

# SOUND & COMMUNICATIONS

Volume 38 Number 8

August 31, 1992



## BALL PARK SOUND

Oriole Park's first full season has shifted eyes — and ears — to Baltimore. Control, computer-aided design, and distributor systems put the ballpark into an audio design. An audio report. **40**

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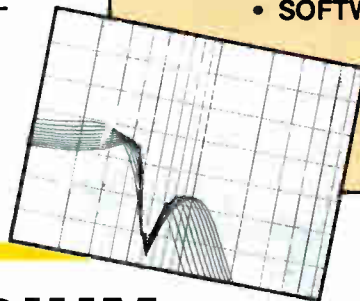
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## KEZAR STADIUM

The 49ers moved, their old stadium needed a makeover. To fulfill the new needs a new Kezar Stadium with concern for the San Francisco neighborhood for good sound. **50**



2-input, 3-output multiway tap digital delay line with 16-bit Delta-Sigma A/D converter and a 48 kHz sample rate.

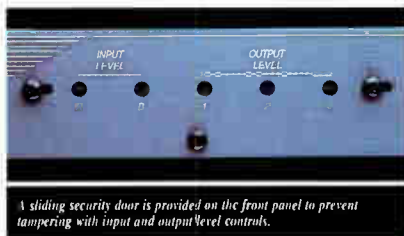
# Sound Simple? It is!

## Introducing the IDL™ 1000 Digital Delay Line Processor From Peavey

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*time alignment of multi-speaker sound systems.*

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A sliding security door is provided on the front panel to prevent tampering with input and output level controls.

distortion low as well as to maintain a full 20 kHz bandwidth. Both the inputs and outputs are electronically balanced and use XLR connectors. Transformers for the inputs and outputs are optional.

To further speed setting the delays, the display can be set in units of milliseconds, feet, or meters. The IDL 1000 has a mute button for each output which can also be programmed to compare the current delay settings to a zero delay. The IDL 1000 utilizes a 16-bit Delta-Sigma A/D converter and a 48 kHz sample rate to keep the noise and



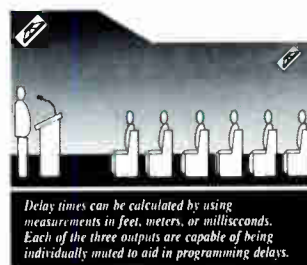
Two input and three output XLR connectors located on the back of the unit have corresponding level controls located behind the security panel in the front (transformers optional). An operation mode button sets the IDL 1000 to either stereo or mono operation. For extra protection against tampering, a lock switch is provided which makes the controls of the unit inoperative.

*The IDL 1000 — simply brilliant.*



The display window provides information on the status of the IDL 1000. You can check or change the output delay times, delay units, and operation mode (stereo or mono).

Setting the IDL 1000 is a breeze with its 4-digit LED display and its variable rate increment and decrement buttons.



Delay times can be calculated by using measurements in feet, meters, or milliseconds. Each of the three outputs are capable of being individually muted to aid in programming delays.



To receive a catalog showcasing Peavey Architectural Acoustics' full line of sound equipment, call or write: Peavey Electronics Corporation • 711 A Street • Meridian, MS 39302-2898 • (601)483-5365 • Telex: 504115

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## LETTER FROM THE EDITOR

# End of Summer Plans and Changes

The summer of '92 has been perked up by a number of special events – the Barcelona Olympics and the political conventions – which provided sound business for several. A quick look at our notes show the following involved in special sound. Bose provided the sound for the opening and closing ceremonies of the Olympics. And the Democratic and Republican conventions saw involvement by the following, among others: ProMix, Burns Audio, Crown, Vega, IDB Communications.

While most of us didn't attend the political conventions, August is the time to plan for travel to business conventions for the year, and those conventions are coming up quickly. August itself sees the ISC – East Show, August 24 through 27 at the Jacob Javits Center in New York. At press time, the keynote speaker was announced as Mario Cuomo, governor of New York – an ISC coup if the Governor in fact appears. The Plasa Light and Sound Show takes place September 6 through 9 in London.

The Audio Engineering Society has its convention in San Francisco October 1 through 4. That venue is a new one for AES and its biannual trek to the west coast. (For those of you who can't make it to San Francisco, we will again be producing and transmitting AES-TV News, the on-site television news program at AES. Tapes will be made available after the show.)

After AES, there's no time for rest, since CEDIA holds its convention October 7 through the 12th in Dallas. CEDIA is planning an expansion from its traditional center of the home theater market – into home automation, security, and other residential products requiring installation. And if you haven't wearied of traveling, you can then go straight to Chicago – to the International DJ Expo at the new Sheraton Hotel. DJ Expo, produced by Testa Communications, pub-



lisher of Sound & Communications, has become an important semi-annual forum for the club market. As a matter of fact, our marketing people tell me that you can still buy tapes of the workshops that were held at the last DJ Expo. Workshops were held on such relevant topics as Designing a Club System.

Forum '92 takes place September 20 through 22 in San Antonio. This event focuses on the residential market and includes talks by Scott Miller of AMX, Jun Matsumoto of Aiphone, and representatives of Smart House, X-10, Square D, and others. Forum is produced by Parks Associates, which is also planning a new event for the spring in San Jose. Habitech is a trade show for home automation systems.

There's no doubt that much news will come out of these conventions, and we will be reporting on them in these pages.

Best regards,

Judith Morrison  
Editor in Chief

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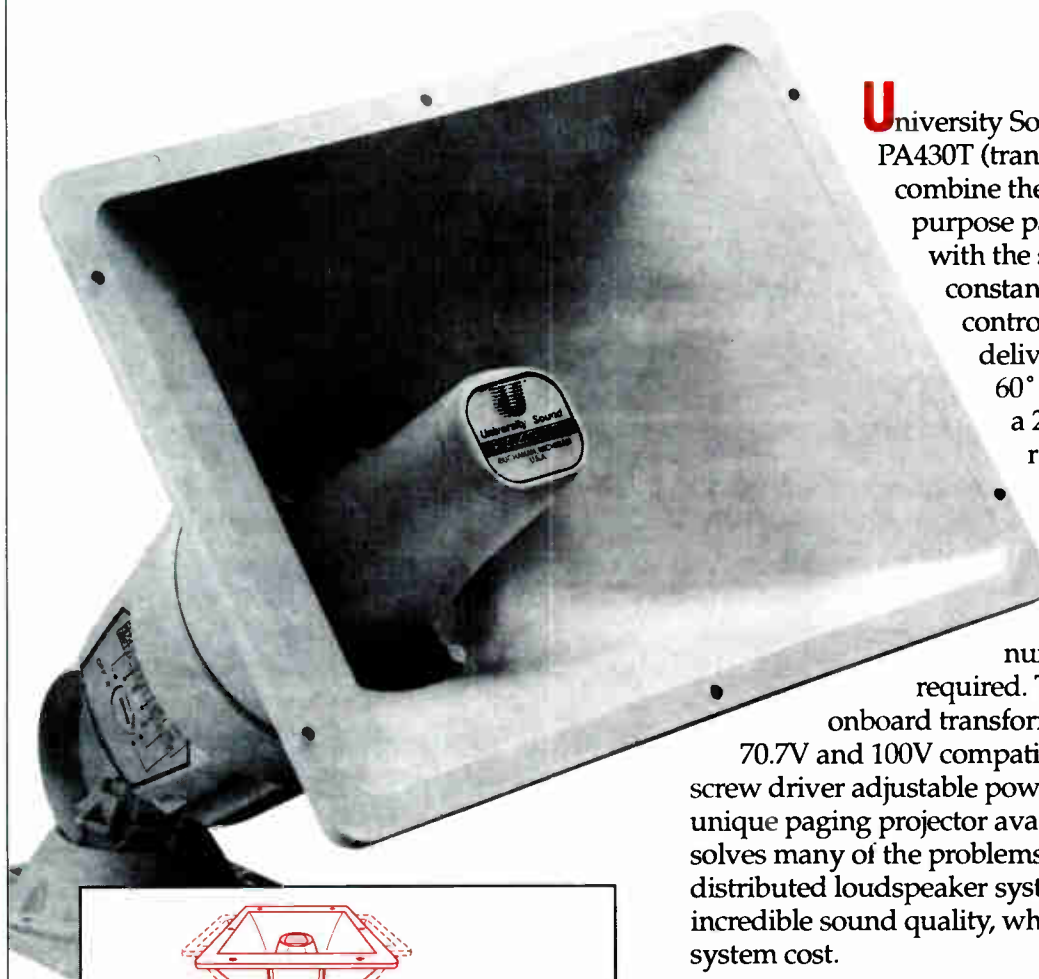
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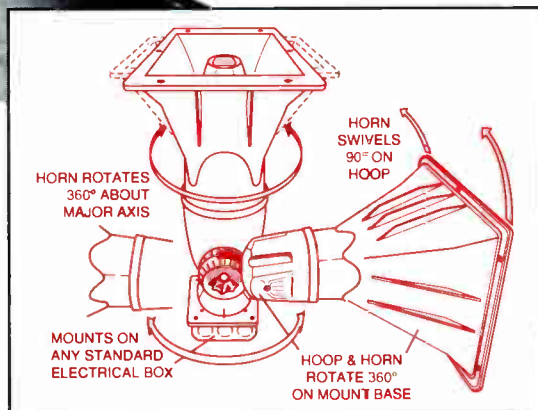
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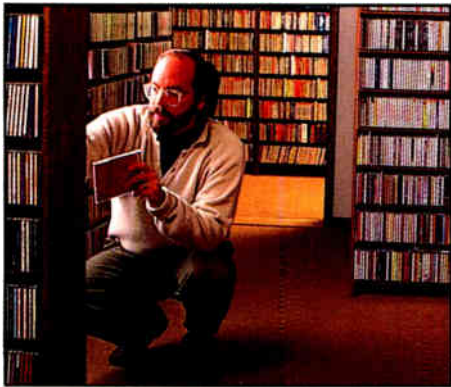
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SOUND  
COMMUNICATIONS

# Serious High Frequency Protection?



We use this illustration to shed some light on a superior design and introduce the new Tannoy CPA5 (ICT)<sup>™</sup> loudspeaker - a small, contractor-specific loudspeaker from our new Contractor Series. Designed and engineered with contractor requirements in mind, our new CPA5 offers controlled directivity and throw characteristics, uncommonly superior vocal articulation and strong vocal midrange presence from a loudspeaker promising failure-free operation from its HF unit. How? "Inductive Coupling Technology" (ICT)<sup>™</sup> makes it so.

Simply stated, the CPA5's five inch ICT transducer has no high frequency voice coil or HF windings. Instead, a one inch Duralumin HF passive radiator sits in the same gap with, and is inductively energized by, the electro magnetic high frequency energy, generated as a by-product of the LF unit. The ICT transducer's crossover free architecture ensures linear, smooth, symmetrical off-axis dispersion out to 22kHz and true point-source, phase coherent sound.

The CPA5's ICT design offers exceptional performance with outstanding dynamic range and 90dB 1W 1M sensitivity. AT LAST you can have a dynamic, full bandwidth background music system which even at the lowest of volumes, remains highly intelligible with shimmering presence. And yes - they also sound great loud.

The CPA5's 100 Watt handling and 110 dB output, provides clean, non-fatiguing sound at exceedingly high volumes - free from mid-range compression, and with remarkable bass response for such a small enclosure (8 1/2" high X 6" wide X 5" deep).

Its modern, rugged, molded polypropylene cabinet (available in two colors) and shielded components are "environmentally friendly" and impervious to most weather conditions. Equipped with 70 Volt transformer fittings for multi unit installations, the CPA5 mounts both vertically or horizontally, offers two grill faces, and an adjustable, rotating badge.

While its affordable CUB-5 hardware meets all safety standards, the CPA5 also retrofits most existing mounting hardware available today.

We think you will find the Tannoy CPA5's exceptional performance a uniquely flexible, cost-effective and reliable alternative to what you've been settling for in foreground/background music systems. We have the required projection and presence you've been looking for, at all volumes, and you'll never blow our HF unit. We may not glow in the dark.... WE DON'T HAVE TO. If you value exceptional high performance and trouble free, safe sound, step up to the TANNOY CPA5 (ICT)<sup>™</sup>.

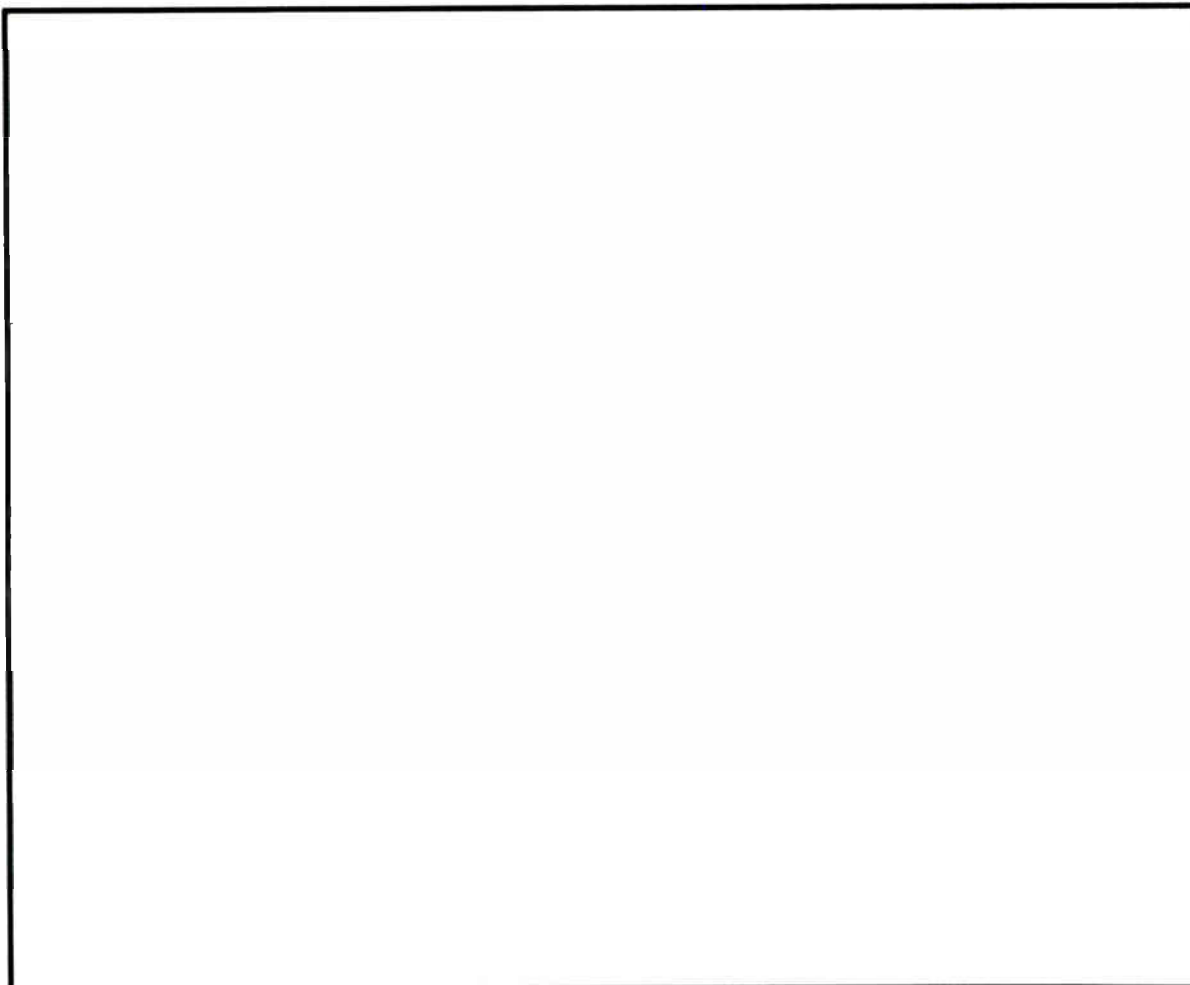
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World Radio History

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# NEWSLETTER

## **CERTIFICATION FOR IQ SYSTEM, NEW LICENSEE**

Crown has announced a new IQ System 2000 certification program for contractors who attend the company's IQ School and then pass subsequent testing. Testing will be administered the day following each three-day IQ School session. To receive certification, the contractor must pass a lab test and a simulation test, as well as an oral review. Crown will keep a list of certified contractors which will be available to consultants. IQ School is open to consultants, contractors and developer licensees.

The company has also opened up its policy for licensing of Crown IQ System 2000 computer control software. Clay Barclay, developer of the IQ System said, "We've come to the realization that we do not yet have a universal standard for computer control. It is important to open compatibility in the marketplace. Crown has developed what Barclay calls "personality" modules that will allow varying systems to interface. According to the company, Crown's Turbo 1 operating system, which will be released soon, will add high-speed performance with new graphics and will be retrofittable to all systems.

Rane Corporation is the latest licensee for the IQ System 2000; other licensees are T.C. Electronics and White Instruments. According to Ray Bloom, director of sales and marketing at Rane, licensing was sought because Rane is pursuing development of a line of IQ-compatible products that will debut later this year.

## **YORKVILLE DISTRIBUTING MICS**

Yorkville Sound is now distributing selected Audio-Technica Pro Series products in the U.S. and Canada. According to Yorkville, Audio-Technica is expanding the Pro Series line to offer more products for pro audio applications and installations, as well as for musicians. Bud Mayer of Yorkville said, "Audio-Technica microphones complement our mixers, power amps and speakers so that Yorkville can offer better variety and value to its customers." Yorkville's two-year unlimited warranty will pertain to Audio-Technica microphones when purchased from Yorkville.

## **BRUEL & KJAER PURCHASE**

The shareholders of Danish-based Bruel & Kjaer (the families Bruel, Kjaer, and Buchmann) intend to conclude a sales agreement with the German industrial group AGIV (Aktiengesellschaft fur Industrie und Verkehrswesen). The sale is scheduled for August 15. AGIV is a German holding company traded on the German stock exchanges. It consists of about 300 enterprises, employs 37,000 employees and earned a reported \$5.4 billion in 1991. Bruel & Kjaer was founded 50 years ago by Dr. Per V. Bruel and Viggo Kjaer, who actively managed the company until 1991.

## **AEI MUSIC NEW DISTRIBUTION AGREEMENT**

AEI Music Network Inc. has announced an agreement with National Video Subscription, Inc. to distribute music, sports and ambient videos produced by NVS. According to James A. Summers, CEO of NVS, "The AEI Music Network provides us a way of marketing our video services to AEI's national account customer base, including retail giants like The Limited and The Gap. William R. Hogan, director of broadcast services for AEI, said, "More and more, our music customers are looking to multimedia to attract, entertain and inform customers in retail and hospitality environments." The combined services of AEI and NVS are already at work in five different divisions of Edison Brothers, a chain of stores using music and video in their mall locations.

## **NEW FORMAT CD MOTION PICTURE**

JVC and Philips have announced that they have jointly developed a CD motion picture karaoke system based on MPEG technology "toward a new generation motion picture reproduction system." The two companies also plan to promote and propose the new standard to other manufacturers as one of the CD formats. The new Karaoke CD system provides 74 minutes of digital motion picture and sound signals on a five inch compact disc. The system is compatible with CD-I FMV players. Existing software can be used. JVC is developing a karaoke system and plans to market an industrial system and software by the end of the year.

# NEWSLETTER

## **BUSINESS IN POLITICS**

Several companies have announced their involvement in the conventions of the Democratic and Republican parties. Lightwave Research had 96 Intellabeam 700 HX's lighting Madison Square Garden for the Democratic Convention. This was reportedly the largest lighting system ever installed at the Garden. The fixtures and lighting support were supplied by Las Vegas based World Technologies. Jim Tetlow did the design.

IDB Broadcast was the provider of television transmission services for the Democratic National Convention Satellite News Service. IDB was awarded the exclusive transmission contract under which IDB transmitted signals via terrestrial fiber connectivity from the Garden to IDB's video switching facility. The feeds were then uplinked to Telstar 302. Over 100 hours of live interviews and taped feeds of event were transmitted.

Vega has announced that its wireless microphone and intercom systems are being used at both the Democratic and Republican National Conventions. Burns Audio coordinated the Vega systems for both conventions, and serves as the sound contractor for the Republican National Convention.

Crown's IQ System 2000 software and CM-230 microphones are being used at the Republican convention. The computer control software has been customized by Crown for the convention to allow a single technician positioned at a host computer screen to control on/off functions of more than 60 individual microphones. Each state delegation to the convention is allotted one microphone, customized Crown CM-230 tri-dundants. The software will allow for the listing and status of each microphone position, by state, on the computer screen.

