represent Bag End Loudspeaker Systems in Michigan and Indiana. Irwin Ensemble also represents Bag End in Ohio, Kentucky, and western Pennsylvania.

Strategy V of Chicago has reached agreement with Bag End to act as manufacturer's representative in northwest Wisconsin, Minnesota, North Dakota and South Dakota. Errol Joki, president of Strategy V, said, "We look forward to a strong partnership with an innovative manufacturer."

World Arts of North Hollywood, California has agreed to represent Bag End for international markets. The announcement was made jointly by John Vitale, sales manager of Bag End, and Martin Miranda, president of World Arts. Miranda was general manager and international sales director of Valley Arts, USA, prior to forming World Arts. As a sound reinforcement engineer and rack designer he has worked with artists such as Larry Carlton, Lee Ritenour, and Christopher Cross.

### Peter E. Schmitt Appointed

Hughes Microelectronic Systems Division has appointed the

Peter E. Schmitt Company its sales representative for the New York/New Jersey territory. George Xouris, contracting specialist and consultant liaison for the Schmitt company, will be directing the sales of the Hughes line of voice intelligibility processors.

### Pacific Rim for MTX

Pacific Rim Marketing is representing MTX car audio and Soundcraftsmen home electronics lines in the Pacific Northwest. Mark Giovannetti is the firm's president.

### Rane Canadian Distributor

Rane Corporation has announced the appointment of Omnimedia Corporation to handle its Canadian distribution. Ray Bloom, director of sales and marketing for Rane, said, "With Omnimedia's 19 years of experience and high focus in the professional and commercial marketplace, this should be a good relationship for Rane Corporation."

### Cassady Joins Excellence

Excellence Marketing has announced that Paul Cassady has joined the firm as a salesperson. He was previously a music retailer. Excellence Marketing represented



Paul Cassady

15 manufacturers of audio, musical instrument, and lighting equipment to retailers, distributors and contractors in Minnesota, North and South Dakota and western Wisconsin.







# PRODUCTS

## A-T's Minis; dbx Gate

By Steve Jacobs

### Miniature Mics

Audio-Technica U.S., Inc. has debuted its Engineered Sound series of microphones. Engineered Sound products are designed for sound contractors and include the MicroLine series of ultra-miniature mics.

Among the first releases within the series are the AT 933PM/ML and AT933R/ML MicroLine miniature shotgun microphones. The mics are designed to be highly directional and feature a narrow acceptance angle for sound pickup problems and a line + gradient design for a



*Steve Jacobs is the Associate Editor of Sound & Communications.*

polar pattern found on larger microphones.

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include defined coverage angles of 60-degrees horizontal and 40-degrees vertical with smooth roll-off



### Expander/Gate

The dbx model 172 SuperGate uses 24dB/octave Voltage Controlled Filters (VCFs) to allow for selective isolation of the signal requiring gating. The filter controls are parametric and the control range has been optimized.

Its Transient Capture Mode uses a precision linear-phase all-pass filter to insert 0.3 milliseconds of delay in the main signal path, allowing the 172 to pass the leading edge of complex transient waveforms. The 172 also features a dedicated Expander Ratio control which has been scaled to contain values for fast, repeatable setup and a OneShot mode which enables the 172 to create consistent note length from irregular drum hits.

**Circle 2 on Reader Response Card**

beyond those limits. Driver loading is maintained to below 500 Hz. The horn is fiberglass reinforced and combined with resin transfer molding technology.

**Circle 3 on Reader Response Card**



### Constant Directivity

The A/A 640-2 from Peavey is a constant directivity horn designed for permanent installation in sound reinforcement applications. The



horn has a ten-inch throat and is recommended for use with the A/A-4000T compression driver.

The dispersion characteristics

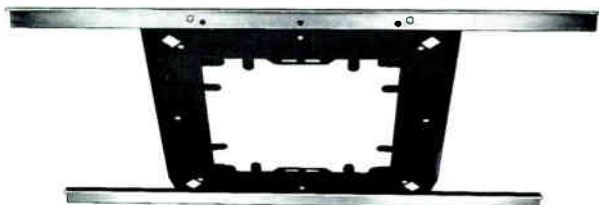
### Not Cube . . . QUBE

Renkus-Heinz has introduced the QUBE Series loudspeaker systems. The QUBE 2 and 3 both are coaxial systems. The QUBE 2 is a two-way system featuring a horn-loaded 15-inch woofer with a wide dispersion HF horn and one-inch compression driver mounted concentrically within the LF horn. The QUBE 3 adds an eight-inch midrange driver in a line array design.

The QUBE STK is a compact system that the company says, offers full size performance in a light-weight configuration. The associated QUBE LOW is a low frequency cabinet designed for applications that need more bass.

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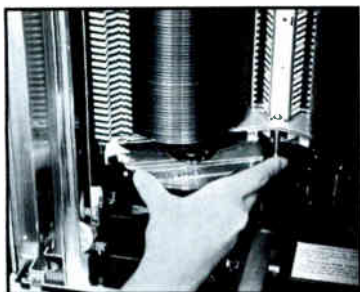
**Circle 279 on Reader Response Card**

### Compact Speakers

Technical Audio Devices (TAD) has introduced its first compact sound reinforcement system with 11-inch woofers to produce an arrayable monitor system designed for fixed install and touring applications.

The TCM-1122 combines four of TAD's 11-inch TL-1101H 500W woofers with the 16-ohm TD-4002 compression driver and TH-4631 high-frequency dispersion horn. The TCM-1122 features a frequency response range of 30 Hz to 20 kHz and a maximum sound pressure level of 135 dB.

Circle 5 on Reader Response Card



### 300 Discs

Pioneer Laser Entertainment has introduced a CD player with 300-disc capacity. The CAC-V3000 can be programmed to play up to nine days of uninterrupted music and features computer interfaces allowing control of the system by personal computer.

The 300-disc autochanger system also features two separate playing heads which operate independently, allowing for "zero wait time" between songs and avoiding downtime in case of technical problems.

Circle 6 on Reader Response Card

### Graphic EQs

Electro-Voice has introduced its EQ-215 and EQ-231 stereo graphic equalizers. The EQ-231 is a stereo, 1/3-octave equalizer with 31 bands-per-channel on ISO center frequencies from 20 Hz to 20 kHz that occupies



two rack spaces. It provides frequency control for applications such as feedback suppression. The EQ-215 is a stereo, 2/3-octave equalizer with 15 bands-per-channel on ISO center frequencies. Features include a switchable high-pass filter.

Circle 7 on Reader Response Card

### 200-Disc Changer

Denon has introduced a 200-disc CD changer. The DN-M200 uses a Denon-developed CD storage and transport system that contains two disc trays, each holding 100 discs. The discs are held by a retainer bar. The trays slide in or out of the mechanism housing which is equipped with a key-locking security door.

A PC-compatible control system for the DN-M200 interfaces to a computer via a standard serial port configurable for RS-232C or RS-422 formats.

Circle 8 on Reader Response Card



### Conferencing System

Gentner Telecommunications Systems has released the Acoustic Telephone Interface (ATI) 2.0. The ATI is a digital audio interface between a telephone line and a conferencing system. It operates in either audio or video teleconferencing systems to allow participants at both locations to speak simultaneously without cut-offs or clipped conversations.

Gentner claims improvements from the previous version in acoustic stability, sound quality and system feedback. The ATI is designed as part of the company's PeopleLink System One.

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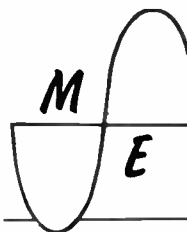
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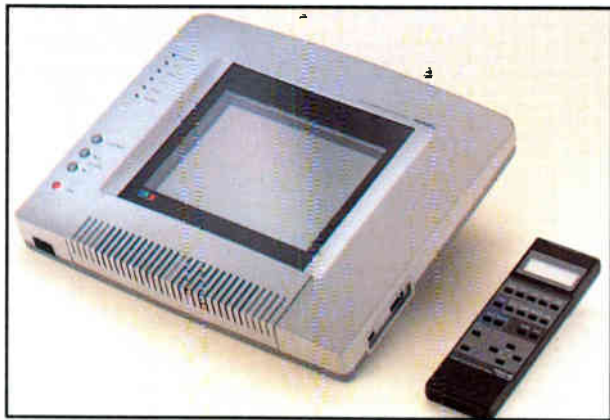


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### LCD Panel

Sharp Electronics has introduced the QA-1150 color TFT computer/video LCD projection panel. It incorporates a 640 x 480 dot 8.4-inch TFT (Thin Film Transistor) color LCD with an active matrix system that can display full-motion computer and video graphics in 185,000 colors. In addition, a monitor loop-through is built in for simultaneous viewing of a projected image and a local computer monitor.