## **PROVAN NAMED GROUP CHAIRMAN**

Gordon Provan, chairman of Celestion Audio, has been named group chairman of Kinergetics Holdings (U.K.), the London-based investment company that recently acquired Celestion Audio and KEF. Prior to his chairmanship of Celestion Audio, a position he will retain, Provan was managing director of Akai (U.K.) and managing director of Rank's Audio Division.

## **TEKTRONIX SEMINARS**

Tektronix, Inc. is hosting free seminars across the United States this fall to teach "the latest oscilloscope and logic analyzer test and measurement techniques." The one-day training sessions will include both a formal presentation and hands-on lab work. The seminars are directed at engineering group managers, test engineers, analog and digital designers, electronics service technicians, evaluation engineers and researchers.

## **AT&T PARADYNE MULTIPLEXERS**

AT&T Paradyne has announced that it plans to begin selling bandwidth-on-demand inverse multiplexers by September. The new Acculink Bandwidth Controller is the first product resulting from its partnering arrangement with ascend Communications and can be used for applications such as video teleconferencing, imaging and LAN interconnect. Prices will range from \$7,000 to \$16,000, depending on configuration.

## **SMPTE HOLDS MULTIMEDIA TUTORIAL**

The Society of Motion Picture and Television Engineers will hold its 134th Technical Conference and Equipment Exhibit, "Images in Motion — The Second Century," from November 10 to 13 in Toronto. On November 9, two tutorials will be presented. "Multimedia World" will provide information on the latest development and trends in media integration. A series of hands-on workshops, a papers program, and equipment demonstration are being planned. "The Post Experience" focuses on the creative and technical aspects of audio, film, and video post-production, with emphasis on the electronic post-production process.



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# PCs for CAD: What's Available?

The Answerman has received many questions on speeding up CAD systems. It was only a few years ago that the AT (286) computer was the top dog, but now it is dog meat! Even the 386 is considered to be hamburger, and the 486 — the king of PCs, is about to be supplanted by the 586. In an upcoming issue, CAD Topics will take a closer look at all this, but for now the Answerman will provide an overview.

### 286 OPTIONS

The 286 is the main CPU ("central processor unit"), i.e., the computing part of your computer. The full name is the 80286, but '286 is the common usage number. Clock speed and whose 286 determines speed. Intel is the originator of this CPU, but Harris and AMD were licensed by Intel so multiple sources would be available. Both Harris and AMD offered faster clock speed versions than Intel. Exchanging your 286 for a faster 286 makes no sense for a number of reasons. Aside from the impracticality of changing clock speed, buying faster memory chips to keep up with the clock, etc., it just does not make economic sense. Forget the fact that you paid big money for your 286 a few years ago, as this year's rocket ship is next year's jalopy. For less than \$100 you can have a math coprocessor installed. The 286 is not a complete CPU, but actually only the main component in a two chip set. The second half is the 287 floating point coprocessor. It is installed in the empty socket directly next to the 286. In defining the 'X86 series, the designers

thought that fast floating point (heavy number crunching) capability should be optional. By installing the math coprocessor, spreadsheets, graphics, sound system simulations, computer-based acoustic analyzers, and other math intensive operations would be speeded up 5-10 times. Intel, AMD, Cyrix and IIT all make math coprocessors.

What about upgrading to the 386? This makes a lot of sense, as the 286 has a few serious flaws, especially in how it works with Windows and computer memory above 640 K.

Absolutely forget about buying a plug-in 386 CPU for your 286. These are grief, regardless of who makes it or what the

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## ANSWERMAN

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salesman promises. Sooner or later you will be sorry if you buy one of these, as incompatibilities with both hardware and software will definitely crop up.

Many computer stores can install a new motherboard within your existing case, keeping the drives, power supply, graphic video card, etc. Of course a brand new computer would be nice, with the latest video standard, a bigger drive, etc.

### 386

The 386 comes in two versions, one with an internal 32 bit path and 16 bit

external, and is known as the SX, while the full 32 bit version is the DX. Having 32 bit external means that the logic, memory, etc. must all be 32 bit devices, which adds cost but increases data throughput. Think of it as adding lanes to a highway. Intel introduced the 386, but now has competition from AMD, Cyrix, Chips & Technology, with Texas Instruments and others shipping soon. The cost of both the SX and DX has dropped dramatically this year, both because of the competition and the competition from the 486. Like the 286, each 386 has a matching coprocessor. The clock speed of the coprocessor must be at least as fast as the clock that controls the coprocessor socket. Your computer store should be able to figure this out (or you should be shopping elsewhere). Intel, IIT, Cyrix, Chips & Technology, UMC all make 387 SX and DX coprocessors. Just over a year ago, the 387 DX chips were selling for as much as \$1,000 for the high clock speed versions, but now you can buy them for less than \$100. This price drop is a combination of competition and increased production yields. Imagine manufacturing a chip with an internal cost of \$50 and selling it mail order for \$1,000! We are in the wrong business!

Aside from adding a math coprocessor, you can now upgrade your 386 SX or 386 DX to a 486 just by exchanging the CPU. Cyrix has recently introduced a 486-like CPU which internally follows 486 instructions, but has the pin-outs and generally smells like a 386 CPU to your 386 computer. The best part is that the CPU

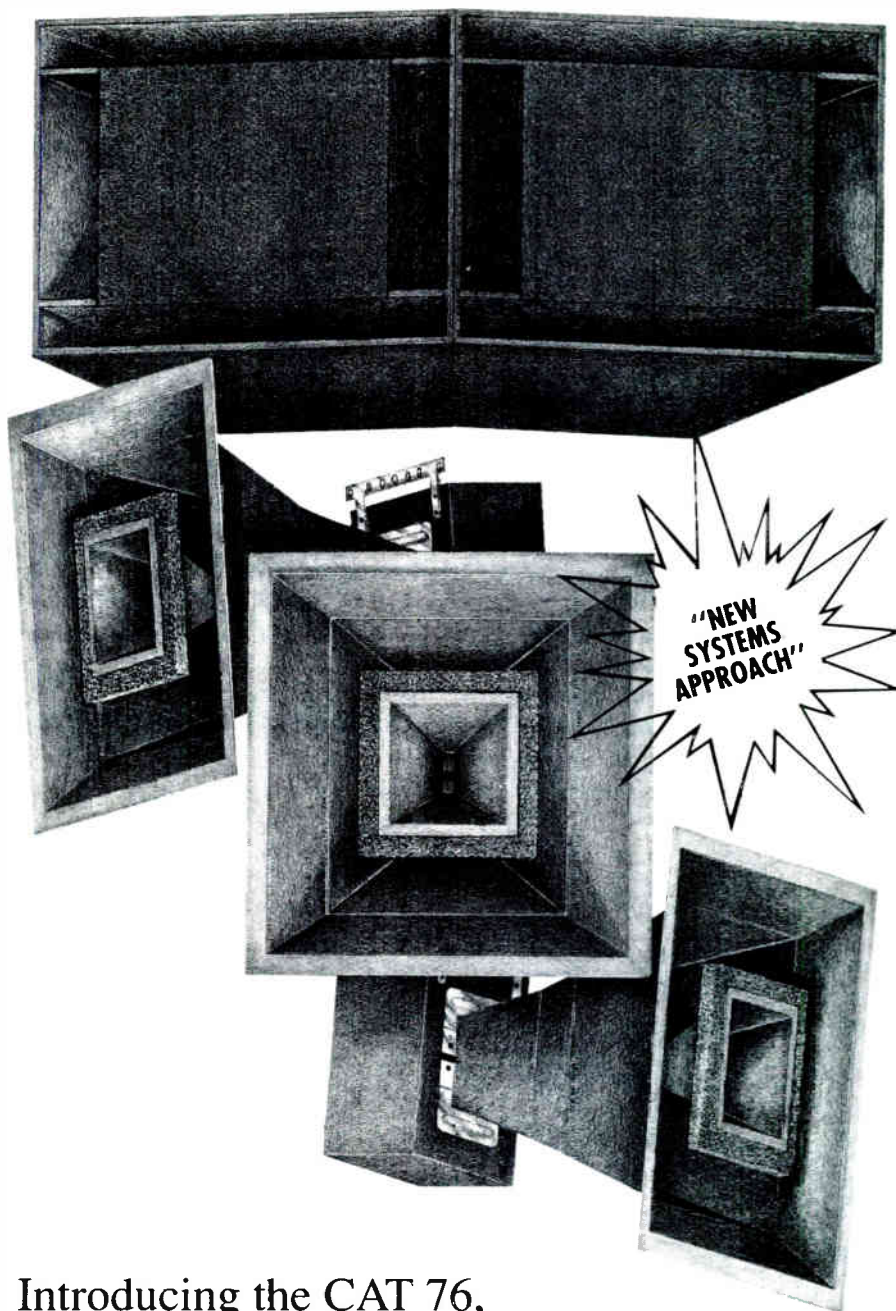
is relatively cheap, about \$120 (not including installation, but this is only exchanging a large chip). How well does this work? We hope to find out in a future CAD Topics when we test all this stuff with sound system programs and TEF/MLSSA/SYSid test gear.

#### 486

Like the 386, the 486 comes in two versions, the 486 SX and 486 DX. The 486 SX does not include the math coprocessor, while the 486 DX does. The 486 originally was introduced by Intel only in the 486 DX version with coprocessor on-board. The idea was that there could be speed benefits in integrating the floating point/math operations into a single CPU. Additionally, RISC (Reduced Instruction Set

### THE CLOCK SPEED OF THE COPROCESSOR MUST BE AT LEAST AS FAST AS THE CLOCK THAT CONTROLS THE COPROCESSOR SOCKET.

Computer) techniques were added, along with cache memory. Perhaps most exciting to Intel is that the 486 would put an end to the competition offering math coprocessors for Intel's processors. Soon afterward the competition in 386 chips became so intense that Intel was forced to offer a cheaper but crippled version of its 486 without the coprocessor. In reality, Intel's 486 SX was a full 486 DX with the coprocessor intentionally damaged and bypassed! Using the advanced technology of its marketing department, users of the crippled 486 SX can then upgrade back to the 486 DX performance by installing Intel's RapidCAD. This is a two chip set which replaces the 486 SX. Because all of the processing circuitry is integrated on one chip — like the 486 DX — it can operate faster than a standard 386/387 combination. The second chip fools the system into thinking a 387 chip



## Introducing the CAT 76, CAT 79, and CAT Subwoofers.

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is present. Initial price of the RapidCAD series was over \$500, but is heading downward and was at \$300 mid-summer.

Still another option is Intel's OverDrive processors. The OverDrive processor fits into the empty upgrade socket on the 486 SX motherboard. Intel claims that unlike a conventional math coprocessor, the part improves both floating-point and integer performance on all applications. The processor is based on Intel's DX2 speed-doubling technology, where the internal clock rate is twice that of the external rate.

Other new developments that you can expect to see more of include thermo-electric cooling of the CPU, allowing clock speed increases way beyond the chip's rating. One firm, Iecap, is offering a micro refrigerator that plugs into the CPU socket and the chip plugs into

the temperature controlled "icebox." A more mundane approach is taken by another manufacturer which uses a tiny fan and heat sink, but with comparable results. Apparently this approach also

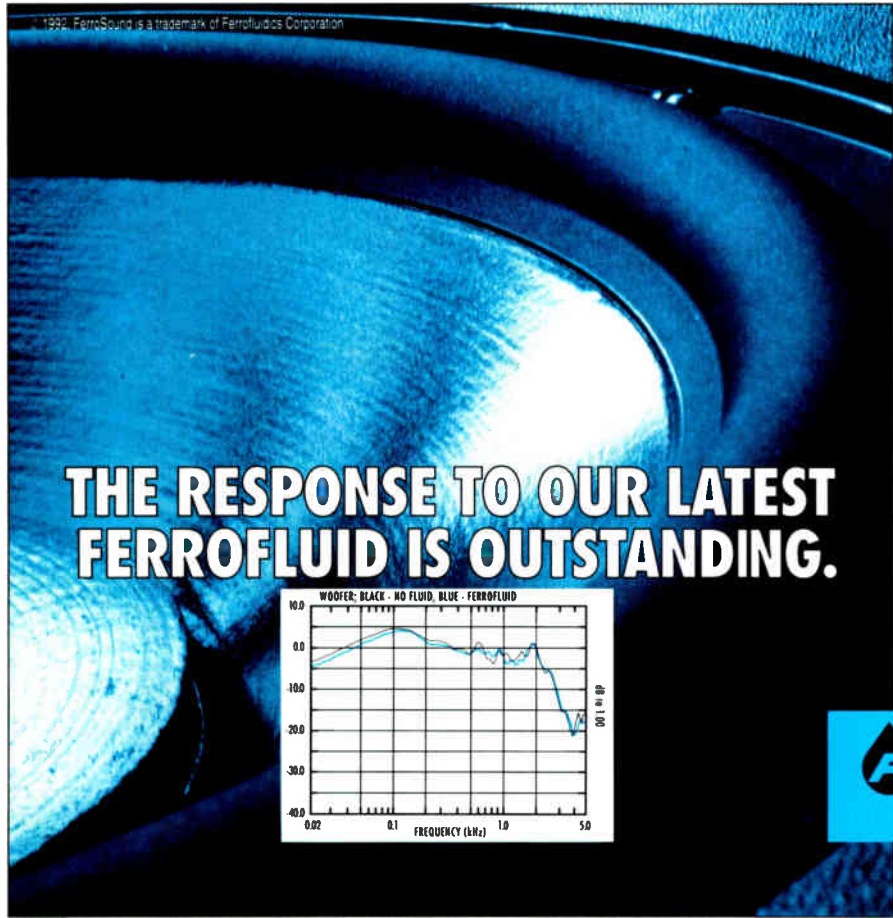
## OTHER NEW DEVELOPMENTS THAT YOU CAN EXPECT TO SEE MORE OF INCLUDE THERMO-ELECTRIC COOLING OF THE CPU.

works for coprocessors — and don't forget to offer your computer a cold lemonade on a hot day.

Chips & Technology introduced a chip set for their 386/387 that allows parallel

processing using multiple 386 chips. A chip set is the other circuitry outside of the CPU and memory. This multiple CPU approach would be an extremely powerful technique, but will require special software to take advantage of. On the other hand, this has not gotten in the way of the coprocessor's success. Compaq also has offered this technique in their top-end computers, but these computers cost well over \$10,000. That is a lot of money for an extra \$100 CPU! While Chips & Technology has temporarily pulled back from offering this multiprocessor chip set due to financial problems, it looks like AMD may be buying the company and this may get the technique back on track.

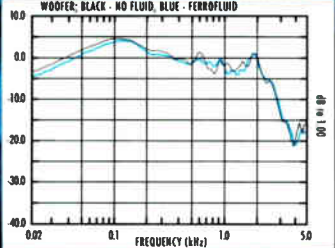
Next month the Answerman returns this column to the world of audio. ■



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# Security Systems and the Sound Contractor

*Add Burglar Alarm Systems To Your 'Package' —  
And Create Recurring Revenue*

BY RONALD J. ROSEN

**T**he majority of sound contractors do *not* sell burglar alarm systems, and want no part of that business.

Why not? The usual perceptions are: the sale is too small, too few dollars to cover the time invested; everyone and his brother sells burglar alarms, whereas sound systems represent a more exclusive market with less competition; alarm systems are a totally different business, having nothing to do with sound and communications.

Maybe in the past your company has taken a try at installing some of the early audio detection systems or some other type of intrusion detection, with enough false alarms and other negative results to thoroughly discourage you. I submit however that the alarm industry has undergone vast change in the past few years, and encourage you to reexamine the issue.

In these difficult economic times few would debate the need to diversify, providing that any such diversification can be accomplished without disrupting our existing business. Maybe you will read this article and still conclude that the

---

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

alarm business is just not something you wish to get involved with; just realize however that many *alarm* ITA contractors are anxious to increase their customer base, and it is not unusual to find a security contractor bidding against you on a sound, CCTV or even a Nurse Call system!

## RECURRING REVENUE

Isn't it nice to be able to count on a regular source of income each and every month without having to do anything more than the billing? If you go to your bank for a business loan or an increase in your line of credit, you will

**In these difficult economic times few would debate the need to diversify.**

find they really like the idea. If you are already seriously in to the background music business you know what we are talking about.

The RMR (Recurring Monthly Revenue) in the security business continued is generated by the monthly fee charged for *monitoring*. Most alarm systems are sold including connection to a

central station, (very few systems today are connected directly to police headquarters) whereby the premises are monitored for an alarm condition on a 24-hour basis. Upon receiving an alarm from your customer's premises, the central station will act according to your instructions by either calling the appropriate police or fire department, or as is more common, first verifying the authenticity of the alarm by telephoning the customer. (If there is no answer, or a predetermined code word cannot be given, police or fire will be dispatched.)

Your involvement when an alarm occurs? None. (Unless you request it.) The central station will usually notify your office within normal working hours that an alarm has occurred.

Your cost for this monitoring service? Usually \$5.00 to \$7.00 a month, per account. Your charge to the customer? Normally between \$20.00 and \$30.00 a month, depending on your area. Is there anything else you currently sell with 300- to 500-percent markup?

Remember, once this is set up your only cost is the fee you pay the central station (usually paid annually, in advance) and your office expense in billing your customer (which can be set up monthly, quarterly or annually). Unlike



the background music business, you do *not* have to maintain the equipment for this fee. A maintenance agreement is extra and naturally adds to the recurring income. You have no receiver to install at *your* place of business, your customers alarm system is connected to his own phone line for transmission to the central station via an 800 number. (A larger alarm company will often install its own central station receiving equipment at their offices, but there obviously has to be a considerable number of monitored accounts to make this worthwhile.)

An additional source of revenue is generated by what is known as Opening/Closing Reports. Often desired by your commercial customer, an Opening/Closing Report is simply a printed record – usually issued monthly – show-

ing the date and time that the alarm system was armed and disarmed. Since most systems allow for a number of different access codes, the report can therefore indicate which employee opened and closed the premises. Opening/Closing Reports can usually be provided by your central station at additional cost.

Depending upon rates in your area, 200 monitored accounts – not considered a large customer base – can therefore yield a *net* recurring income of between \$3,000 and \$5,000 a month. Who said there was no money in this business?

#### COMPATIBILITY

If you handle CCTV, you are obviously already in the security business. If you are also in to fire alarm and/or card

access, you are even more prepared to add intrusion alarm to your bag of tricks.

If one were to start up a security alarm business, one would need electronic technicians, installers, vehicle, tools, ladders, etc. – in short, everything you probably already have as a sound contractor.

You are already set up in business presumably with an established reputation, which will enable you to overcome the objections of a potential alarm customer who may be reluctant to deal with a start-up company.

Should you offer alarm systems, your existing customer base can be an excellent source of leads. Certainly your industrial and commercial customer needs protection against break-in; how many schools and churches have had to install intrusion alarms to protect against burglary and vandalism? Restaurants, night

## 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."

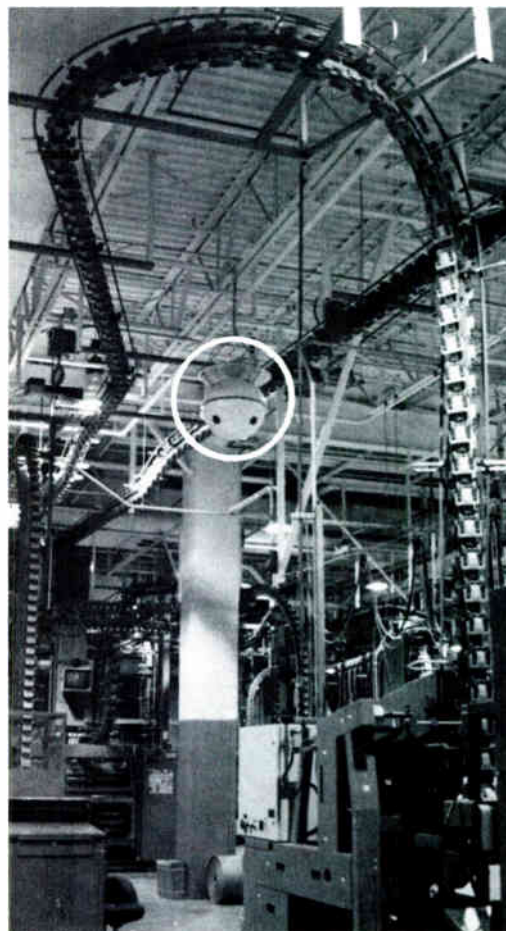
The installer, Bernie Lory has also put two Soundsphere #2212-2 speakers in the stacker area to improve the efficiency of that portion of the operation. He is planning to use more Soundsphere loudspeakers at this site to solve other operational problems.