*Circle 10 on Reader Response Card*



### Small Box, Big Sound

SoundTech has added the US12T to its Universal Series of speaker systems. The two-way system features an excursion 12-inch STS woofer and a Motorola piezo tweeter in a small box. SoundTech claims

increased low frequency response because of the system's long excursion capabilities. The enclosure has been computer tuned to the specifications of the speaker for efficiency and is designed for small club PA applications.

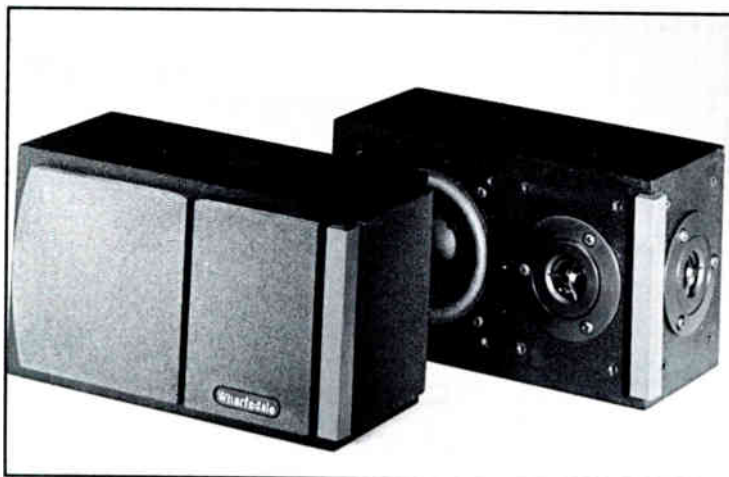
*Circle 11 on Reader Response Card*

### Satellite and Sub

Optim Audio, Inc. has announced the introduction of the Wharfedale Professional Products Model 2130 stereo satellite and sub-bass system to the U.S. market.

Each ported satellite enclosure contains front-mounted and side-mounted 3/4-inch dome tweeters aligned at 90 degrees, a three-inch midrange driver that produces a frequency response of 150 Hz to 20 kHz. The sub-bass unit houses two eight-inch, push-pull drivers that extend low frequency response to 40 Hz.

*Circle 12 on Reader Response Card*



### Security System Control

Javelin has introduced Quest Plus, a control system for mid-size security and surveillance system applications. Quest Plus offers control of system operating and programming functions using on-screen interactive menus with click and run pick lists. Quest Plus combines text, user-defined display and mouse operation.

Quest Plus is able to handle video switchers of up to 200 inputs by 40 outputs, 600 alarm sensor inputs, 600 relay contact outputs, 200 pan/tilt and zoom cameras and 10 operator controllers.

*Circle 13 on Reader Response Card*

monitor with resolution up to 1,600 x 1,200 pixels. The Megagraphics provides almost twice as much viewing area as standard 20-inch monitors. It can display multiple, actual-size pages on a single screen.

*Circle 14 on Reader Response Card*

### Multiple Device Interface

Intelx has introduced the PA-422 interface module, allowing linkage and control of multiple 422 bus-compatible devices through the Intelx Mind Control System.

Up to 63 separate 422 devices can be connected to the interface module. In addition, other 422 masters can be



### 29-Inch High Res

Barco has introduced the Megagraphics, a 29-inch graphics

connected to the 422 bus simultaneously via the interface module. By adding the interface, commands from a PA-422 device can be introduced into the Mind Control matrix.

*Circle 15 on Reader Response Card*

### Automation and Security

Ademco has introduced its Home Automation System that links with Ademco's Vista system to provide a home automation system that integrates home security with telephone, lighting, appliance and temperature control.

The Home Automation System is operated from the Personal Home Director and remote control devices known as Room Directors. A synthesized voiced with 2,000



to 3,000 phrases guides the user through the set up and operation of the system.

*Circle 16 on Reader Response Card*

**Look Ma, No Wires**

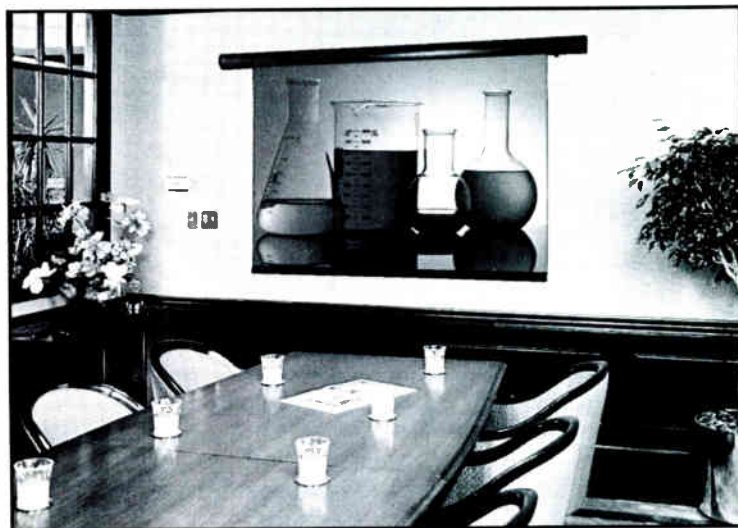
Draper Shade & Screen Co., Inc. has introduced the Profile: an electric screen that requires no wiring.

The concept incorporates battery operation, infrared remote control, and an ABS plastic fascia and end caps.

The Profile is offered in AC and

DC versions in sizes up to eight inches x eight inches or 10-inches diagonal. Demonstration sales kits are available to all dealers.

*Circle 17 on Reader Response Card*



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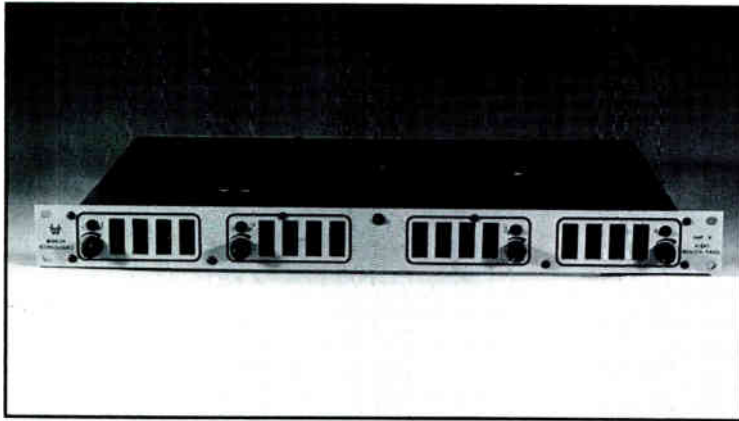
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### Four-Channel Monitoring

The VM-4 from Wohler Technologies allows simultaneous monitoring of four discrete audio channels with "voice quality" fidelity in a single rackspace unit. Each channel has its own dedicated power amplifier and speaker so the audio source signals remain separate from input to output.

Applications include monitoring of multiple audio inputs in theme

parks, security installations, convention centers, teleconferencing systems and other commercial sound installations.

*Circle 18 on Reader Response Card*

### Noise-Exclusion Earphones

Etymotic Research has introduced the ER-4 earphones. The ER-4 Canal Phones are in-the-ear phones that reproduce the average diffuse-field response of the ear at the eardrum and provide 20-25 dB of external noise exclusion allowing for monitoring in high-noise environments. The company claims a virtually flat response down to 20 Hz.