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clubs, performing arts centers; almost all sound and communication systems are installed in locations that also require an intrusion alarm. If you are already addressing your customer's sound and communication needs, there is absolutely no reason why he would not also welcome your quotation on his security requirements.

### GETTING STARTED

The first step is to find out if a *license*

is required in order to install alarm systems. Licensing requirements vary from state to state, and may be complicated by an ordinance requiring a license in order to work within a particular city or county. Even if a license is required, in many instances your existing credentials as an installer of low-voltage systems may enable your company to be "grandfathered" in upon payment of the required fee; in other instances, a technical test may be required.

Speaking of things technical, let us examine your company's capabilities in this field.

A thorough technical discussion of alarm systems being beyond the scope of this article, we will confine ourselves to generalities.

It is fair to say that the average sound contractor deals in systems a good deal more complex than burglar alarm, and we can assume that your technicians will find little difficulty with hook-up, programming, check-out and subsequent servicing. If however, no one within your organization has any previous experience with burglar alarm, unless you are working from plans, there is going to be a learning process in becoming familiar with the various protection devices, and locating them for proper protection of your customer's premises.

Many security contractors opt to join their local chapter of NBFAA (National Burglar & Fire Alarm Association) and this organization operates a national training school, coordinated with the local NBFAA Chapters across the United States.

This is an excellent program leading to certification as a Level 1 or Level 2 Alarm Technician, with the requirement that the technician continue his education via ongoing seminars and courses in order to maintain his certification.

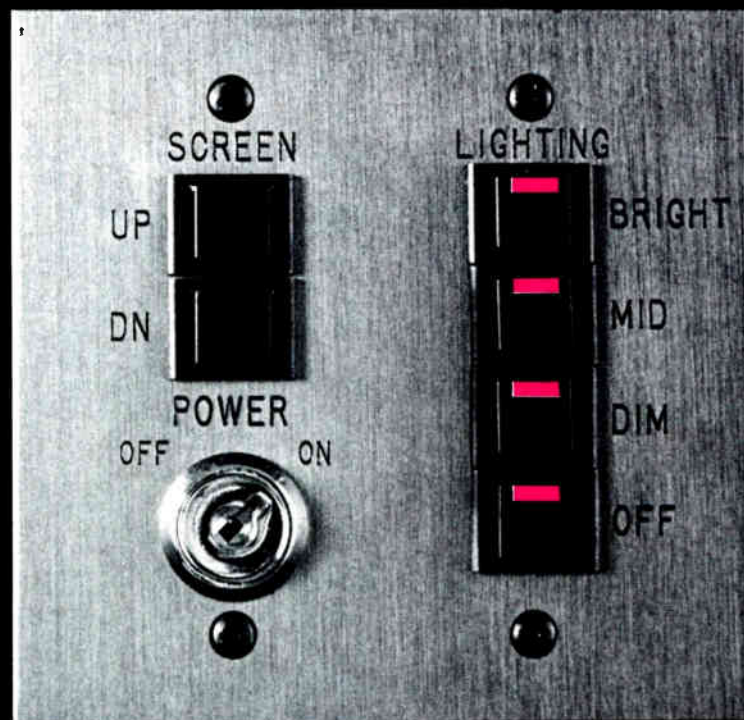
The only downside is that your technician is going to be spending some of your time and money learning basic electronics and other skills that he already possesses. If you are required to be licensed, an NBFAA Certification may be part of the license requirement; if not, it comes down to your own evaluation of your capabilities in this field.

(Further information on the NBFAA may be obtained from: National Burglar & Fire Alarm Association, 7101 Wisconsin Avenue, Suite 1390, Bethesda, MD 20814-4805, (301) 907-3202.)

### EQUIPMENT

So far, this article has touched upon the similarities between intrusion alarm and the systems we presently supply.

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While the technical part may be similar – a group of peripheral devices reporting to, or being controlled by, a central processing unit – there are some noticeable differences in the way alarm equipment is manufactured and marketed.

It is customary for the average sound contractor to be appointed as a distributor for the brands he represents, purchasing equipment directly from the manufacturer. In the alarm business, however, chances are you will have to accept the “two-step” method of distribution, whereby you will purchase your alarm systems and parts from a wholesale distributor. (There are a few alarm manufacturers who sell direct rather than go through a stocking wholesaler, but since prices are about the same as comparable equipment purchased from the wholesale house, and distribution is

generally not limited, the only advantage to this seems to be to the manufacturer who has eliminated the middleman profit).

Speaking of limited distribution, that is the second thing you will have to accept. The same brands of equipment will be sold to any qualified alarm contractor in your area; chances are you will not be granted any “exclusive.” This should not present a problem, however. Brand recognition in the alarm system business is low where the user is concerned. Your customer is going to rely upon you and your fine reputation to install quality equipment at his premises.

Which brings us nicely to the third issue, that of selection of quality equipment.

Nowhere is the difference between the alarm industry and the sound and

communications industry more pronounced than in the development of new product. During the time a manufacturer of sound and communications has agonized over the gestation of a new school sound system or nurse call, the alarm panel manufacturer is producing fourth generation versions of his new product. The speed at which new alarm systems are developed and placed on the market is truly astounding. The alarm system you installed five years ago may be hopelessly out of date.

There is of course a down side to accelerated R&D. Unfortunately, development is often market driven, and the push is to bring out more feature-enhanced equipment to meet or beat the competition, often with sacrifices in quality, user-friendliness, ease of installation and servicing, or all of these.



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Fortunately, most of us can recognize a quality-built piece of electronic equipment. If you will spend time at the alarm wholesaler opening the doors on the various control panels, you should be able to settle upon a brand that does not offend your electronic sensibilities. Having done that, the next step is to obtain that manufacturer's installation manual; good technical writing seems to be scarce in the alarm industry, and much of their technical literature appears to be a token gesture to the few unfortunate souls who have never worked with this particular piece of equipment before.

Most of the equipment required for an alarm installation falls within three broad categories: the control equipment which includes the control panel itself, the digital communicator to transmit the alarm over the telephone lines (usually built in

to the control panel) and the user controlled key pads; the initiating devices such as window and door contacts, motion detectors, photo-electric beams, etc.; the alarm sounding devices such as bells and sirens.

As with sound and communication systems, very few manufacturers produce all of these items. A number of control panel manufacturers are content to offer only the panel and associated keypad, whereas some elect to include the peripheral devices in their catalog, although these devices may in fact be "private-labeled" for that company. There are a number of smaller companies specializing in only one type of product such as motion detectors, contact switches or glassbreak detectors. The point is that the wise contractor should select the best device for a particular application,

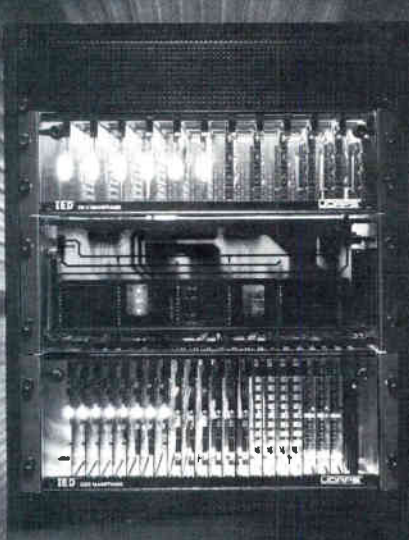
and should not be hampered by the necessity of staying with the same brand throughout the installation.

While your installation may include equipment from several different manufacturers, there is a good case to be made for staying with *those* products. For example, once you have chosen the brand of control panel based on its quality, flexibility, user-friendliness and ease of installation, we don't suggest you hop around trying every new gimmicky panel that fits the market. Let your technicians become familiar with installing and programming one brand: Learning is an expensive process, don't repeat it unnecessarily.

Speaking of control panels, in addition to the aforementioned insistence on quality construction there are several

*(continued on page 71)*

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# Satellite Video Systems

## *Opportunities, Pitfalls and the Seasoned Sound Contractor*

BY DANIEL SWEENEY

**M**ost sound contractors don't do satellite and they're missing an opportunity – in fact a lot of opportunities.

Satellite video is one of the great electronics success stories of the last two decades, up there with video cassette, compact disc, and cellular telephones. Obviously the unit sales aren't of the same magnitude – satellite's installed base is somewhere in the low millions — but since the cost of a system is relatively high, the dollar volume is very considerable, as is the growth curve since public satellite broadcasts are only about 15 years old.

Moreover, satellite's future growth seems virtually assured. Satellite service is in increasing demand among customers for prewired residential installations, and the hotel and restaurant market continues to grow. And if, as seems very possible, db's satellite broadcasting becomes the medium for the introduction of high definition television, we may expect explosive growth in the years ahead. Satellite will also play an increasing role in mobile and personal communications, and thus a familiarity with satellite technology will become increas-

ingly important for the installation specialist who would remain competitive.

### WHY SATELLITE?

Satellite broadcasts began as a low cost alternative to microwave transmission for the television networks, and were originally set up to distribute program feeds to affiliate stations. But by the mid eighties satellite was a legitimate alternative commercial distribution channel for video programming, and was vying with landbased broadcasts, cable, and pre-recorded video software for viewer allegiance.

Today satellite broadcasts attract viewers for a number of reasons:

Satellite broadcasts at their best provide video images of unsurpassed quality – a quality that can fully reveal the performance capabilities of a properly set up component big screen video system. Satellite also provides the customer with the very best broadcast video sound – far superior to MTS stereo.

As well as quality, satellite offers variety and the greatest choice in programming. A satellite system offers the viewer literally hundreds of stations, and from any point in North America. Moreover, much satellite programming remains free, though more and more broadcasts are scrambled.

Finally, satellite offers reception where it may not be otherwise available, especially in rural areas. Satellite completely frees the user from dependence on local transmitters or cable systems. A satellite user on the Barren Lands of northern Canada will get just as much programming as his counterpart in New York, in fact probably more since his environment is apt to be free from terrestrial microwave interference.

Thus satellite offers readily demonstrable benefits available from a relatively mature technology which can no longer be considered exotic. The properly engineered satellite system sets the total A/V system apart, and establishes the installer as a vendor of unique credentials. Yet despite the manifest consumer benefits of satellite systems, relatively few sound contractors sell them on a regular basis, and even fewer have mastered the techniques of satellite system integration and installation.

The hesitancy on the part of most installers to commit to satellite arises from a number of factors – sheer unfamiliarity with the technical details of setup, fears of undo complexity and impracticality for the end user, and from personal experiences involving the poor performance of haphazardly installed systems. As I hope to show,

---

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



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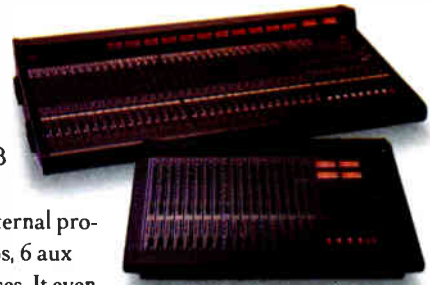
"There are two more PM series consoles. And they start at a mere \$5,500 MSRP. So obviously, they're for those situations where you want the best console available. But you don't have the space or the budget to get the 3000.

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

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# DRIVE THE WHITE LINE



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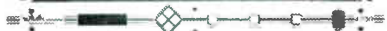
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none of these fears should be persuasive, though each does have some foundation in reality.

As a matter of fact, early consumer satellite systems were unduly complex and finicky, were difficult to install and equally difficult to keep in good working order, and weren't at all user friendly. Current satellite systems, on the other hand, are largely automatic in regard to both initial setup and ordinary use, greatly simplified in design over earlier offerings, and highly reliable if correctly installed. Installation itself does involve several critical adjustments, must be performed carefully, and does require specialized knowledge, but the general degree of difficulty does not exceed that associated with large distributed public address systems. There's no reason any qualified sound contractor should not offer satellite television installation as a regular part of his or her sales and service, and there's every reason he should. It gives him a definite edge over the competition.

## EXPLOSIVE GROWTH

Public broadcast satellite television is a relatively recent phenomenon. It really begins only in 1979 when the FCC lifted its requirement for licensing on all receiving dishes. Prior to that, satellite broadcasting was strictly an inter-industry distribution system by which broadcast networks and cable companies sent programming to local stations. Any consumer or nonbroadcast commercial applications were either illicit or too specialized to merit much attention. Since that time, however, the growth and transformation of the public satellite broadcast television industry has been uncommonly rapid.

A brief look at the history of the satellite phenomenon is useful for the contractor considering the sale of such systems, if for no other reason than to gain some understanding of how so many misconceptions about the format have arisen.

A scant dozen years ago, when the market was just beginning to be defined,

consumer satellite was a marginal industry in all respects. The satellite owners of the period essentially eavesdropped on network transmissions, and little dedicated programming had yet emerged, while the equipment itself consisted of bastardized, derated, cheapened broadcast designs. The basic quality of the signal, intended as it was for professional use, was always excellent, but few satellite owners experienced that signal reproduced at anywhere near professional standards. Basically, early satellite was not sold as a high quality alternative to conventional broadcast or cable, but as an expedient aimed at individuals in rural areas with no access to other services, or else to freeloaders. Price resistance was high among both types of core consumers, hence the indifferent quality of reproduction in most early commercial and consumer systems.

From those unpromising beginnings, satellite emerged as one of the fastest growing product categories in consumer electronics, and before mid-decade the industry was already beginning to mature. Broadcasters had begun to scramble their signals to thwart the freeloaders, and were beginning to see the installed commercial and consumer base as a potential source of profit. By 1985 hundreds of thousands of consumer systems had already been sold, representing in toto an incredibly steep growth curve for a new industry, though during the same period the manufacturing sector was in crisis, due to the fact that the curtailment of free programming was severely threatening further growth in the established rural market. Slowly and sometimes reluctantly the industry began to focus on the quality potential of the medium.

At the same time that a shift in market emphasis was occurring, the basic technology was rapidly improving. Microprocessor controlled motors came into general use for focusing the dish, and low noise, ultra wideband gallium arsenide transistors came to prevail in satellite receiver R.F. circuitry. Outboard



electrical componentry was reduced from three boxes to one, and prepackaged cabling became the norm. Installation became much more foolproof, and much less time consuming.

And all the while the cost of equipment continued to drop – a matter of considerable significance to the present day sound contractor. Today satellite hardware prices are depressed, and margins are low – typically much lower than is the case for either professional audio hardware or consumer high end audio equipment. For this reason successful sale of satellite systems must be predicated on clearly stated labor and consulting charges. The retailing of satellite equipment is simply not a good business at this time.

It is also very important to differentiate oneself in marketing terms from

the kind of quick and dirty satellite specialist who sells to sports bars, motels, and the Ma and Pa Kettle class of consumer. This type of vendor has defined markets where both labor and hardware are grossly undervalued, and where typical consumers go for under five thousand dollars. A satellite installation in the context of a distributed professional sound system or a multi-room home entertainment system or home theater should be priced at the same level as other A/V systems of equivalent complexity. Pricing should not be predicated on the slam dunk installation, and the finished product should be fully integrated into a high quality audio video ensemble delivering top performance and harmonizing with the general interior design of the business or residence.

## TRANSMISSIONS AND RECEIVERS

Satellite transmissions themselves may best be viewed as microwave in a vertical dimension. The frequencies of the carriers are in the gigahertz – well within the microwave region – and in the same general frequency range as the bands used for point to point microwave transmission of commercial television signals. Before the availability of satellite service, much commercial television traffic went over telephone microwave systems, and when satellite channels became available, television broadcasters and cable distributors strove for continuity with the older system. Existing consumer satellite transmissions take place in the C band (6-4 GHz) and the newer Ku band (11.7-12.2 GHz). The

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*Satellite service is in increasing demand in a number of applications.*

embryonic DBS broadcast service (at 12.2-12.7 GHz) is not yet operational over the Continental U.S.

Satellite broadcasts at best provide a far better signal than terrestrial broadcasts following NTSC standards – and not surprisingly, since satellite feeds are intended for network broadcast use. The video signal is FM rather than AM, so it is far less noisy than local terrestrial broadcasts, and the audio, for the most part, is discrete FM with no matricing. Because of the lack of suppressed subcarriers, the stereo sound is effectively wider both in channel separation and in bandwidth than either MTS sound or FM radio broadcasts. Furthermore, the stereo signal has sufficient phase integrity to permit accurate transmission of the Dolby Motion Picture Matrix, and thus satellite broadcasts can be decoded for surround sound with excellent results.

Virtually all satellites of interest to consumers are located over the equator in geosynchronous orbit with the earth, which is to say their speed of revolution is the same as the speed of the earth's rotation. Thus they appear to hang motionless in the sky 24 hours a day. The 30 or so satellites producing acceptable signals and relevant programming for North America are arranged across the sky in a broad arc called the Clarke belt after astronomer and science fiction great Arthur C. Clarke. The sky over the equator is growing rather crowded, and in terms of the positioning of the satellite receiving dish, only 2 degrees of arc separate some of the various commercial satellites in the Clarke belt. This

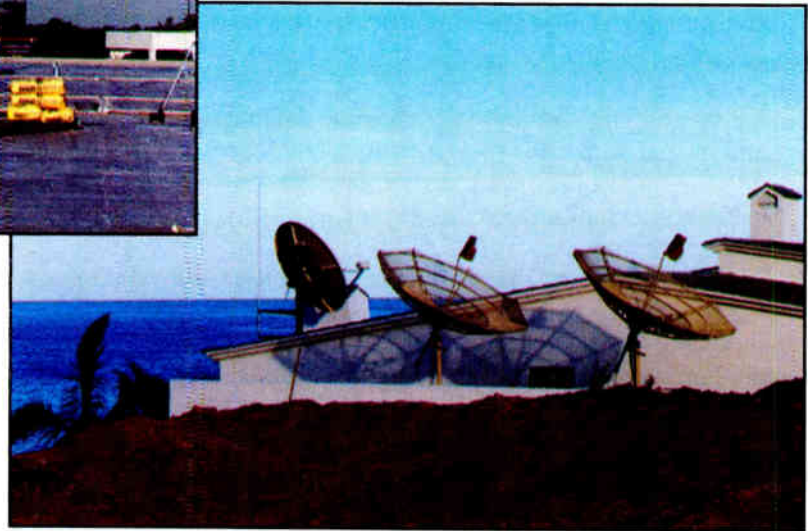
has considerable relevance for dish size and setup, as I'll explain in a moment.

Satellite broadcasting is typically done at low power levels – no more than 50 watts – and signal strength on the ground is extremely low. This accounts for the use of the dish rather than some kind of rod antenna design. The dish itself is a parabolic reflector which concentrates electromagnetic energy at the center just as a dome concentrates acoustical energy at its apex. The shape of the dish is fairly critical for reception, and any significant departure from a true parabolic curve will result in considerable signal degradation.

The energy focused in the middle of the dish is captured by another device called the feedhorn which is poised over the mouth of the dish and supported on struts. The feedhorn is a tuned tubular waveguide which directs the microwave energy to a microwave front end circuit. The signal is amplified and then down converted to intermediate frequencies where demodulation and tuning are more easily accomplished.

The actual microwave R.F. circuitry is generally housed in a single component known as an LNB (low noise amplifier/block converter). Block conversion of all channels to an intermediate frequency range occurs prior to tuning. Tuning in

*The properly engineered satellite system sets the total A/V system*



almost all quality consumer systems made today is by PLL digital synthesis as with most modern televisions and FM tuners. Tuning is done in a user accessible satellite receiver which produces discrete audio and video outputs that may then be amplified or processed in the same manner as the outputs of a stereo VCR, laserdisc player, or component television broadcast tuner.

### **INSTALLATION CONSIDERATIONS**

A satellite dish with feedhorn and LNB is a very high Q, highly directional resonant system. The dish itself must be aimed at the individual satellite producing the broadcast the viewer wishes to receive. Each time a different satellite is selected, the dish itself must move. Most satellites themselves carry several channels.

We might mention in passing that satellite antennas are available with two or more feedhorns and focal points which can simultaneously receive signals from more than one satellite. Such antennas are intended for the large installation industrial market, and are rarely applicable in the sort of commercial and consumer settings where a generalist sound contractor is likely to seek business.

Movement of the satellite dish is accomplished by a servomotor controlled

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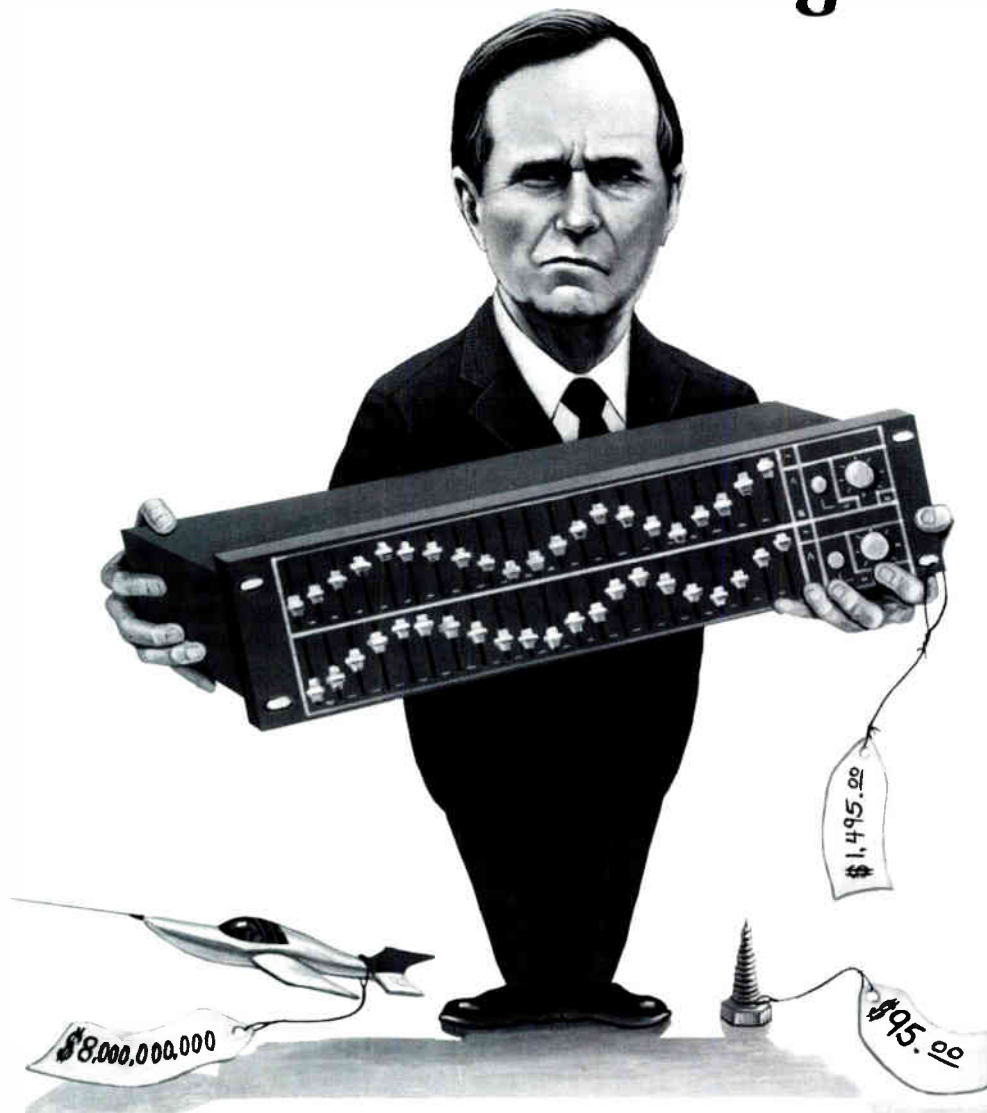
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An example of an earth station receiver system — the Drake ESR1250.

actuator arm in present day systems (early systems were tediously hand cranked into position for each satellite). In most current systems the satellite dish itself swivels on a horizontal axis known as the azimuth, while changing vertical elevation for each position. Both movements must be perfectly synchronized, and the mounting pole itself must be absolutely vertical, and must not move about its own longitudinal axis. An alternate scheme called the polar mount has the dish rotating about a single axis which is canted diagonally between the horizontal and vertical planes.

In present day systems the satellite receiver sends the signals that control the actuator arm via a hardwire connection. The user simply punches in the desired channel number, and the receiver does the rest; however in order

for the receiver to generate the correct control signals, it first must be programmed by the installer. Thus installation involves both physical setup and applications software.

Satellite systems are not terribly complicated, but performing an installation properly is a fairly painstaking process for a number of reasons. The alignment both of the satellite dish on its mounting pole, and of the feedhorn on the satellite dish are very critical. In many areas the positioning of the satellite dish within the mounting site is also very critical.

Let's examine some of the reasons that precise planning and setup procedures are so important.

Satellite broadcast frequencies are situated in a region of the spectrum which is filled with R.F. activity. Sources of such activity include point-to-point

telephone microwave transmissions, military transmissions, radio telescopes, navigation satellites, radar installations - and the sun itself. (Solar radiation is not a negligible source of interference; it can literally swamp satellite transmissions, and unfortunately there's nothing you can do about it.) Thus, not surprisingly, satellite television systems are highly susceptible to microwave interference from a variety of sources. The incidence of microwave interference varies over areas as small as a few square yards, and the installer electing to get into satellite must familiarize himself with all microwave facilities within the areas in which he does business, and must map the patterns of microwave interference. Since microwave emitters of any consequence must be licensed by the FCC, information on the location of

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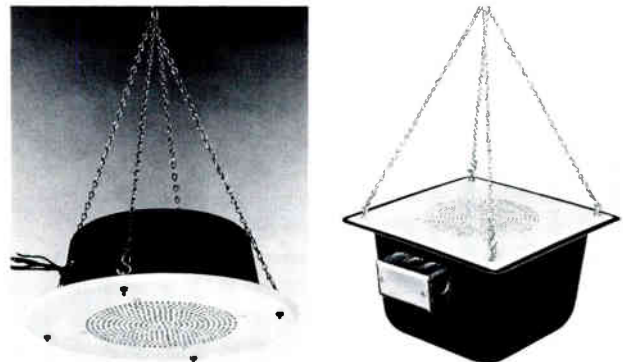
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potential offenders is readily available. One should be aware that some installation sites are so poorly situated in regard to terrestrial interference that good satellite reception is a virtual impossibility, and the installer of satellite systems must have the detailed knowledge of local interference patterns to make determinations as to system viability in specific locations.

### QUALIFYING THE CUSTOMER

To reiterate, satellite receiver systems offer three significant advantages over more conventional delivery systems: potentially higher quality sound and picture, greater program selection, and broadcast services in areas where they are otherwise unavailable. Initially the last consideration was stressed above all else in the marketing of commercial

and consumer satellite, but for most potential customers today, the first two considerations, program selection and signal quality, are likely to be much more important.

This being the case, it is incumbent upon the installer to make the client understand the significance of both dish size and of mounting procedures.

### THE DREADED DISH

The form and dimensions of a satellite dish are entirely a matter of function and cannot feasibly be altered. Many persons object to the size and appearance of the dish, but in fact the dish can neither be permanently concealed nor significantly downsized without vastly reducing performance potential. Unfortunately many vendors of satellite systems as well as writers in the consumer electron-

ics press have led consumers to believe that technological advances have made six-foot or smaller diameter dishes fully competitive with the older twelve footers. Such claims are demonstrably false. The as yet undeveloped dbx system will in fact permit the use of six and even four foot dishes, but current C and Ku band broadcasts require larger dishes. And unfortunately, the bigger the better, all things being equal. A twelve foot dish should be utilized if at all possible, and eight footers should be regarded as very marginal.

Dish size is so very important because it determines the gain of the signal at the mouth of the feedhorn, and thus ultimately the signal-to-noise ratio of the system. The relationship here is absolutely linear. Double the dish area equals double the dish gain. But, beyond that,

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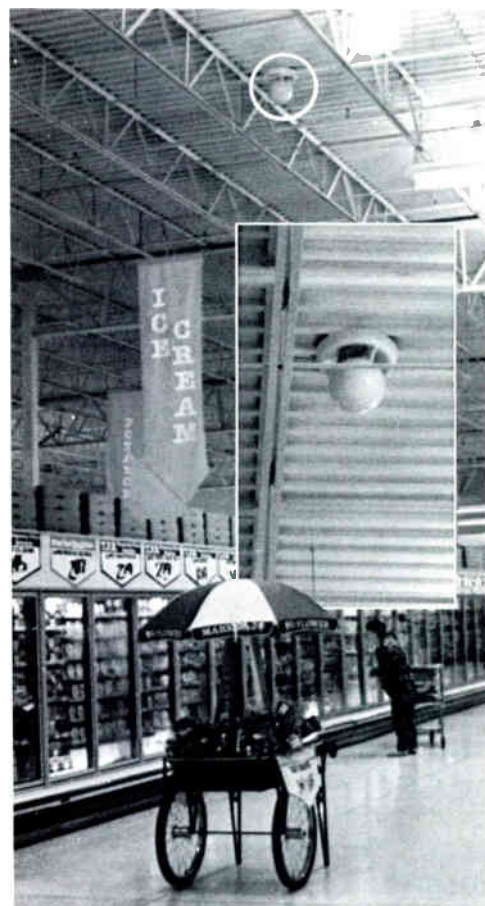
Scott Miller, Manager of Pro Sound at Muzak of Minneapolis, notes that the Cub Foods executives selected parchment-colored #110 Soundspheres to meld with the ceiling color and felt that the shape and color were highly compatible with the contemporary interior design esthetic.

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dish size determines the resolving power of the system in terms of rejecting interference from adjacent satellites.

But size alone is only one consideration in dish selection. Dish shape and mode of construction are also very important, and requirements in these areas should also be conveyed to the potential customer.

Satellite dishes utilize a number of construction techniques. Some are made of pressed sheet metal, some of wire mesh, some of spun metal, and some of molded fiberglass covered with a thin metallic coating. Most dishes sold in the marketplace today are perforated to reduce wind loading—a tactic that imposes some performance tradeoffs, particularly in regard to Ku band reception. Perforations reduce the effective surface area of the dish, and, if sufficiently large, create

unwanted diffractive effects at certain frequencies. Moreover, the reduction in wind loading is only significant at low wind speeds. In high winds a perforated dish is almost as vulnerable as a solid unit.

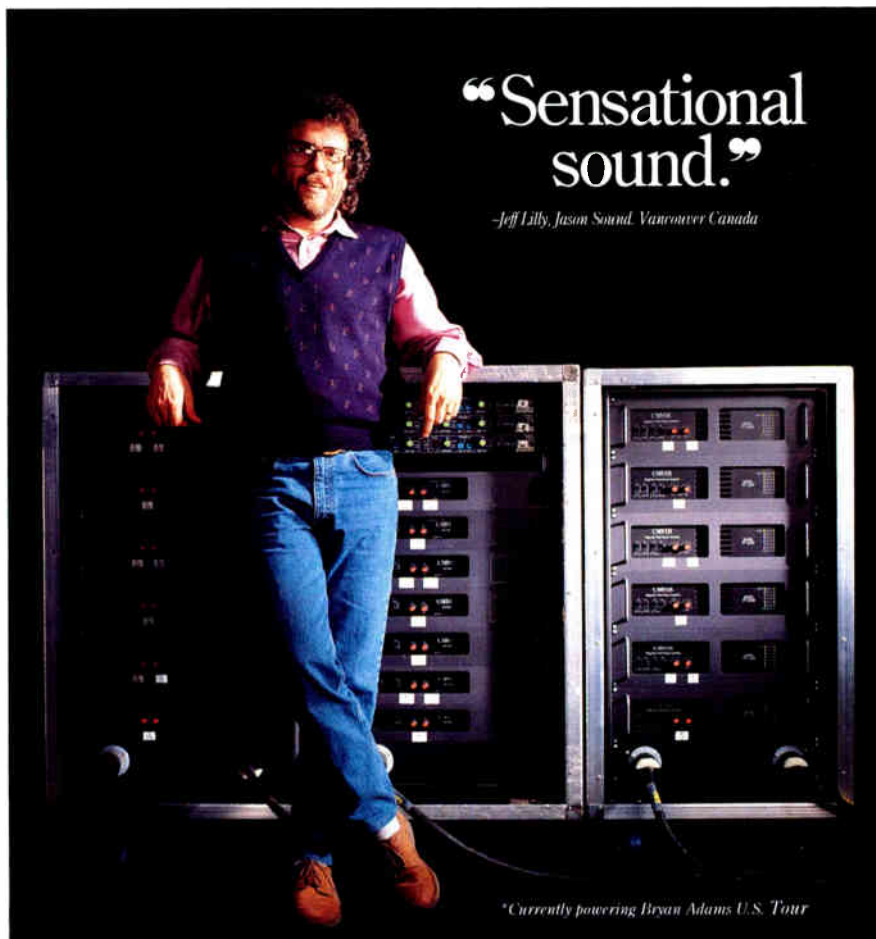
Perforated or mesh dishes that come in sections impose a further limitation. Such dishes can never assume a completely accurate curvature, and thus they will focus energy less effectively. Still, if properly assembled, a multi-section ten or twelve foot mesh dish can give excellent results.

Assuming that the customer is willing to accept the notion of a physically large dish on the premises, that customer must also understand the mounting requirements for such a dish.

Since performance of a satellite receiver system is entirely dependent on

the dish maintaining a fixed mounting position, a massive, rigid mounting base is highly desirable. The simplest way to provide such a base is to pour a concrete slab on a suitable patch of ground and fix a heavy steel pipe in the slab. Roof mounting, while common in the industry, is generally far less satisfactory because the frames of residential structures are subject to settling, vibration, and warpage, and seldom provide a degree of rigidity remotely comparable to that of pole mounted in concrete. A misalignment of the dish or its support structures amounting to as little as a sixteenth of an inch can measurably affect signal quality, so the importance of stable rigid mountings cannot be overemphasized.

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## PROGRAMMING

In the beginning there was nothing but feeds from broadcast and cable networks. Such feeds are still available for satellite viewing today, and still provide the satellite system user with a tremendous amount of programming. NBC, CBS, ABC, and Fox feeds are all transmitted via satellite, with NBC and CBS scrambling some of the feeds, while ABC and Fox never scramble. Cable News Network is scrambled at night but not in the day.

In addition to the feeds, a great deal of dedicated programming now exists for satellite users such as PBS, C-SPAN, Paramount Syndication Channel, MuchMusic, Entertainment Live, and many, many more, including broadcasts emphasizing religious, sports, or children's programming, Spanish language material, or so-called "adult entertainment."

Most of the dedicated material is, of course, scrambled, and is available only to subscribers who are provided with decoders by the satellite service. As a matter of note, an underground industry of pirate decoders continues to exist, though present day scrambling techniques are quickly outpacing the efforts of garage manufacturers. Sound contractors are well advised to have nothing to do with pirate decoders. The installation of such is a crime, but beyond that, installers trafficking in such devices are blackballed by legitimate manufacturers and their professional lives come to be difficult. — D.S.

market presents special problems in regard to dish positioning because many customers have been led to believe that dishes can be situated out of sight in their attics, or else mounted unobtrusively to the side of the house. Unfortunately the behavior of microwaves entirely precludes such schemes. In fact transmission of microwave requires a completely unobstructed path-

*(continued on page 71)*



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# Not Just for Elevators

*Business Music Upgrades Its Image and Its Style*

BY MARIA M. CONFORTI

**B**usiness music: It's not just for elevators anymore. Keeping up on music trends and client concerns will help a contractor's bottom line stay in tune.

"We can only look at our sales activity, and I would certainly say that contractors have been hit hard by the economic recession; I don't think I'm saying anything new when I say that," says Bernard Kron, director of music services, EMS Music. The music supplier recently made its first shipment of four-hour CD-Is. (Compact Disk Interactive is the Philips-developed multimedia format.) Kron adds: "We are starting to see – just in sheer, raw activity and numbers and ignoring CD-I, because that's causing increased activity in its own right – some improvement in business conditions over the last several months. We're definitely seeing increased sales. I think things are beginning to pick up, but it's still early in the day."

"From a construction and development standpoint, with few exceptions, things are fairly sparse," concurs Michael J. Malone, CEO/chairman, AEI Music Network. In addition to its current offering, AEI will roll out a CD-ROM format

in early 1993. "For our affiliates, the strong ones are doing well. 1992 is certainly stronger than 1991. From AEI's standpoint, we're up 20 percent over last year, and last year was 16 percent over the year before."

No surprise here: a combination of quality and affordability appeals to end users. "Today, with the new technology in satellites, the better quality in tape, quality has become far more important than it has been in the past," says Geoff Lonstein, president, Infinite Modular Power Systems. IMP offers a distributed power system; though new to

**"With day parting, they set up a schedule, and it's all done automatically. It's not a hands-on thing."**

America, the products have sold in Africa and Europe for several years. The line will include more amplifiers, home speakers, mic mixers, mic masters, and zone paging systems within a year.

"The number one concern of the end

users is that they have the appropriate music for their business; that's why foreground music has rapidly become the force that it is," notes Kron. "The next concern is that the system be simple, reliable, and easy to understand and use. The third concern that users have, we've learned since we were developing CD, is that they want systems that they want to own. . . . Not for technical reasons necessarily, but because of pride of ownership.

"We approached what CD-I could do in a sound system with a fair amount of cynicism," Kron continues. "The kinds of speakers that are in ceilings and so forth are not necessarily the greatest in the world; frequently the systems are mono. We're surveying every customer we're shipping the CD-I to. What we're hearing initially is that they're almost all uniformly commenting on superior sound and viewing it as a plus. Frankly, it surprises us to some degree, because we have no idea how good or bad their sound systems are out there. The next thing that we're hearing is that our random shuffle mode really works for them. It makes it seem like a lot of music."

"Affordability is important, and the other thing we've found is bundled services are important," says Leslie Ritter, Muzak's director of marketing. "With

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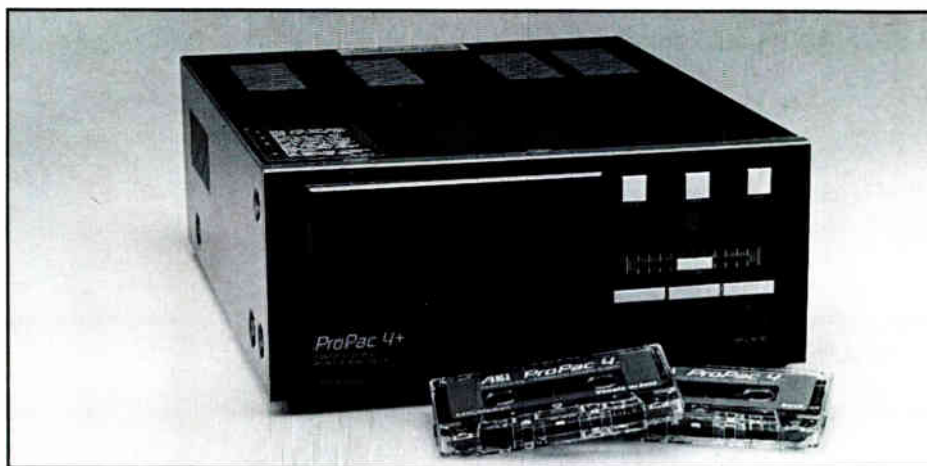
*Maria M. Conforti is a freelance writer in the New York area.*

DBS, we and other suppliers offer a number of channels to choose from, plus data messaging that we can transmit over the same satellite signals for the customer. So what we have found is really big as far as growth goes for us has been bundled services such as music and data, and music and audio advertising messages, and music and broadcast television via satellite. It all uses the same signal, it all uses the same basic receiver." This type of service is particularly popular with chain retail and chain restaurants, Ritter notes.

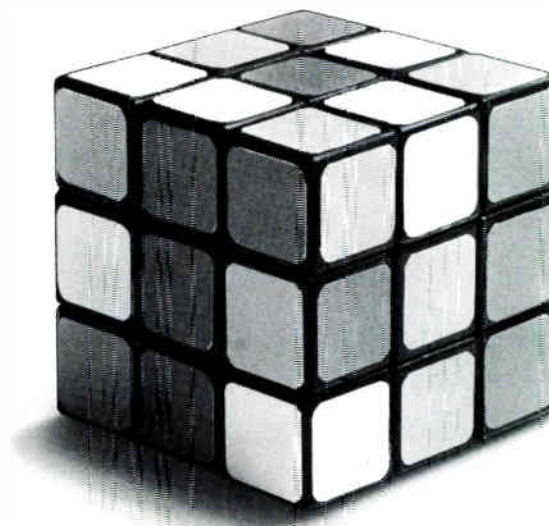
"Another thing you can do with DBS is what we call 'day-parting' " Ritter explains. Day parting suits customers who want to listen to two or three types of music during the day. The music programming switches on the receiver for a given time or zone. "That's become very popular; people are starting to lean away from just one music channel. . . . In our tape service, people may have a selection of 12 tapes, but we've found that they put in one tape and just let it play, because they get really busy doing their business. With day parting, they set up a schedule, and it's all done automatically. It's not a hands-on thing."