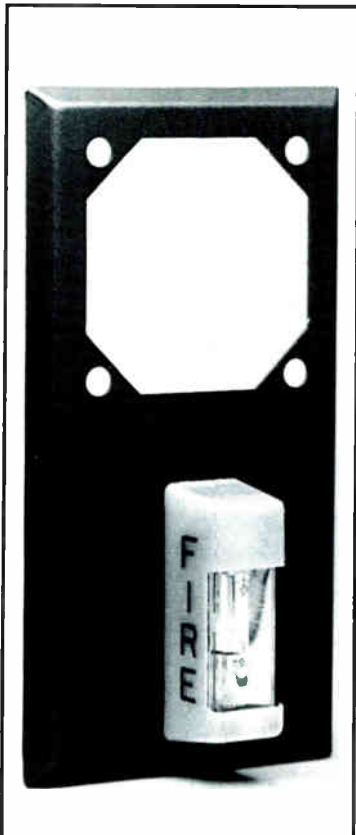
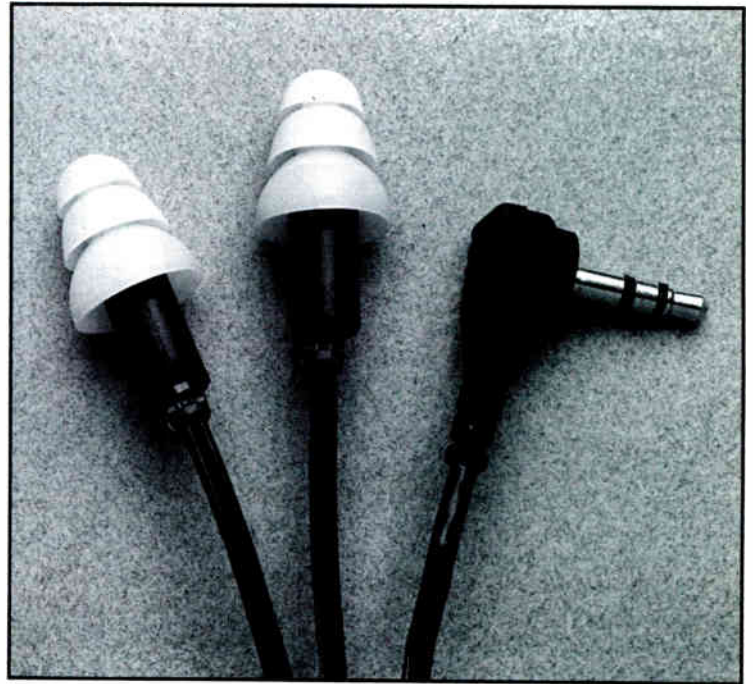
The Canal Phone fits into the ear canals sealing the canals with soft-flange ear tips or optional custom-fitted ear molds. The phones weigh less than one ounce and come in stereo and binaural models.

*Circle 19 on Reader Response Card*

### Strobe Retrofit Plate

Wheelock has added a strobe retrofit plate to its line of 117 Candela Strobe products for Americans with Disabilities Act (ADA) fire alarm signaling applications. The VLPM plate is designed for retrofit of existing audible signals with 117 candela strobes. The VLPM strobe plate mounts directly to standard four-inch square backboxes or to the SBL backbox for surface mounting.

*Circle 20 on Reader Response Card*



## COMING IN JANUARY

- Racks — Everything you ever wanted to know — Part One.
- The CEO at home and at the office.
- Sound Contracting in Asia.
- Special Events — Dealing with time and equipment — and coordinating them both.

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## NEWS

(Continued from page 66)

### Ampex Delivers Thousandth Award

The 1,000th Ampex Golden Reel Award was presented to Genesis for its album "We Can't Dance," which was recorded exclusively on Ampex audio mastering tape. The Golden Reel Awards, given to commemorate "excellence in professional audio achievements," has been an ongoing program with Ampex for 14 years. Over \$1 million has been provided to over 700 different charities chosen by the recipients of the awards.

In other news, Ampex has rolled out the Ampex 489DM S-VHS tape "specifically designed for audio digital master recording and digital bin audio duplication." The company says the product is designed to meet the changing needs of high performance digital audio multitrack master recording, "an area which increasingly uses the proven S-VHS video technology with products such as the Alesis ADAT Digital Multitrack system." Steve Smith, marketing manager for Ampex Audio Tape Products, said, "The market's response to the Alesis ADAT system has shown that the format can be quite successful. The tape is designed to stand up in the repeated-use environment of multitrack recording."