Business music clients are very clear about what sounds they want to help set an atmosphere. "Country is as hot as it can be right now," says Tom Pelissero, supervisor of music and programmed sound products at 3M. "We're lining up a new country music channel that will be devoted to new country artists. The requests [for country] come from everyone from country and western boot and saddle shops to supermarkets, to convenience stores. Everyone seems to be into the new country music, so it really opens up a variety of businesses. It's kind of a family music now, so it works well in restaurants too."

"We see growth in music that has more of an international sound — what we call World Beat," says Malone of AEI. "Also rap/crossover music for contemporary — not hardcore rap, but dance rap. Crossover country music continues to be very strong in both the hospitality



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and retailing sectors. The passe side is the 'background' 'easy-listening' music. But there are still tens of thousands of customers who are listening to 'elevator music' – or turning it off, as the case may be. Our conversions, just from the companies we bought, from that type of format or even a middle-of-the-road adult contemporary, is pretty massive."

"Our most popular program is Foreground Music 1, which is an adult contemporary/soft rock kind of format. They're buying it for offices as well as all kinds of retail environments, retail restaurants," Ritter says. "We've got almost 200,000 customers still on our environmental music channel, and they're still holding strong. But most of our new business is in Foreground Music 1. We're just introducing a country channel, and it's amazing how many people are subscribing to it."

Contractors don't have to worry about

## **"There are statutory rights that one has to have with the music companies."**

music rights; that's strictly the suppliers' headache. States Malone, "If [an end-user] is using consumer equipment, then the obligation to pay that performance right is theirs. The performance license runs about \$20 per month. Because of the compilation music that we put together, there are statutory rights that one has to have with the music companies, payments one has to make to the publishers, synchronization rights that one has to pay to the American Federation of Musicians. So a company like AEI or Muzak is in essence a clearance house for bigger companies to be sure that the music is cleared."

"We take responsibility for covering our customers' licensing," Ritter concurs. "But we cover them for their use of our materials; so if a customer happened to have a consumer cassette player in their business as well, we don't cover them for that."



Satellite Antenna.

No doubt digital is the wave of the future. "As the prices of digital-to-analog/analog-to-digital converters come down," Lonstein says, "digital transfer of information will be able to take place. We'll have digital loudspeakers, and when we start having that, quality will increase tremendously."

"Right now we are putting a big push not only to convert our existing tape customers to compact disc – which is going very nicely – but also we have a big corporate sales push going on," Kron states. "We are finding it remarkably easy to get in to see corporate decision makers, because of the overall utility of the CD-I format."

"We will be a working partner with our corporate accounts, in terms of developing their use of the CD-I platform," continues Kron. "They're already calling on us to do that. We offer full CD-I altering capabilities, which means the ability to make interactive titles on a customer basis. We know that at least among our multi-unit corporate users that that will happen. In the next year or two, we will be able to do very small run custom programming, even one-off discs if that's appropriate. We are currently developing a very aggressive dealer program to support CD-I. We look forward to developing relationships with dealers of ours who themselves have important corporate clients and are going to need this technology. And, of course, supporting the single-location sales as well. Our CD-I catalog will grow rapidly within the coming months, so that within a year or so it will be every bit as big and well-supported as our tape catalog."

"From a systems standpoint, with the

continuous growth of digital music, we see our growth in the high-end systems," Malone predicts. "We do about \$11 million just on equipment sales, and we do a lot of systems on just 4,000-square-foot retail establishments, but we've seen the average system go from \$1,800 to \$6,000. So we've seen business people saying 'This is capital expense for peanuts, when we amortize it over five or seven years, that has a heck of a lot better quality.' A case in point is the Gap stores, where they were spending \$1,600 or \$1,800 on a sound system, and now we're going through updating the sound system to three times that money. We sell it and train our affiliates to sell it through the importance of music. So if somebody recognizes that music is important to their customer, then the quality of that music is equally important." Though identical programs may play in two establishments, the place with a more elaborate system to back up the music will make a better impression. "The impact of the software has a tremendous amount to do with the quality of the hardware."

Although appealing to a prospect's bottom line is a powerful tool, don't sell solely by price, advises Lonstein: "I like to use the Yugo as a comparison. It was sold on price only – and it's not available in America anymore. In the long run, the cheapest is not the least expensive. You find that, the worse the economy is, the more businesses that last are buying quality because they're buying for the long term – instead of trying to save 10 percent now and paying 300 percent in the long term."

"People are looking for something different, and for something that will give them a competitive advantage," Lonstein adds. "Our system also works on battery power, in case of a power shortage. The system is extremely small, and we've packed a demo in a suitcase. Now the reps and sound contractors can open a suitcase and demonstrate the quality that they're giving. In the end, even if it's slightly more expensive, the client is always willing to pay for quality, if you

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can demonstrate that you have real audible quality."

"[Businesses] will always want a playback platform in their stores or offices that can not only provide them with business music, but which has a capability to be used for everything from training and sales, multimedia presentation, to point-of-purchase and things of that nature," Kron asserts. "For example, you could use CD-I to show somebody a catalog; all you need is a video monitor or television set, because the CD-I specs support standard NTSC output as well as various other video outputs. . . .

With our initial contacts, retail environments are very receptive to what we're offering because not only do they need foreground music, but they have a very active and dynamic training and catalog agenda. They're training their employees very frequently on new products, new services, and new approaches, and they're doing it now in a variety of ways: on videotape, flying people to corporate headquarters, flying managers out to train on-site, corporate retreats and that sort of thing. CD-I is a complement to that."

"It's important - whether you're a sound contractor or an audio systems consultant or an audio/video systems consultant - to keep your end-users' needs in mind, and strategize to fulfill those needs," says Kron. "That's certainly something that everybody knows, and if they don't it should be driven

home at every chance."

The importance of music to the general public is a good selling point to the unconverted. "People spend more for music than they do for shoes in the United States," Malone observes. "When we see selling a music service as an adjunct or support to a system design, we recognize that music is important to consumers. So if it's that important to your customers, what are you doing about it in your environment? We think that's a logical conclusion, and anything that's important should have an element of control.

"We sell millions of dollars of equipment, and the only reason we sell that equipment is that people want the service to sound better," Malone claims. "So there's a great opportunity for the sound contractor who's selling a quality music service, that can greatly enhance the ability to sell equipment or more expensive equipment."

"A lot of [new businesses] are saying 'I'll just wait to put in a system.' To get around that, remember to sell the music service as a business tool, not just music," Ritter says. "The benefit of it is all the things that it does: It keeps people in your business longer, it puts them in a mood to buy, people stay in a restaurant longer when it's playing music that's appropriate for them, workers are more productive; we've got research that substantiates all of that." ■

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# Baltimore's Oriole Park

## *An In-Depth Report on the High-Tech Audio*

BY KEITH CLARK

**O**ver the past 20 years, baseball fans have bemoaned the demise of traditional baseball parks, which have been systematically leveled in numerous cities throughout the U.S. and replaced with structures most often termed “multipurpose stadiums.”

Cincinnati's Crosley Field, Pittsburgh's Forbes Field, and Shibe Park in Philadelphia are just a few of the many old-time ball parks replaced by facilities loudly derided as “cookie-cutters” by baseball traditionalists. While a scant number of the older ball parks have survived the fate of the wrecking ball (Wrigley Field, Fenway Park), they serve only as examples, definitely not the norm.

However, the Baltimore Orioles and Maryland Stadium Authority decided to buck the cookie-cutter trend when it came time to replace aging Memorial Stadium, which was built in 1953. The goal was to construct a “new, old-fashioned” ball yard, designed to evoke the myths, memories and traditions of the great American pastime.

And it would appear that the ball club and stadium authority has succeeded. The new Oriole Park at Camden Yards,

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*Keith Clark is Vice President, Public Relations for Jesse Walsh Communications in Buchanan, Michigan.*



*Cluster outside the stadium.*

which celebrated its first Opening Day this April, is a 48,000-seat throwback to the days of brick and steel, rather than concrete and glass – and domed ceilings. Odd wall angles are the rule in the outfield, while tight foul lines provide fans with an intimacy not found in any other stadium constructed over the past two decades.

The ballpark is located in a former

railroad yard in the heart of downtown Baltimore, tightly woven into the fabric of the city. In fact, the ballpark stands near a site that at one time served as the boyhood home of the legendary Babe Ruth. A 1,000-foot long warehouse, originally constructed around the turn of the century, looms just behind the right field wall and acts to further integrate the look and feel of ball parks from days gone by.

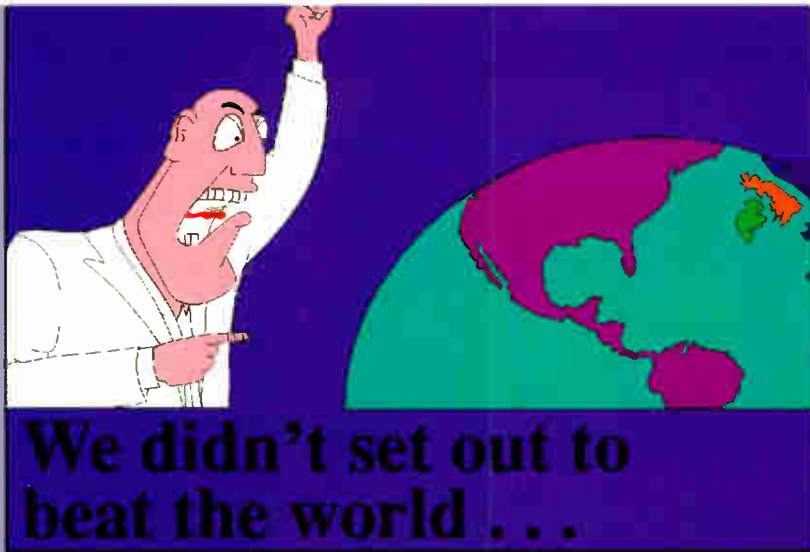
### **SPECIFICATIONS TO MEET A VARIETY OF NEEDS**

As one can imagine, designing a sound system to fit Oriole Park might be a daunting task. First, the designer would be subject to aesthetic considerations. The system, while needing to be state of the art, would also have to blend in with the surroundings. After all, the art of modern-day electro-acoustics hadn't really even been conceived during the time period that the park is designed to model. “It was a tremendous challenge to install over 1,300 speakers in the facility, taking into consideration acoustics, aesthetics and fan sight lines. And we succeeded.” says Eli Eisenberg, technical manager for the Maryland Stadium Authority.

Topper Sowden concedes that aesthetics did play a major role in the system design. Sowden, who is currently

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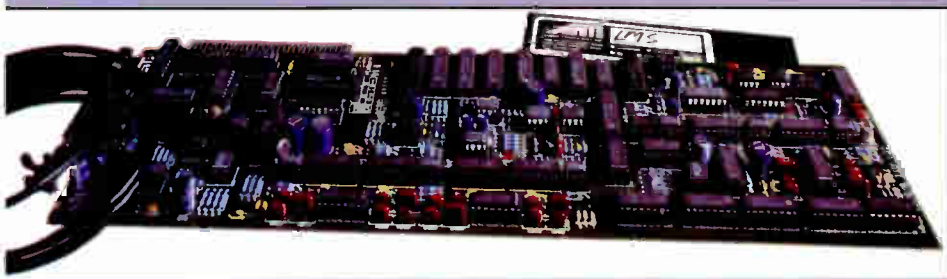
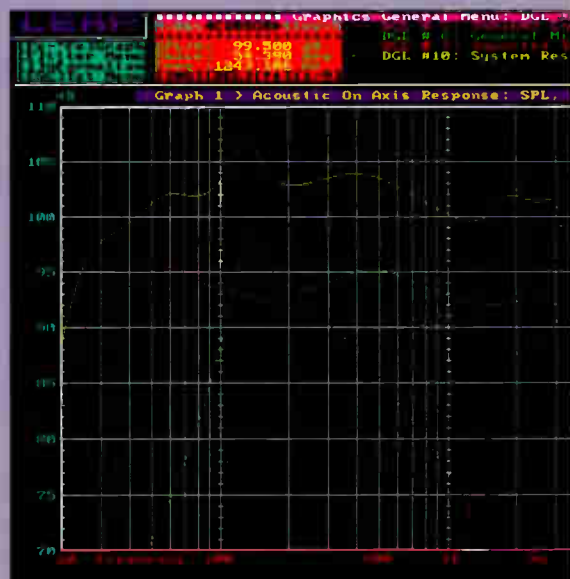
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with Pelton Marsh Kinsella of Dallas, was with the Joiner Rose Group back when plans were first being formulated for Oriole Park in 1988. Sowden and the installing contractor, Maryland Sound, also enjoyed a close working relationship throughout the project. Sowden continued to monitor the installation's progress even after he switched firms and officially left the project in October of 1991. Richard Zwiebel of the Joiner Consulting Group (with Sowden's assistance) saw the project to its successful conclusion.

"Obviously, the look of the park impacted the color selection and placement of the speakers," Sowden says. "We had to keep all of the audio gear as small and unobtrusive as possible. After all, the task at hand was to keep the 'technological' ballpark from happening. All parties concerned were committed to staying with the original plan of a traditional ballpark."

Horns for the loudspeaker clusters of the distributed system are slate gray in color, ensuring that they would blend in with the dark green and other dark colors that are predominant. All other visible equipment was shaded to go with that color scheme.

When it came to positioning, acoustics had to take some precedence over aesthetics. Working with the architectural firm, Hellmuth Obata & Kassabaum of Kansas City, Sowden was able to make some recommendations to modify the park's design to accommodate the loudspeaker components. For example, the upper canopy was extended and raised forward slightly, helping provide solid, even coverage in the upper deck areas.

Sowden initially proposed a choice of either a central cluster or distributed system. He favored a distributed system because a central cluster could have caused echo problems with relation to the warehouse in right field. Memorial Stadium, however, featured a central cluster system that worked fairly well and was favored by several parties on the Oriole Park project.

To help with a final decision, Eisenberg



Baltimore's Oriole Park at Camden Yards.

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arranged for a demonstration pitting a distributed system against the central cluster at Memorial Stadium. "They were blown away by the distributed system," Sowden says. "The demo, although it took a great deal of work, was the deciding factor. We were given a unanimous

**"Obviously, the look of the park impacted the color selection and placement of the speakers," Sowden says.**

go-ahead to pursue a distributed system."

A total of 71 clusters, each comprised of horns, drivers and a low-frequency cabinet, ensure that almost every seating section is covered by a cluster. In the upper deck, three Electro-Voice small format HP-series horns with E-V DH1A drivers are arranged in a configuration providing a front-firing horn, down-firing horn and back-firing horn for each cluster. Two 12-inch loudspeakers in a tuned box with an F3 to 42 Hz provide the low frequencies.

The lower deck and outfield sections feature clusters consisting of two HP-series horns with DH1A drivers front-firing and down-firing. In the lower deck, three 12-inch loudspeakers in a tuned cabinet provide low-frequencies, while cabinets with a single 12-inch loudspeaker (in a tuned cabinet) are utilized in the outfield. The upper deck cluster

arrangement is nearly symmetrical to that of the lower deck. Both the clusters and components within each cluster are time-aligned. (More on this topic later.)

The clusters are powered by 52 Crown Com-Tech 800 amplifiers, while Com-Tech 1600's power the underbalcony and auxiliary systems. The amps are rackmounted in four rooms located throughout the stadium's mid-levels situated between the upper and lower decks. Four rooms were required to keep cable runs as short as possible. Number 10 wire pairs are used for power runs to the horns, drivers and low-frequency systems, while number 12 wire pairs are utilized for the underbalcony system. Each cluster loudspeaker driver is routed back to the amps separately on a wire pair.

#### COMPUTER CONTROL: THE MODERN TOUCH

When Sowden and project engineer Fred Curdts (then of Maryland Sound and now with Signal Perfection Limited of Baltimore) began work on the Oriole Park project in 1988, the development of the Crown IQ System 2000 computer control system was in its infancy. "We were aware of Crown IQ development at the time we began this project," Sowden says. "However, it really had not progressed to the point where we thought it would be viable for this project." So in the meantime, he pursued development of a relay-driven component control system that would provide control of the signal distribution to allow muting of selected loudspeaker clusters throughout the stadium.

"We knew that we wanted to employ some type of control for the system.

When you want expedient control and adjustment of 71 individual clusters, not to mention their individual components, some type of central control system is essential," Sowden explains.

By early 1990, the IQ System had progressed to the point of being a viable option to meet these desires. At about this same time, Curdts and Maryland Sound were in the process of installing a Joiner Rose Group designed sound system using Crown IQ and AMX control at Anaheim Stadium, a job also involving Zwiebel and Sowden.

Anaheim was the first stadium to feature the IQ and AMX combination, and based upon the success of that installation, it was decided that a PC-based IQ System, with the added benefit of an AMX controller that allows control from a single LCD touch screen, would be a viable choice for Oriole Park. Curdts

*Horns for the loudspeaker clusters of the distributed system are slate gray in color, in order to blend in with the color scheme of the park.*



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began work on a similar system for Oriole Park, with modifications to accommodate its different design and configurations.

Curdts notes that the IQ System for Oriole Park is designed to allow control of three specific functions: power of the entire system, the muting of specific zones via the amplifiers, and easy user-access and operation of the system. He points out that the control of muting within each zone even extends to the individual high- and low-frequency com-

ponents. All equalizers (White 4600's) are also under computer control.

Curdts, directed by the designers, made sure that the AMX touch panel had the capability to display each individual cluster within the system, allowing for easier and more exact on/off capabilities.

The AMX touch panel is located in the audio control room. In addition, all signal control devices (EQ's, crossovers, etc.) were installed in a room directly adjacent to the audio control room, adding convenience in the adjustment and

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maintenance of the system.

Computer control also makes for more expedient and accurate tuning of the system. Zwiebel notes that the time for tuning and adjustment of the system can be cut by more than half. "You don't have to make frequent trips to the amp rooms to make measurements and adjustments. Without IQ, we typically take our measurements in the field and then go to the amp room to adjust all of the amplifiers, feeding pink noise into the system and adjusting the amplifier gain to a new setting on an AC voltmeter," he says. "We then go back out and listen. This process can take hours, and we can't precisely remember how the system sounded before the adjustment, making comparisons more subjective. As a result, fine tuning within 1 dB cannot be accurately accomplished.

"With IQ, we position a technician in the sound room to operate the IQ system host computer while I walk the stadium," Zwiebel continues. "I am then able to radio in changes and obtain instantaneous A/B comparisons, allowing much more accurate tuning of the system. Not only do I save a lot of time and energy, but I also end up with a better sounding system."

Zwiebel cites a recent install where computer control was not used, at Toronto's Skydome, a facility seating over 50,000. "As you can imagine, there was a lot of time spent running back and forth. I believe that this is one of the major reasons that you see computer control coming to the forefront. With as many as 150 power amps on jobs of this size, spread out over several amp rooms, you can lose some of the accuracy. And as you might surmise, we highly encourage all of our clients to go with systems of this type."

Zwiebel is also quick to point out that computer control systems are ideal for audio installations of almost every size and type, because of the provisions for pre-setting as well as user-friendliness and the aforementioned convenient and accurate tuning.

The Joiner Consulting Group staff also went over each electronic component

with a fine-toothed comb. "Ray Rabourn of our staff adjusted every single crossover, delay equalizer – every single piece of equipment in every path and signal chain – making sure that they were set for optimum performance," Zwiebel says. In addition, Gary McAuliffe, Joiner Consulting Group's project manager at Oriole Park, designed the broadcast systems and performed an equally precise adjustment of those systems.



*The audio control room.*

## FINE TUNING THE DISTRIBUTED SYSTEM

Zwiebel performed a comprehensive fine-tuning of the distributed clusters. Each loudspeaker component was checked for aiming, time alignment, level adjustment and equalization.

Although the speakers are aimed according to specification (based upon the Bose Modeler program) when they're installed, final adjustment is still required.

"The ultimate goal is to get the smoothest coverage and the highest intelligibility possible," Zwiebel says. "Many times the speakers must be re-adjusted due to architectural changes that have occurred

in the building process. Corners or bends tend to be much more concentrated and focused."

For aiming test and measurement, Zwiebel employed both an Ivie IE-30 analyzer and also a GenRad-1982, an SPL-type of meter that also allows for selection of different octave bands. He generally sets the unit to 2 kHz or 4 kHz, but he adds that he uses all of the octave bands as well as the A- rated settings.

He also points out a phenomenon with relation to the front-firing horns of the clusters.

"The tendency is to aim these horns to the very front seats in a section. But you have to be very careful with this, because when the sound hits the grass it can be almost like skipping a rock across water. You can't have too much of a grazing angle because grass, and especially AstroTurf, tends to be very reflective."

With stands on the opposite sides of the diamond about 500 feet away, this skipping effect can produce a delayed reaction echo of a half-second or more.

"The speaker clusters covering the main seating area are not intended to cover the field. A significant signal drop should occur within the first 20-30 feet away from the stands. If you're walking out 50-70 feet and only getting a drop of 6-7 dB, then you're probably going to experience this skipping problem. The bottom line is that you really don't want to cover the field with sound from these clusters," Zwiebel says.

Another interesting phenomenon of distributed systems is how much better they sound when the seats are filled with spectators. "The cross-field sound from the clusters across the field arrive much later than the direct sound of the speaker clusters covering a specific section," he explains. "Even though this signal is much lower in level than the direct sound, this long delay time can result in a very audible, disturbing effect. Fortunately this sound is low enough in level that it is masked by the noise floor created by the crowd in a filled stadium."

Another key to the success or failure of any distributed system is getting the

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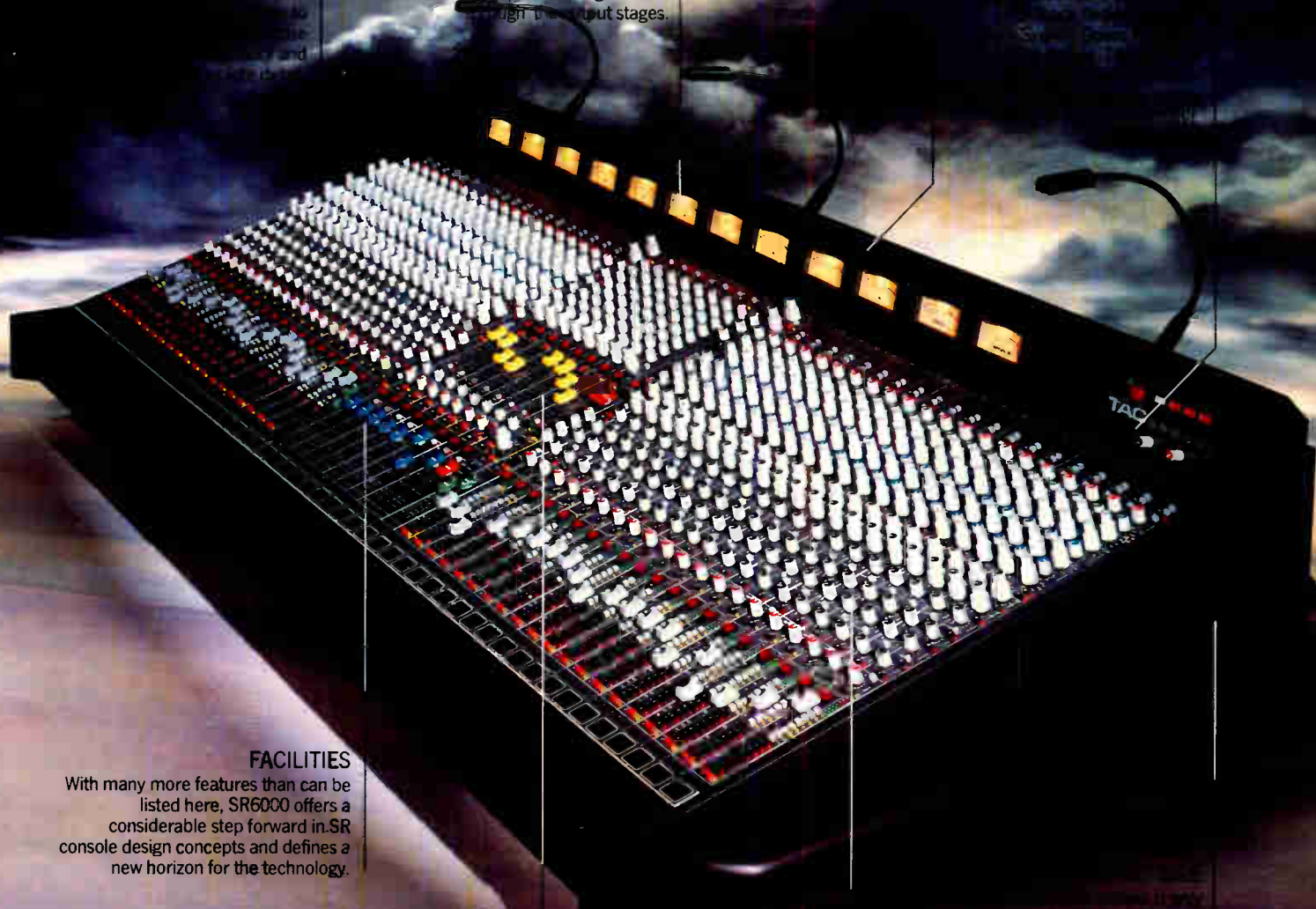
A 7-stage LED meter is linked to the mute switch on each channel giving an immediate assessment of levels from signal present to +12dB. 12 VU meters with individual multi-source input selection enable rapid checking of levels through the output stages.

### MASTERS & SLAVES

Linking of multiple SR6000s in slave configuration enable rapid checking of levels through the output stages.

### PEDIGREE

SR6000 has an acknowledged pedigree in the audio trade (featured in the book 'Sound Reinforcement' and 'Manufacturing of Concert Hall Systems' by the BBC) and has been used by many of the world's leading recording studios.



### FACILITIES

With many more features than can be listed here, SR6000 offers a considerable step forward in SR console design concepts and defines a new horizon for the technology.

### TOTAL CONTROL

SR6000's output system has been designed to allow maximum flexibility in configuration of output stages. Each input can separately address 8VCA/Mute groups and 8 aux subgroups, all of which are overlapping. The main stereo output and the 10 x 8 output matrix allow multiple speaker arrays to be controlled with ease, while the VCA Master gives overall control of all 10 main outputs.

SR6000's revolutionary auxiliary system allows the 8 aux buses to be split between left and right sides of the console, giving the engineer 16 auxiliary paths for large effects-heavy mixes.

SR6000's revolutionary auxiliary system allows the 8 aux buses to be split between left and right sides of the console, giving the engineer 16 auxiliary paths for large effects-heavy mixes.



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Circle 203 on Reader Response Card

World Radio History

# The New Ball Game

BY ANN FISHER

Babe Ruth, a Baltimore Oriole in 1914, could run out onto the field today and feel right at home. Baltimore's new Oriole Park at Camden Yards has been lovingly designed to include such old-time features as an asymmetrical playing field, steel trusses supporting stands, and a board that permanently posts out-of-town team scores. However, the telecasts are anything but old-fashioned.

Those tuning in to Home Team Sports' Orioles broadcasts are watching the game from nine camera positions, more angles than any other telecast offers. Baltimore broadcasters have their own field of dreams, one that is "telecast friendly," from its aesthetics to its resources.

No one knows that better than Bill Brown, director of production for Home Team Sports (HTS), the Bethesda, MD-

based regional cable network that is broadcasting 70 Orioles home and 20 away games this season. When the Orioles began laying plans for their new home in 1988, the team solicited broadcasters' ideas, and HTS presented a detailed plan - complete with camera heights, angles, positions and lighting design. They were hired to serve as consultants.

With all their cameras, HTS offers

## The foul-line action comes from cameras 5 and 7.

Orioles fans at home more variety than the national broadcast networks, which use only five to six cameras for regular season baseball games. HTS has added its signature "foul-line cameras" to the mix. When ESPN comes to town it uses the feeds from those HTS cameras to supplement its own coverage.

At Oriole Park, the foul-line action comes from cameras 5 and 7, handheld Sony BVP 701s with 17:1 lenses located in unobtrusive photo pits on the home plate side of each dugout. Need some high stadium angles or the perfect wide angle beauty shot of Baltimore's Inner Harbor? Camera 9, a robotic Sony handheld in a weatherproof casing, has it from atop a light standard on the Camden Yards Warehouse beyond right field. Want to get up close and personal in the dugout or check out the nuances of left or right-handed batters? Check out cameras 1 and 3, installed in each dugout. Need some play-by-play or close-ups of pickoff attempts? Cameras 2, 6, and 8 provide it from perches above home plate, right field and first base. Want to check out the pitcher's curve ball or watch the sweat bead on his forehead? Camera 4, out beyond centerfield and 15 feet left of the ballpark's imaginary mid-line, provides the angle. All stationary cameras are Sony BVP 360s with 50:1 lenses.

In addition to accommodations for 24 broadcast cameras, Oriole Park has room for five production trucks and 15 news vehicles with satellite dishes, plus seven permanent microwave dishes for local affiliate transmissions.

"This is one of the first [major league ballpark] facilities that has taken television and looked at it for the maximum production techniques," says Eli Eisenberg, technical manager for the Maryland Stadium Authority. "When the older stadiums like Memorial Stadium [the Orioles' old home] were built, TV was just a stepchild. It didn't have the impact that sports TV has today; only a handful of games were televised. Now it's a totally different marketplace. For any one game, there are two to three different companies telecasting, and three to four production trucks."

Opening day was the facility's baptism by fire. There were 22 live feeds leaving the park - four broadcast TV (one for

*Ann Fisher, formerly head of public relations for NFL Films, writes frequently about sports broadcasting.*



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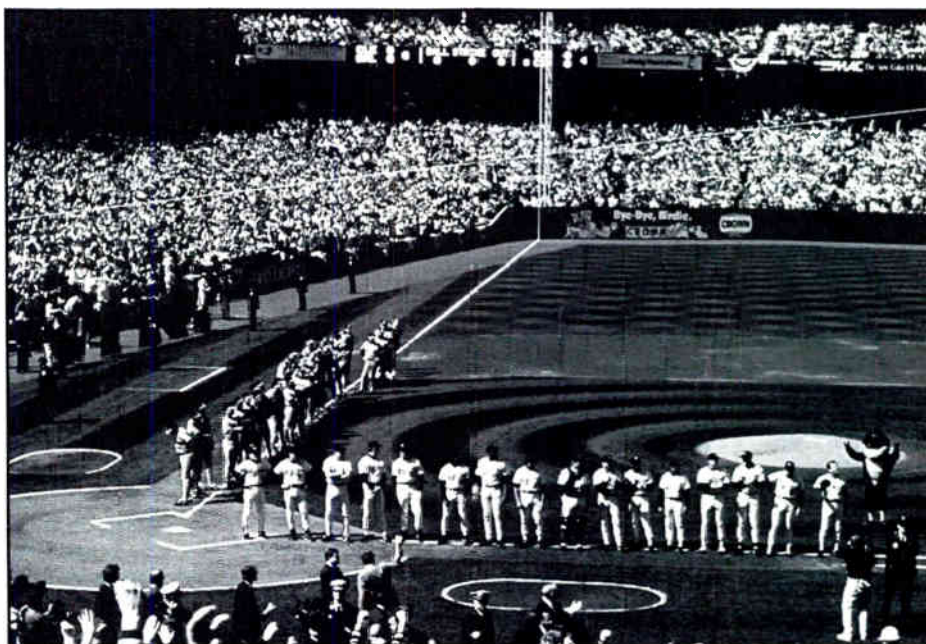
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NHK in Japan), three broadcast radio, three national TV shows (Good Morning America, The Today Show, and The Maury Povich Show) and 12 ENG news feeds.

When planning the camera placement in Oriole Park, there were three concerns: production value for broadcasters; aesthetics (camouflaging camera positions with paint and materials); and fan sight lines. The fans' view of the game was critical, the Orioles insisted. So when it was discovered, a few hours before the first pre-season game, that the drape behind home plate that allowed the HTS camera a clear shot caused sun glare and obstructed fans' views, plans were immediately made to replace it. The backstop is now a vertical chicken wire screen that goes unnoticed by television viewers.



Opening Day at Oriole Park.

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Given the opportunity, the Orioles and HTS addressed production problems that had arisen during telecasts in their old home, Memorial Stadium. For instance, the lighting had been concentrated on the pitcher's mound, falling off dramatically as it moved away. Oriole Park is so well lit that the cameras' 2X

extenders, which double the power of the 50:1 lenses, work as well for night games as day. HTS's popular "foul line" cameras had been squeezed into the front row, right along with the fans. Now the operators of those handhelds have some leg room - they reside in a 6 x 12 x 2.3 foot bay below the spectators. ■

## "MUTANT FROM THE CONTROL ZONE"

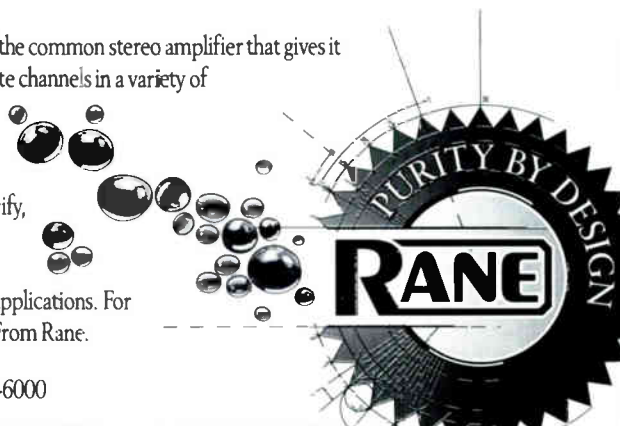


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Circle 252 on Reader Response Card

August 1992 47

proper signal delays. Zwiebel first aligns adjacent horns in each cluster, employing a TEF analyzer for micro-second adjustments. "Checking the time alignment on these components may sound like a relatively simple task, but you find that each and every seat has a slightly different relation to the speakers that

**"The look of the park impacted the color selection and placement of the speakers."**

you are aligning," he says, adding that he finds the "worst case" location where the difference is greatest and the "best case" where it is smallest and takes the average of the two measurements, using it as his target for the majority of

*The clusters are powered by 52 Crown Com-Tech 800 amplifiers, while Com-Tech 1600s power the underbalcony and auxiliary systems.*



seats in that section.

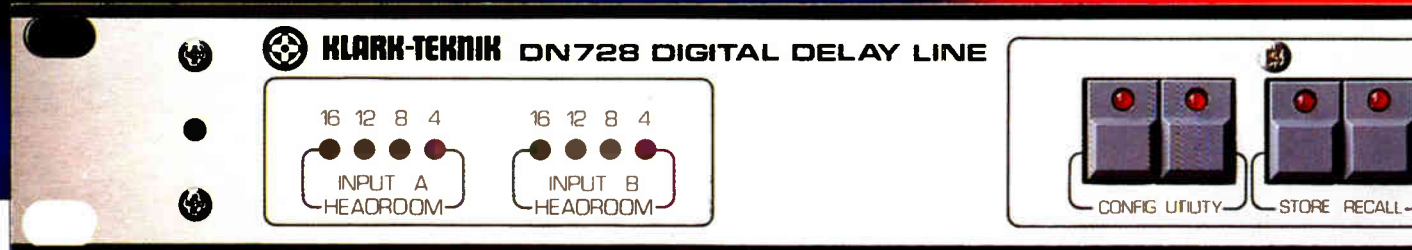
Following individual component alignment, attention then turns to the clusters as a whole, with Zwiebel shooting for an "ideal" range of under 20 milliseconds of discrepancy. "Anything beneath 20 milliseconds sound good, while 25 milliseconds is the limit of acceptability in most cases," he says. "At Oriole Park, we had delays of 20 milliseconds or less, because there are so many clusters. Where you

really run into problems with time alignment is at venues with the clusters spread fairly far apart. But in Baltimore, they are only 30-40 seats apart."

Signal alignment is performed from the upper deck down, with various offices, locker rooms and other rooms saved for the end. Following the signal alignment, level adjustments and final equalization are performed. In final equalization, Zwiebel utilizes an Ivie IE-

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30 and GenRad-1995, which allows for storing the actual house curve set at the main seating level. This curve can be simultaneously displayed with the real-time  $1/8$ -octave display. The equalizers for each seating area are then set by adjusting the system to match this "house curve." Final equalization is performed by ear, during careful listening tests.

The audio console and front-end equipment is installed in the Communications Control Room, consisting of equipment for the sound system, Daktronics matrix scoreboards and Sony JumboTron video board. A Soundcraft 200B mixing console is the heart of the system.

"The original 16-input board was just too small," says the stadium authority's Eisenberg. "With the elaborate production the Orioles feature at each ball game, a larger console was a must." The con-

sole handles eight microphone patch panels throughout the stadium, plus two Otari cart machines, two Carver CD players, two Nakamichi cassette decks, a Technics turntable, and four feeds from video tape machines.

**At Oriole Park, we had delays of 20 milliseconds or less, because there are so many clusters.**

The microphone panels, located throughout the ballpark, include six tie lines between each panel and the control room patch panel, an intercom outlet and two field monitor outlets. All systems in the control room are tied together with ClearCom intercom equip-

ment. "I specified ClearCom from all of the vendors and tied all 37 drops into one large matrix," says Eisenberg.

**THE RESULT: OUTSTANDING AUDIO**

The years of planning and labor on the Oriole Park system have obviously been well worth the effort. Comments from the stadium authority right down to the fans have been extremely positive.

"The system offers so much presence. I've heard comments from fans that we have the best sounding audio system in country," says Eisenberg. "We wanted to create a system that made fans feel like they were sitting in their living rooms, and I believe we succeeded. The ultimate goal was to add to the entertainment perspective of the ballpark, and that purpose has definitely been accomplished." ■



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Circle 254 on Reader Response Card

# San Francisco's Kezar Stadium

*Below Grade and Neighborhood-Friendly*

BY GREGORY DeTOGNE

**R**ising from the ashes of one of the NFL's legendary stomping grounds, the new Kezar Stadium features a high-powered sound system specially designed to keep the rest of the neighborhood in the quiet zone.

Following the relocation of the San Francisco 49ers to Candlestick Park, their old home turf in Kezar Stadium was handed down to the city's Department of Parks and Recreation. The new

**“It can easily be said that we went an extra mile or more to keep things as quiet as possible on the other side of the stands.”**

residents at Kezar continued the grid-iron tradition by hosting high school football games, but towards the end of the last decade, it became apparent that the once-venerable facility had fallen into a state of disrepair which left visitors with little more than memories of the

good times.

Paradoxically, the city decided that in order to save Kezar, it would have to be destroyed. In its place, a scaled-down stadium would be constructed that was more suitable for its role with the Parks and Recreation Department. Unlike the original Kezar, the new stadium would be built entirely below grade, with the tops of the spectator stands reaching to a ground-level promenade. High school football would still be the major activity within the confines, but this time accommodations would also be made for track and field events.

Early in 1990, with the project past its stages of infancy, bids were accepted to build the new Kezar's sound system. Ceitronics, one of the Bay Area's larger communications contractors, located in San Jose, emerged as the victorious bidder. Using a design penned by Joel Lewitz, Ceitronics assembled all of the components, signed on the necessary subcontractors, and the installation process officially got underway with careful attention being paid to the system's impact upon the local environs.

Surrounded by Golden Gate Park on three sides, the stadium exposes one of its flanks to a residential neighborhood. As a result, Lewitz's design made every effort to keep sound from the stadium's voice-only PA inside of the facility and not in neighboring backyards and living

rooms. “To address the issue of noise spilling out into the surrounding area, the system was designed with as much directivity as possible without sacrificing uniform coverage,” explained Ceitronics' Jim Thielemann, who served as project manager during the installation. “In fact, it can easily be said that we went an extra mile or more to keep

**Custom wooden enclosures lined with 4 inches of acoustical insulation were attached to the rear of the horns.**

things as quiet as possible on the other side of the stands.”

Directivity for the seating area was optimized by using 18 Community horn/drivers distributed in groups of nine at promenade level on each side of the playing field from end zone to end zone. “The horns are Community's 90 x 40 PC1594Ms, while the drivers are M4s,” Thielemann revealed. “They are mounted atop 40-foot poles and aimed down at the stands. The resulting performance is strong, highly intelligible, and features tight pattern control, which is what was intended to keep sound out of

---

*Gregory A. DeTogne is a publicist in the sound and communications industry for such companies as Community Professional Sound Systems and TOA.*

the surrounding areas.”

As an extra precaution to reduce the chances of disturbing the neighbors, custom wooden enclosures lined with 4 inches of acoustical insulation were attached to the rear of the horns located on the side of the playing field backed by houses. The enclosures virtually eliminate the chance for sound emanating from the rear of these horn assemblies to escape from the intended area of coverage.