### MultiCom at VA Hospital

Multi-Communication Systems and Service (MultiCom) has reported signing a letter of intent with electrical contractor Fischbach and Moore to act as subcontractor on key low voltage communications systems for the new Veterans Administration Replacement Hospital in Detroit. Under subcontract to Fischbach and Moore, MultiCom will provide the auditorium audio/visual systems, auxiliary sound systems in the chapel, multipurpose/activities rooms, and catheterization lab, as well as the hospital wide broadband distribution system. The contract is reportedly valued in excess of a quarter of a million dollars.

Lonnie Ervin, president of MultiCom, said, "It is gratifying to see major contractors come to our community and offer work to local firms. Fischbach and Moore has placed a high priority on awarding significant contracts to small and minority owned companies and we are proud to be a part of their team."

### Mollnhauer Leaves Rauland Borg

Fred Mollnhauer has retired from Rauland Borg after 46 years. Mollnhauer began at the Rauland Corporation in 1946 and served the company in a variety of assignments, beginning as an inspector in the amplifier assembly department. In 1966, after 20 years of engineering experience, he was designated senior applications engineer assigned to the Sales Department. In recent years, he conducted a series of Service Schools on Telecenter communications. Rauland Borg issued this statement concerning Mollnhauer's retirement: "All of us at Rauland wish Fred godspeed in his new 'career' which we know will be fulfilling. We look forward to his future visits and the continuity of a most valued friendship."

### Symetrix in Germany

Symetrix Inc. has appointed Musik Productiv its distributor for Germany. Jon Bosaw, director of sales and marketing, said, "Musik Productiv was chosen based upon their enthusiasm and background. We feel they will be a great asset to our push to better serve our international customers and users."

### SKB Appoints Kaman Pro

SKB Corporation has appointed Kaman Pro as the exclusive distributor in the pro market. In conjunction with Bob Rufkahr, independent representatives will be set up to sell the SKB pro audio case product line and other related Kaman professional products. The sales and marketing for SKB are handled on a worldwide basis by Jerry Freed of Freed International of Fort Worth, Texas. Jerry Freed said, "It is important that we

have a distributor for this product that can give immediate service to the sound contractors and pro audio accounts. Kaman Pro is equipped with six warehouses. This network

will assure two day delivery anywhere in the nation. Bob Rufkahr was previously an independent rep and vice president of marketing for Altec Lansing.

## LETTER FROM THE EDITOR

(Continued from page 4)

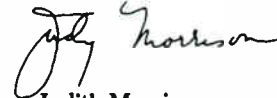
(generally acknowledged — but not officially by Fostex — as the ex-employees of the now defunct New England Digital) will be doing joint R&D with Alesis, according to Alesis.

And what about DAT? It's earned its place in the professional community, with Sony's DADC reporting that 15 percent (and increasing) of the mastering tape it receives is DAT. DADC regularly uses DAT as a reference tape sent to producers.

All these formats lead to confusion in the market, and in fact all-out war has been implied by parti-

san manufacturers. However, the digital domain is now housing more opportunities than ever for innovative applications of technology. The more clever in the audio community will conceive of applications using interactivity, microprocessor control, and inclusion of more and more functions to expand the uses of sound technology.

Best regards,



Judith Morrison  
Editor in Chief

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## LITERATURE

### Display, Panels and Projectors; B&K Testing

#### Examining Projection

The International Communications Industries Association (ICIA) Market Information Center has published Large Screen Display Systems: the US Professional Market, Liquid Crystal Display Panels, and Overhead Projectors: The International Market. Each wall chart provides a listing of the projection equipment available by the major distributors and manufacturers.

The eighth edition of Large Screen Display Systems lists more than 175 products from 35 manufacturers. The sixth edition of Liquid Crystal Display Panels (LCD) provides a listing of LCD projection panels used with overhead projectors.

Circle 21 on Reader Response Card

#### Instruments and Accessories

B&K Precision has released a 64-page catalog covering the company's line of electronic test instruments, including oscilloscopes, IC testers, spectrum analyzers, digital multimeters, signal and function generators, power supplies, component testers, video test instruments, probes and accessories.



The B&K Precision Test Instrument Catalog BK-93 provides specifications, summaries of product features and product features.

Circle 22 on Reader Response Card

#### Combined Catalog

Leitch has released the Leitch/Hedco Combined Catalog. This is

the first time information on all Leitch and Hedco products is available from one source. The catalog contains new products as well as sections on distribution amplifiers, test equipment and digital products, to name a few.