**“It was no easy task trying to find something that would keep birds from nesting on our custom enclosures.”**

“By necessity, these enclosures are large,” Thielemann notes. “But they’re not as large as the one that was required for the single pole-mounted cluster which provides sound for the playing field itself.”

Resting atop another 40-foot pole standing at the 50 yard line on the side of the playing field backed by houses, the

**“We obtained the desired results without resorting to the usual nasty things contractors sometimes do like shorting the inputs.”**

cluster consists of three Community long-throw 40 x 20 PC1542M horns driven by M4s.

“If it were in Tokyo, the central cluster’s enclosure would provide enough real estate to rent out office space,” Thielemann quips. “In total, it measures 102 inches wide by 68 inches deep and about 28 inches high. All of that attaches to another fixture, which is another 48

inches high. So in total, you have a structure sitting atop a pole which is about 6 feet high. It makes for an interesting sight, to say the least.”

The boxes in the air above Kezar have proven to be effective in keeping the sound within the confines of the stadium. As for our feathered friends (which like the quarterbacks on the playing field, have been known to hurl long bombs of their own), they are kept from roosting on the boxes by special “architectural bird proofing.”

“It was no easy task trying to find something that would keep birds from nesting on our custom enclosures,” Thielemann said. “But finally we found a company called Nixalite which manufactures strips of a stainless steel material resembling grass outfitted with ex-

tremely sharp barbs. This stuff is definitely not something any living creature would want to sit on or even stand next to for that matter. We applied it with nails and wire to any surface on the enclosures where birds might have taken up housekeeping. It too has been quite effective, and even provided a few of the technicians working with it free acupuncture treatment.”

All of the amplifiers and the electronics for the system are housed in three 72-inch racks which reside in a small structure located at the rear of the west end zone, while the system controls can be found at the top of the stands in the press box. Power is supplied by nine of Crown’s Com-Tech 200 amplifiers, and three of their Com-Tech 400s. The nine CT-200s drive the horns used for the seating

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Unlike the former home of the 49ers, the new Kezar Stadium was built entirely below grade, with the tops of the spectator stands extending up to a ground-level promenade.

As an extra precaution to reduce the chances of disturbing the neighbors, custom wooden enclosures, lined with four inches of acoustic insulation, were attached to the rear of the horns located on the side of the playing field backed by houses.



area, two of the CT-400s fuel the playing field's cluster, and the remaining CT-400 is used for a monitoring system which generally makes appearances at the 50 yard line when needed.

Crown's Com-Techs were selected for this application primarily because of their ability to drive the system's 70-volt lines without using separate transformers. "By making a simple modification on the Com-Tech P.I.P. cards, we were also able to provide a safe and effective way to throw each amp channel into standby," Thielemann added. "This was critical



Amplifiers and electronics for the Kezar system are housed in three 72-inch racks located in a structure at the rear of the west end zone. Power is supplied by nine of Crown's Com-Tech 200s and three 400s.

because we wanted to be able to provide a way to mute any horn in the system. And since we effectively designed the system with one amplifier channel allotted to each horn, we obtained the desired results without resorting to the

### **A number of delay cards are active only when the playing field's cluster is turned on.**

usual nasty things contractors sometimes do like shorting the inputs."

In the present equipment room layout at Kezar, one entire rack is filled with the Com-Tech amplifiers. Another is packed primarily with Energenius emergency battery back-up power, and the third is home for the rest of the electronics.

Current regulars in the electronics rack are an Aphex 301 limiter, two UREI 537 equalizers, and a Rane AC-22 crossover, which according to Thielemann, is "used only to bandwidth-limit the system for voice only. . . the horns work between 250 Hz and 3.3 kHz, and the rest of the frequency spectrum is trashed."

An IRP System 41 card cage is also housed in the electronics rack, and is rigged with a number of delay cards which are active only when the playing field's cluster is turned on. Relays which switch between delayed and non-delayed signals found a space in this rack too, along with the switch panel which allows qualified operators to mute the loudspeakers according to specific needs.

Back up in the press box control area, a remote switch turns on all of the electronics, while signals are mixed via a Soundcraft 200 console. For emergencies, a special microphone jack was additionally installed in a nearby maintenance building which when activated, overrides anything coming from the press box and sends announcements through all of the speakers regardless if they've been turned off in the equipment room or not.

Completed in the spring of 1991, the Kezar system has lived up to its expectations and then some. To date, the concern shown for the neighbors has paid off in the form of no complaints as well. "The only complaints about the system came before it was ever turned on," Thielemann recalls. "They occurred when the local residents first saw the poles going up with the huge boxes on top. They assumed that since the enclosures were large, that the sound would be as well. Some people were even predicting a barrage of heavy metal chords blasting down the streets. These fears were put to rest with a dose of community relations, however, and the neighborhood remains quiet, just as it did before we first flipped the sound system's switch to the on position."

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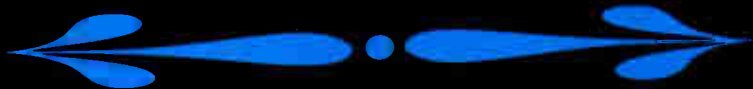
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# Baylor U's Football Den

## *Floyd Casey Stadium Gets A New Audio System*

BY KEITH CLARK

**W**hile the structure of Baylor University's Floyd Casey Stadium in Waco, Texas, had received several renovations since being built in the 1940s, the audio system badly needed a face lift of its own.

Prior to the installation of the new system, the entire stadium had been covered by a public address system consisting of four horns — two posted on each side of an athletic building located beyond the stadium's north end zone. This small system, powered by a total of 250 watts, didn't offer much coverage for a major stadium with a capacity of 46,000 that serves as the "den" to the Southwest Conference's Baylor Bears football team. Although the old system worked at an acceptable level when the crowd was "quiet," hearing any announcements during noisier periods could be very difficult. The Baylor Athletic Department, upon receiving funding, gave the go-ahead to installing a new system. But there was one catch: it needed to be in place within 25 days, in time for homecoming weekend.

Obviously, the system required a fast-track team effort — going from concept to completion within the allotted 25 days.

---

*Keith Clark is Vice President, Public Relations for Jesse Walsh Communications in Buchanan, Michigan.*



*Baylor University's Floyd Casey Stadium in Waco, Texas.*

System specification and design, provided by Charles Boner of Boner & Associates in Austin, Texas, was accomplished very quickly. Boner has enjoyed a good working relationship with Baylor over the years, and was eager to make sure that the best system be installed within the tight deadline. The contract was awarded to Kevin DeOrnellas of Universal Time Equipment Company in Tyler, Texas, with on-site management provided by Bruce Milliken of Thomas Electronics in Fort Worth. Milliken and his crew put in a load of 12-hour-plus days on the installation effort. A prelimi-

nary meeting between the athletic department and the sound team gave insight as to the system's requirements. Due to limited space in the scoreboard structure at the south end of the stadium, the new system's speaker clusters would be located on the roof of the athletic building where the old system continued to be located. In fact, due to time and budget considerations, the old system was left in place, with the new clusters built over and around it.

"The team looked at a lot of different systems and equipment after deciding to go with the clusters in the end zone," said Bruce Milliken, the engineer with Thomas Electronics who supervised the installation. "We looked at two factors. First, we obviously wanted the best equipment for the job. Second, we were under a very tight time deadline and had to be sure that the equipment we needed could be delivered within that deadline. Considering both of these factors, we decided to go with clusters made up of the new Electro-Voice MH6040 Manifold Technology horn/driver systems.

"Electro-Voice worked closely with the sound team, and employed extra shifts to ensure that the horns could be delivered within the required time limit. The horn for the MH6040 system is one of the largest ever developed, with a mouth that measures 39 inches x 59 inches, and requires a great deal of manpower to be



completed on a timely basis. The MH6040 comes equipped with two E-V DL10XWP drivers mounted in a manifold configuration, with each driver having a long-term capacity of 300 watts. They're designed to cover a frequency range of 100-4,000 Hz, with a 60 x 40 coverage pattern. E-V recommends that to extend output to 20,000 Hz, an E-V HP640 horn, equipped with any 2-inch driver in single or manifold configurations, be mounted coaxially within the MH6040's mouth. For Casey Stadium, the HP640 was mounted in each horn, with the manifolded driver configuration. E-V DH1A/2mt drivers were chosen.

A total of 13 MH6040/HP640 combinations were employed in the system's two clusters. The clusters were split for aesthetic reasons, with one cluster to

contain six of the horns and the other to contain seven. They cover nearly 100 percent of the bowl-shaped stadium, providing a "mirror-image" of coverage on each side.

Boner had specified that the seats farthest away from the cluster should still receive at least 93 dB of sound pressure, a major reason that the horns with dual drivers were selected. Milliken notes that because the system is primarily intended for speech reinforcement, the low-end of the MH6040's were rolled off below 150 Hz.

The stadium was divided into 10 sectors, with each sector covered by at least one horn. For seats in sectors located farther away, the output of two horns is combined to ensure complete coverage. The horns, mounted by the crew on space frames made of unistrut, com-

prise two clusters, each approximately 16 x 10 x 8 feet. The drivers, already weatherproofed and sealed in fiberglass covers, are further protected by a structure erected around the cluster. The structure has a slightly sloped roof to allow for drainage, with an open mesh on the front to prevent birds and debris from getting into the clusters.

A total of 20 power amplifiers drive the system. Thirteen E-V AP3200 amplifiers were chosen for the low-frequency reinforcement, while seven AP2600 amps handle the mid and high frequencies. The amp racks for the system are located about 75 feet from the clusters, inside the building supporting them. Milliken, concerned about excessive power demands on the building's electrical system if all amps are turned on at one time, rigged them to fire up at inter-



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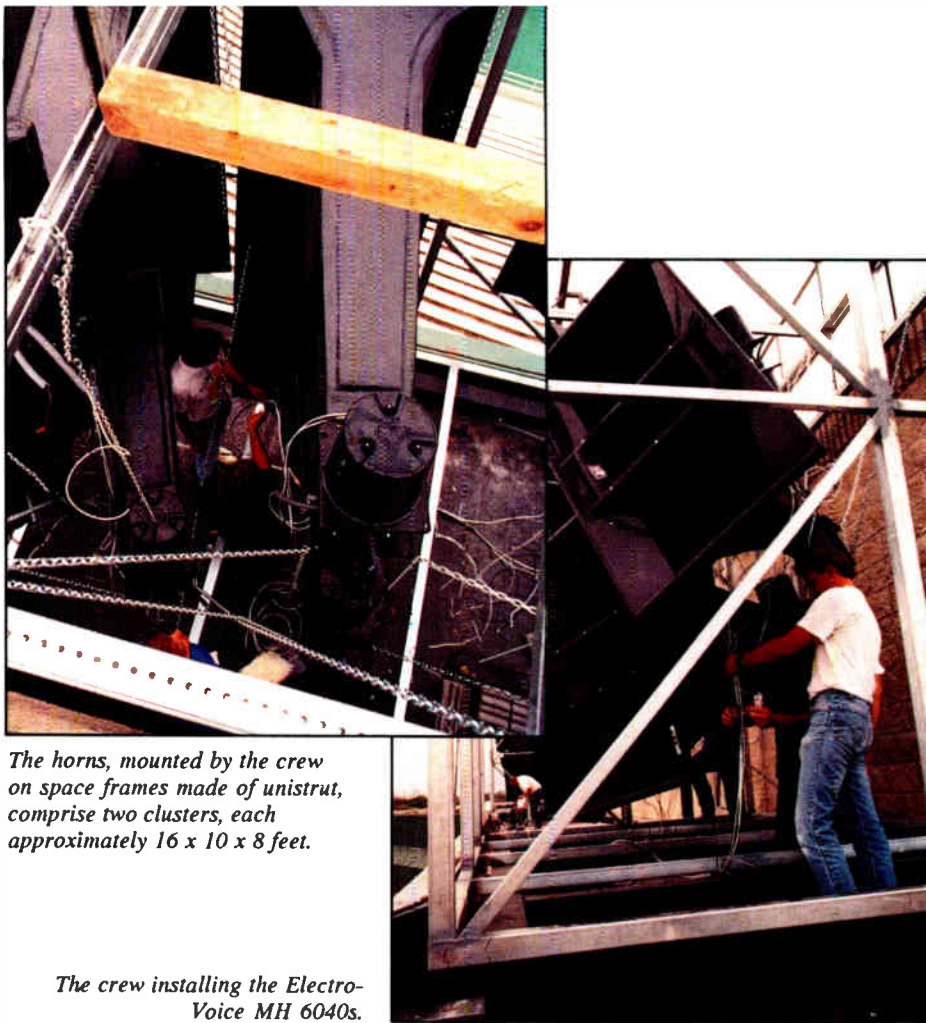
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vals over a total of seven seconds, with no more than three amps turning on at one time. Only one area cannot be covered by the main clusters — a 60-foot section of seating located under the stadium's press box. To provide coverage, eight E-VS-40 small speakers (powered by an AP2300 amp in bridged mono mode) were mounted under the press soffit immediately in front of the seats. These speakers feed off the same signal driving the main cluster. A Klark-Teknik DN716 set at 303 milliseconds provides the proper digital delay. The entire system was up and running in time for the Bears' homecoming game, and Milliken reports that university officials are extremely pleased with the quality of sound that it has delivered.

"The system has performed very well — great intelligibility for all speech, with nice, even coverage," he said. ■



*The horns, mounted by the crew on space frames made of unistrut, comprise two clusters, each approximately 16 x 10 x 8 feet.*

*The crew installing the Electro-Voice MH 6040s.*

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# Tubular Bells

## *A Minor Miracle in a House of Worship*

BY DANIEL SWEENEY

**T**he Loretto Academy chapel in El Paso, Texas was the kind of church where preaching the gospel was almost indistinguishable from speaking in tongues. With marble floors throughout, and enormous expanses of stucco and stained glass, the worship space was extremely reverberant with an estimated RT-60 of several seconds. Intelligibility was predictably poor, and nothing short of a miracle seemed likely to remedy the infernal acoustics. The church itself was a historical structure and a repository of sacred art, and the Sisters of Loretto whose church it is were not amenable to structural makeovers for the sake of acoustics. Steve Waltman of Waltman Multi-Systems, the contractor responsible for the current system, knew that considerable inventiveness would be required.

Before Waltman Multi-Systems took a look at the chapel, several other sound contractors had tried to get a handle on the listening space, and several speaker systems had come in and gone out. But none of the previous attempts had been remotely satisfactory, and no one had succeeded in designing a system that would provide even minimal intelligibility to worshippers through the seating area, let alone a system that satisfied the choir.

Steve Waltman, the designer of the present system, faced several institutional constraints in addition to the in-

herently problematic acoustics. The budget for the new system was set at \$20,000, and the basic appearance of the interior could not be significantly compromised. Furthermore, a single system had to serve all functions within the church.

Previous systems, which had included horn clusters, loudspeaker columns, and even a distributed system, had all suffered from insufficient coverage combined with undue excitation of the reverberant field with consequent poor intelligibility and low gain before

**The client wanted front to back projection of sound to direct the worshippers' attention toward the altar.**

feedback, especially at the frequency extremes. Indeed the system in place when Waltman was hired had been equalized to roll off response below 300 Hz and above 3 kHz to alleviate feedback problems.

Interestingly, the chapel acoustics favored the performance of live instrumental music, and the structure is occasionally used by classical ensembles. It also houses a pipe organ, and the Sisters had always been pleased with the sound of the organ in the chapel. The main problem was voice intelligibility during the celebration of mass.

Obviously the pervasiveness of hard, reflective surfaces was the prime culprit, but since substantially increasing the absorption of the room surfaces was impractical, Waltman figured that he would have to control loudspeaker directivity very tightly, and focus the sound onto the congregation with as little splash as possible onto bare walls and floors. The dimensions of the room made that difficult though. The chapel was 120 feet deep but only 65 feet wide with a maximum speaker placement height of roughly 35 feet. Illuminating that area evenly without engaging sidewalls seemed virtually impossible by conventional means without compromising the aesthetics of the interior.

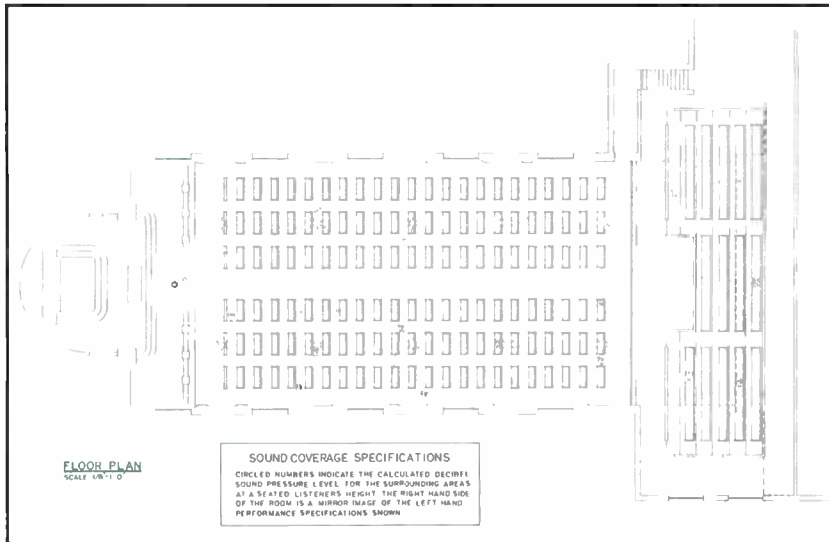
"We looked at very high-Q horns," relates Waltman, "but we couldn't find anything small enough for the job. The sisters didn't want anything obtrusive." Another distributed system was also ruled out because of the paucity of suitable mounting surfaces on sidewalls. Waltman also rejected a ceiling mounted distributed system because the client wanted front to back projection of sound to direct the worshippers' attention toward the altar.

### LATERAL THINKING

Waltman's solution to the problem was novel and ingenious. Basically he borrowed a technique used in concert sound reinforcement. Waltman decided to build the system around a pair of Electro-Voice DH-1A bi-radial horns and a single 15-inch EVX-150 driver in a vented cabinet. The horns were turned

---

*Daniel Sweeney is a freelance writer and a frequent contributor to Sound & Communications.*



*Floor plan of the Loretto Academy chapel.*

sideways and offset 45 degrees from one another, and the single speaker assemblage was flown near the front of the room above the altar. The resulting pattern came fairly close to what Waltman wanted, but still wasn't tight enough in the lateral plane.

**To deploy passive acoustical devices in a hanging cluster posed considerable logistical problems.**

Waltman figured that by flanking the horns laterally with sound absorbent devices, he could sharply reduce early sidewall reflections and considerably reduce the strength of the reverberant field, but to deploy passive acoustical devices in a hanging cluster posed considerable logistical problems, particularly in view of the fact that the altar was precisely the area where obvious acoustical treatment would be least acceptable.

Waltman's way out of his conundrum showed considerable ingenuity. He decided to design the passive acoustics into the cluster itself, and to assemble the cluster in such a way that its external

form would closely resemble that of the large chandeliers disposed at intervals along the length of the nave.

Waltman, who is personally skilled in sheet metal fabrication, created a flanged aluminum mounting structure out of 1/8-inch sheet metal to support the speaker system and the total of 13 ASC Tube Traps utilized for acoustic control. The speaker cluster itself was placed in the center, and the Tube Traps were distributed around the speakers in a radial array like the lamps in a chandelier. Six 11-inch Traps shared the same horizon-

**The chapel was 120 feet deep but only 65 feet wide with a maximum speaker placement height of roughly 35 feet.**

tal plane as the speakers themselves, and a single 8-inch Trap hung below the speaker cluster surrounded by six Trimtraps with 3-inch cross-sections.