Circle 23 on Reader Response Card

#### Graphic Reporters and Specialty Printers

Astro-Med's graphic reporters and specialty printers are described in a four-color, 24-page illustrated catalog. The text is in English with French, German, Italian and Spanish translations.



The catalog features the company's line of chart recorders and OEM recorders/printers ranging from two- to 12-inch print widths.

Circle 24 on Reader Response Card

#### Magnetics

Microtran Company, Inc. has published a 28-page 1992 catalog that contains the company's line of audio, telecommunications, SMPS, DC-DC converters, power transformers and inductors in miniaturized commercial and MIL construction.

Charts, application notes, MIL information and a guide to specifying transformers are shown in the reference and technical data section of the catalog. Transformers are listed with detailed ratings, outline drawings, schematics and pricing.

Circle 25 on Reader Response Card

# PEOPLE

## Nishiyama at TOA; Sony VP

### President of TOA

Hiroyuki Nishiyama has assumed the position of president of TOA Electronics, Inc. Nishiyama has almost 30 years of sales and marketing experience with TOA Corporation.

Nishiyama's goals include strengthening the company's U.S. market and pursuing the research and development of products designed for the U.S.



Nishiyama

### Dauphinee at Sony

Sony Corporation of America has appointed Kevin Dauphinee to vice president/general manager of the Business and Professional Group's Northwest Region. Dauphinee is responsible for managing sales and marketing activity throughout the northwest.

Dauphinee previously held the titles of senior business development manager and market development manager at Sony. Prior to joining Sony, Dauphinee was product marketing manager at Ampex Corp.

### Calvert Promoted

Shure Brothers Incorporated has promoted Nancy A. Calvert to Director, Marketing Communications. Formerly Manager of Advertising and Public Relations, Calvert joined Shure in 1990 after 14 years with the Electro-Motive Division of General Motors Corporation, where she was Director, Public Relations and Advertising, and Manager of Sales Promotion, Customer Publications and Media Services.



Calvert

### Kawalek Named

Jimmy Kawalek has been appointed to the newly created position of Sales Manager, Entertainment Products for Renkus-Heinz, Inc. Kawalek was previously Products Manager for Renkus-Heinz.

Kawalek has more than 15 years experience in the professional audio and entertainment fields. His efforts focus on the markets in the nightclub and live entertainment industry.



Kawalek

### Realigning Vega

Vega has announced a realigning of its sales and marketing department. Ken Bourne has been promoted to vice president of marketing where he will be directly responsible for Vega sales and marketing activities. Robert Bell has been promoted to the position of wireless marketing manager. Previously, Bell was Vega's national sales manager. Paul Baughman has been named national sales manager. Baughman had held that position previously before leaving Vega in 1989.

### Lee at AEI

Andrew Lee has joined AEI Music Network as Director of Marketing and Sales for the Systems Group. His responsibilities include development of market strategy and management of sales for contracting.

Lee, formerly a partner in Sound Chamber, Inc. has been serving as an A/V project consultant for Helekulani Hotel Development Group and Caesar's World Las Vegas and Tahoe properties.



Lee

### Pfeiffer Joins Throckmorton

Robert Pfeiffer has joined Throckmorton Sales Company as

account representative for Kansas and Nebraska. Pfeiffer leaves Sheffield Lab where he served as National Sales Manager since 1989.

## CALENDAR

### Upcoming Events

#### JANUARY 1993

**Consumer Electronics Show:** Las Vegas, Nevada. Contact: (202) 457-4919. January 7-10.

**National Association of Music Merchants (NAMM):** Anaheim, California. Contact: (619) 438-8001. January 15-18.

**Infocomm:** New Orleans, Louisiana. Contact: (703) 273-7200. January 11-17.

**Imaging Conference and Exposition (IMEX):** Miami, Florida.

Contact: (617) 487-7934. January 21-23.

#### FEBRUARY

**Image World:** San Jose, California. Contact: (800) 800-5474. February 1-5.

**ISC West:** Anaheim, California. Contact (708) 390-2462. February 16-18.

#### MARCH

**InterMedia:** San Jose, California. Contact: (203) 352-8297. March 30-April 1.

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University Sound	39	207
Wavephore	41	255
West Penn Wire	21	217
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White Instruments	60	272
Williams Sound	62	270
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# MARKETPLACE

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Attention: Jim Sorenson

All responses considered confidential.

### System Sales

National company is looking for individuals for their Atlanta, San Francisco and Los Angeles offices. Must have one to three years successful selling of sound, video and communications systems.

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#### AEI MUSIC NETWORK INC.

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Attention: Jim Sorenson

All responses considered confidential.



### Systems Salesperson

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# PRODUCT CHECK: WORSHIP CENTERS

Products used most frequently in worship center installations...

## ... NOW IN PROGRESS

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	FIRST PLACE	SECOND PLACE	THIRD PLACE
Microphones	SHURE	ELECTRO-VOICE	CROWN
Speakers	ELECTRO-VOICE	JBL	TOA
Mixers	YAMAHA	ELECTRO-VOICE	MACKIE
Signal Processors	RANE	YAMAHA	FURMAN
● CD Players	● TECHNICS	● TASCAM	● SONY/TEAC*
Tape Players	TEAC	TASCAM/TECHNICS*	SONY/CARVER*
VCRs	PANASONIC	MITSUBISHI	SANYO/SONY*
Projectors	JBL (HARMAN)	NEC	GE
Power Amps	CROWN	TOA	ALTEC LANSING

\* Indicates tie

## ... IN LAST SIX MONTHS

**P  
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	FIRST PLACE	SECOND PLACE	THIRD PLACE
Microphones	SHURE	TOA	ELECTRO-VOICE
Speakers	ELECTRO-VOICE	JBL	TOA
Mixers	YAMAHA	ELECTRO-VOICE	ALTEC LANSING/ SOUNDCRAFT*
● Signal Processors	● YAMAHA	● RANE	● PEAVEY
CD Players	TECHNICS	YAMAHA	TEAC
Tape Players	TECHNICS	TASCAM	TEAC
VCRs	PANASONIC	JVC	SONY
Projectors	SONY	SHARP	NEC/GE*
Power Amps	CROWN	TOA/YAMAHA*	RAMSA

\* 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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## Array Series. Designed To Impress Everyone Who Has Heard It All Before.



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.

JBL engineers have drawn upon proven advancements in loudspeaker design and state-of-the-art digital electronics to create Array Series: a comprehensive sound reinforcement system concept with performance second to none. Developed as dedicated array elements, Array Series systems can be easily configured to fill any venue with seamless coverage from a deceptively small package.

Such performance could only be achieved by designing the exact transducers required for the job. The Array Series is the first professional loudspeaker system to use neodymium magnets. The LF transducer's unique motor structure topology also includes proven Vented Gap Cooling (VGC™) and a deep copper-sleeved gap to significantly reduce distortion and power compression.

The 38 mm (1 1/2 in) exit HF compression driver also uses a neodymium magnet structure, a Coherent Wave™ phasing plug and damped titanium diaphragm. The result is effortless and reliable high frequency output with outstanding accuracy. A 45° Optimized Aperture Flat-Front Bi-Radial® horn assures proper matching and summing of multiple Array Series systems.

The 13 ply hardwood enclosure has 45° sidewalls to match the horn coverage in arrays, and is reinforced with integral steel attachment hardware, designed to interface with S.A.F.E.™ flying hardware for quick and secure cluster assembly.

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

System functions, such as crossover filter points, transducer acoustic center alignment, system equalization and protective limiting are achieved totally in the digital domain by the ES52000 Digital Controller. The ES52000 employs Finite Impulse Response (FIR) filters for zero phase shift and requires no amplifier output sensing cables, so you can expand your system by adding Array Series loudspeakers without having to add additional controllers.

The sum of these parts is Array Series: a complete system providing extremely high power handling, very high sound pressure levels with full dynamic range, low distortion and unmatched fidelity. Truly a system capable of impressing *anyone who has heard it all before*.

Call or write for detailed specifications. Or, for more *immediate* response, you can get current product information on Array Series, the ES52000 Digital Controller and all JBL Professional products, *VIA FAX* by calling (818) 895-8190.

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