In this arrangement only three of the Traps surrounding the speakers played any direct role in shaping speaker directivity, by absorbing loudspeaker side



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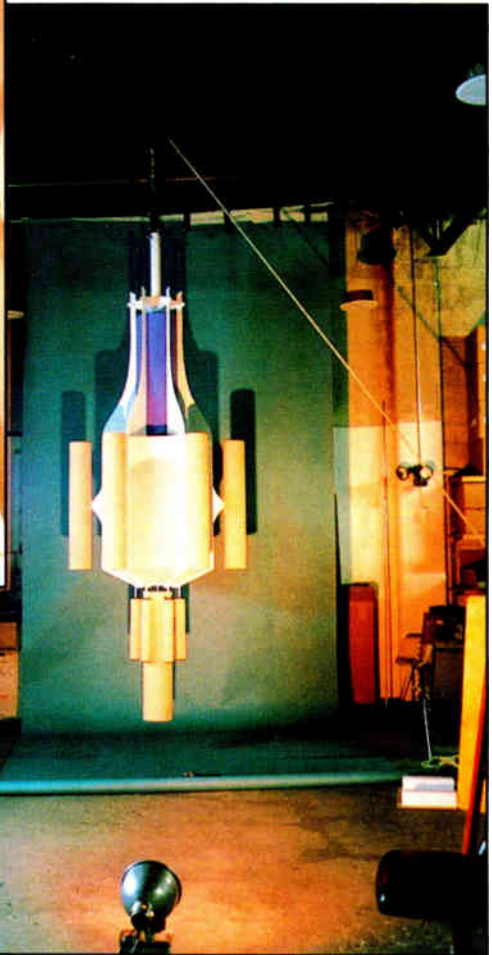
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Waltman's cluster in place at the Loretto Academy chapel.



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Waltman created a flanged aluminum mounting structure out of 1/8-inch sheet metal to support the speaker system and the total of 13 ASC Tube Traps utilized for acoustic control.

lobes at the mouths of the horns, while the other Traps helped to damp low frequency standing waves. Waltman indicates that the traps also solved a feedback problem caused by a floor reflection striking the cluster and then reflecting back to the microphone on the altar.

**The main problem was voice intelligibility during the celebration of mass.**

Waltman also wrapped the bass cabinet with fiberglass batting to combat the same problem.

The aluminum superstructure was painted, and the Traps and speaker cabi-

nets covered in a blue grille cloth that harmonized with the accents of the existing decor. The cluster, which weighed approximately 200 pounds in toto was securely anchored to the beam ceiling.

Other equipment included wireless microphones, QSC amps, and a Gainmaster. The total budget inclusive of labor was \$20,000.

Waltman asserts that the RT-60 appeared considerably reduced. Sound levels before feedback measured 92 dB at the completion of the project. Waltman himself professed to be unaware of analogous use of Tube Traps in stage settings, and claims that the idea for the cluster was pure inspiration.

Or as the Sisters of Loretto might say, God works in mysterious ways.

# SPEAK EASY LOW FREQUENCY DESIGNER: SUBWOOFER DESIGN SOFTWARE

By Mike Klasco and Derek Pierce

Just over a year ago we took our first look at SpeakEasy's speaker box program, Low Frequency Designer — version 1.0. The latest release, 3.0 has numerous improvements and enhancements.

The program excels in dealing with multi-tuned bass bins which are popular in clubs and auto-sound installations, although it is equally well suited for conventional sealed or vented bass bins. Low Frequency Designer works on IBM compatibles with monochrome graphics, EGA/VGA color, monochrome variants of EGA/VGA monitors and even low resolution CGA monitors. There is support for a mouse, and Epson and HP laser compatible printers. Math coprocessor support is included, but not required. Low Frequency Designer sells for \$195 (including shipping) from SpeakEasy, 46 Cook St., Newton, MA 02158, phone 617-969-1460.

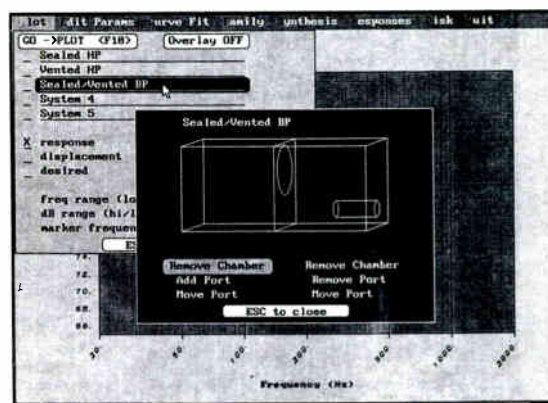
Bose has popularized the multi-tuned subwoofer enclosure scheme, first with their Tandem-tuned double bass reflex and later followed by dual acoustic labyrinth systems including the small Acousta-Mass subs and the 12-foot long

bass Cannon. Other pro subwoofers using loading techniques for both the front and rear of the woofer have been introduced by JBL (Triple bandpass), E-V (Manifold), with variations from EAW and Renkus-Heinz, to name a few. Speaker designers like multi-tuned enclosures because the gain-bandwidth tradeoff is beneficial for subwoofers. If the raw driver used for a subwoofer has a response up to 500 Hz or higher, but you only need output to 200 Hz or less, you ought to be able to get something extra back by giving up the response above 200 Hz. With multi-tuned boxes, both the front and rear of the speaker face some sort of loading, that is, neither side of the speaker is used as a direct radiator. The benefit of this type of loading is usually a combination of higher sensitivity and reduced cone excursion for a given power input. Unfortunately, engineering multi-tuned enclosures does not lend itself to empirical techniques, but requires computer modeling. Until recently, none of the popular speaker design software was able to model multi-

tuned boxes. Now we have Low Frequency Designer, whose main function is to do complex subwoofer modeling.

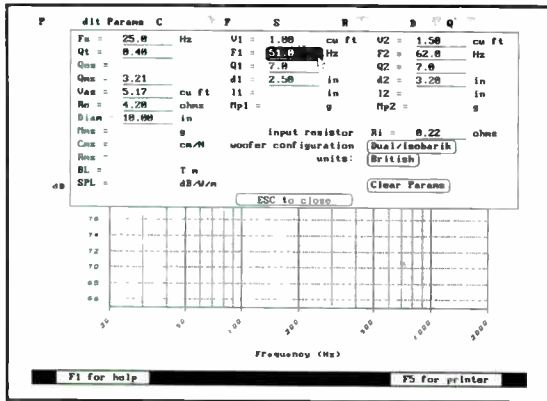
There are an endless number of multi-tuned box techniques used in auto sound, including incredibly complex plumbing schemes with chambers feeding vents, feeding other chambers, woofers facing woofers, and so on. Low Frequency Designer 3.0 just about handles all these variations. If you have ever designed and built one of the "high-order" bandpass systems and tested it, you would find you did not get exactly what you might have thought you had coming. Standing waves, box losses due to friction, turbulence, enclosure panels flexing, and other hard to computer-model phenomena probably have lost whatever you theoretically gained from your high Q "overtuned" masterpiece.

Michael Chamness, the developer of Low Frequency Designer, points out that he has built numerous bandpass (multi-tuned) systems using the program and found the measured and predicted results to be within  $\pm 1$  dB! But



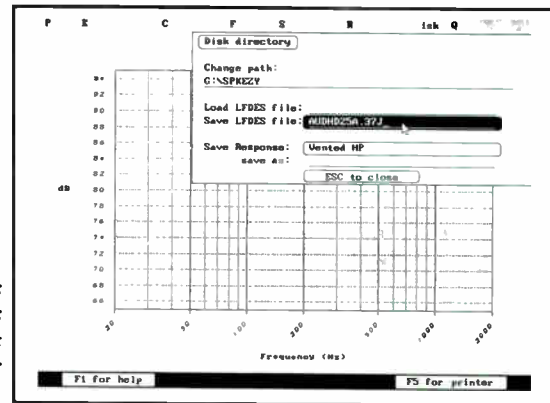
Cabinet editor allows user to create customized system configurations.

Mike Klasco is the Technical Editor of Sound & Communications. Derek Pierce is affiliated with Menlo Scientific, Ltd.



Basic driver and box parameters can be edited with cursor keys or mouse. Unknowns are then calculated.

The user creates customized libraries of driver and box parameters for retrieval.



this accuracy will require not only a careful and experienced speaker designer, but an upscale design with the luxury of stiff panels (thick or well braced), large diameter vents, and a lot of attention to detail.

The latest release of Low Frequency Designer includes modeling compound woofer designs which use two woofers facing each other, nose to nose or at opposite ends of a short tube. This tech-

nique doubles some parameters, while halving others. For certain very specific conditions, this approach makes sense. Perhaps far more useful for sound contractors is the new ability to model the effects of enclosures which have two woofers mounted side by side on the baffle. Oh yes, simple sealed and bass reflex boxes are fully supported also.

Low Frequency Designer does not have a manual, but provides context sensitive help screens. The program is not completely intuitive and a manual would help. You can print out the help screens as a document for reference. While very few readers want to hear about the math behind the program, there are times when a written discussion of the program's modeling limits would be helpful. For example, you decide to build the mother of all Cannon subwoofers. The lower tuning is 40 Hz, the upper tuning is 120 Hz. Two different length tubes are used, with a speaker desperately trapped in between. The two tuned columns will reproduce sound in somewhat staggered but overlapping bandwidths, in some phase relationship. The relationship of how close the two ends of the air columns are will affect the (vector) summing of the already non-linear phase response of the speaker enclosures at the overlapping bandwidth (huh?). If you have a straight Cannon you will have a different composite frequency response than a Cannon that has a U-turn with both mouths adjacent to each other. There is no place to look for a discussion like this on the disc's help files. Of course, the author provides his phone number and you can call him up, but a written reference section would fill out this package. By the way, we did call and the

program does not consider the effects when the spacings between the enclosure apertures begin to approach a wavelength.

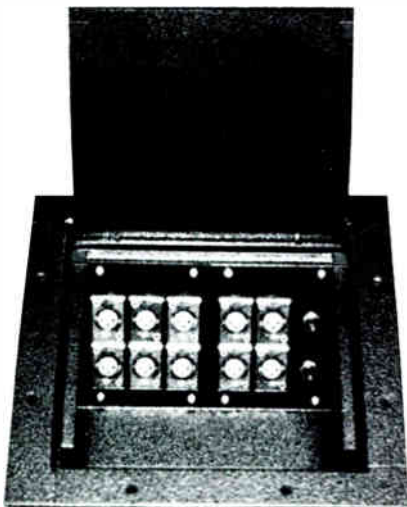
## USER INTERFACE

Low Frequency Designer uses pull down menus which are located on the top of the screen. By using the cursors or a mouse, you select a heading. A menu of options drops down, and you select some function, or type in the requested data. Directly below the pull down menu is the graph for plotting predicted responses. Along the bottom of the screen is the status line. If you get confused or backed into a corner, hitting the ESC button always gets you out of trouble. Overall, the program is easy and pleasant to learn and use.

A number of the other medium-priced speaker programs include a driver library. Aside from saving you the effort of manually entering driver parameters, many programs offer a parameter search function, which automatically suggests candidate drivers for your project. On the other hand, the program does make it easy to save driver and box data that are manually entered and thereby create your own library of useful drivers and designs.

The program does not have a software interface to import/export to LMS, MLSSA, SYSid or Audio Precision analyzers, unlike a number of other programs. While Low Frequency Designer does not offer these capabilities, it does have a unique design tool called CURVE-FIT. With the Curve-Fit function, you can enter any desired response curve and then let the program reiteratively adjust driver or box parameters to approximate the target.

## STAGE POCKETS



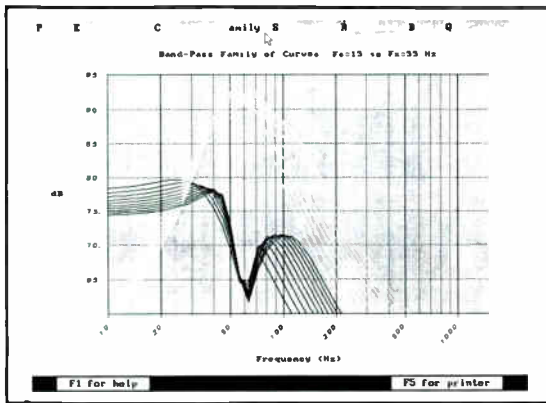
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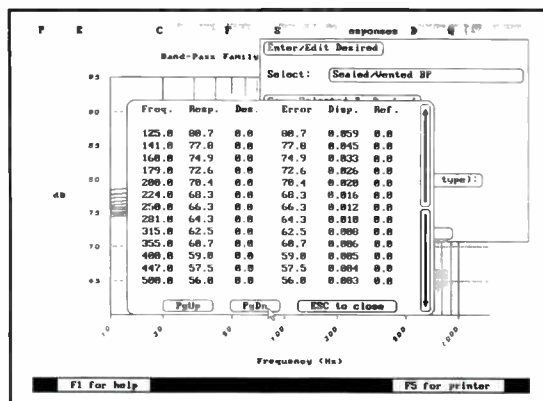
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Families of curves can be examined for system response as well as displacement.



Scrollable windows provide access to tables of response data.

Aside from predicting frequency response, the driver excursion requirements versus frequency can be calculated by the program. This is especially important data when you are making design decisions on tuning your subwoofer.

Other functions include FAMILY and SYNTHESIS. The program generates families of curves based on the variation of any chosen parameter over a given range. This can be helpful on multi-tuned designs where the design process is not always intuitive. Synthesis for sealed and vented systems allows you to instantly and exactly calculate driver and box parameters from a desired response. This is different from Curve-Fitting, where the response is approximated.

Low Frequency Designer is a useful tool for sound contractors who want to build subwoofer and woofer enclosures, but the program does not attempt to deal with factors such as phase, power compression, port resonances and transient response (not to mention crossover network simulations). Somewhat more sophisticated programs that deal with these parameters are LEAP and CACD, which we will review later this year. Still, many sound contractors do not care to be

bothered with esoteric factors that they can do nothing about (short of re-engineering the driver or selecting a different driver).

If you do require a filter design program for passive or active networks, then you might want to consider SpeakEasy's Filter Designer 1.0. The program has a similar user interface to Low Frequency Designer as the "what-if" type curve-fitting routine that allows a component value to vary and the results plotted. Passive and/or active filter responses can be added to Low Frequency Designer's calculated driver/box responses with the Filter Designer program and you can import from Audio Precision.DAT files into Filter Designer. We will take a look at Filter Designer later this year when we do a survey of crossover network software.

Low Frequency Designer is a good choice for sound contractors who want to experiment with subwoofers. It is not too complicated or expensive, easy to learn, reasonably accurate, bug free, and has a couple of useful and neat features. Even if you already have a basic speaker design program, Low Frequency Designer may be a good addition to your engineering software library.

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# SOUND SYSTEMS FOR OCCUPATIONAL SAFETY

By Bret D. Hatt

**Never before has the role of intra-plant communications been as important as it is today. Intercom systems, once installed to simplify daily operations, are now critical components of industrial alarm systems.**

Reports of hazards in industrial facilities are on the rise, and the Occupational Safety and Health Administration (OSHA) is taking action. To comply with strict OSHA regulations and avoid record-breaking fines, many corporations are reviewing emergency procedures to determine exactly how intra-plant communications systems can help.

Because of their critical role in industrial safety, proper placement and type of intercom system speakers cannot be overlooked. Construction materials, ambient conditions, noise levels, machinery and location of personnel all factor into the equation when considering optimum system performance.

Alarm system implementation and design regulations are established by OSHA. According to OSHA, employee alarm systems and emergency response are functionally inseparable; the alarm system must provide notification of an emergency and the response must allow employees to confirm and respond to that emergency.

*Bret D. Hatt serves as East and Midwest Region Technical Consultant for GAI-Tronics Corporation, Reading, Pennsylvania.*

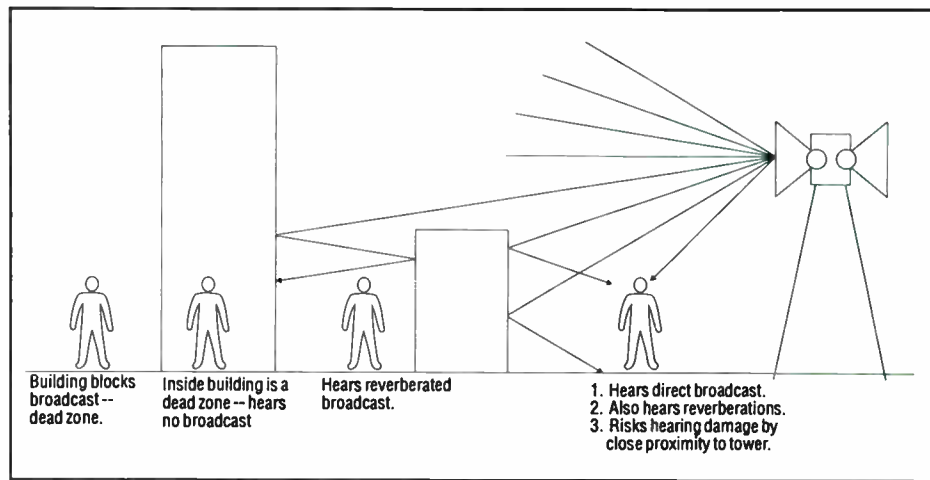


Figure 1: Disadvantages of a tower system.

OSHA Regulation CFR 1910 deals directly with sound levels during emergencies. First, several sections of this regulation (CFR 1910.28 and 1910.120) emphasize that alarm broadcasts must be heard and understood by all employees. For all personnel to hear and understand the alarm, the acoustics of the plant require detailed analysis. Size, structure, layout, ambient noise, operating conditions and practices all impact alarm system design. Clearly, the ability of employees to understand the message is directly related to the quality of the sound system. Therefore, a durable sound system requiring little maintenance and infrequent component replacement is critical to emergency procedures.

Second, OSHA regulations stipulate that employees must have a means of egress or escape designed to avoid any hazardous area. Therefore, an alarm system cannot simply notify employees that an emergency is occurring; it must also tell them where the problem

has occurred, so they do not enter a dangerous area.

Again, the message must be clearly understood to be effective. The alarm system must be able to broadcast a variety of tones for different situations. Systems using code calling or steam whistle notification do not allow the listener to readily identify the various alarm sig-

**OSHA REGULATIONS STIPULATE THAT EMPLOYEES MUST HAVE A MEANS OF EGRESS OR ESCAPE DESIGNED TO AVOID ANY HAZARDOUS AREA.**

nals. However, even systems capable of broadcasting multiple electronic alarm tones may confuse the listener who typically can only easily recall four to six

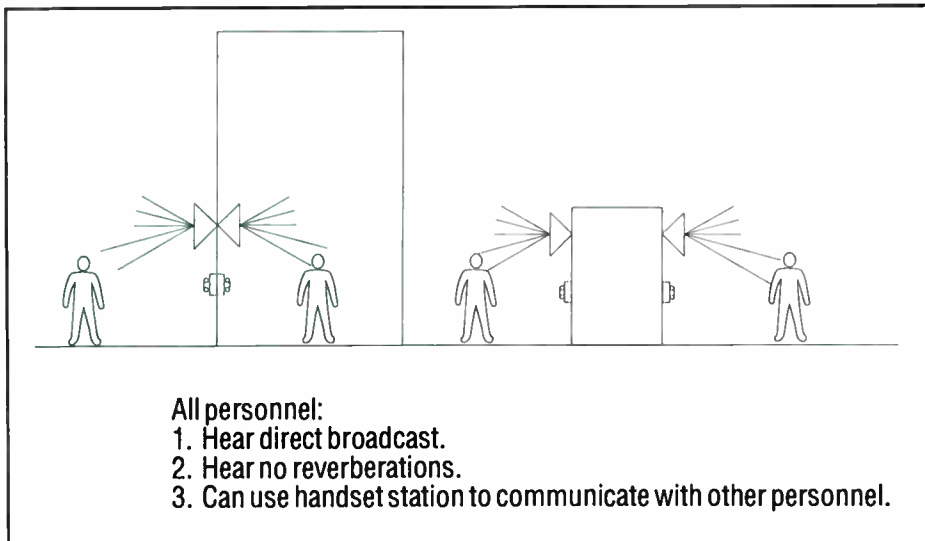


Figure 2: Advantages of page/party systems.

tones. An integrated system able to link speech messages with alarm tones allows the listener to immediately identify the occurrence. The broadcast cannot simply be *loud* it must be *understood*.

Although central tower systems can also produce tones with speech messages, they present several distinct disadvantages. (See figure 1.)

- High output levels. The extremely high output of a multiple speaker cluster in one location can injure the hearing of personnel in the immediate vicinity, including those wearing hearing protection.

- Distortion and dead zones. Distortion occurs when environmental factors, such as noise, reverberation, or physical obstructions affect the transmission of sound. Dead zones are areas where walls or hallways obstruct sound messages from reaching personnel. Because of their centralized configuration, distorted messages and dead zones (both against OSHA regulations) can be a problem with a tower system.

In comparison, properly placed speakers with controlled dispersion – distributed amplifier systems – work well within OSHA guidelines. (See figure 2.)

*What should a quality sound system cost?* In general, large facilities employing as many as 500 workers may invest up to \$250,000 for an installed operations and maintenance paging and intercom system. An integrated alarm and communications system can be four to eight times that original figure. As with any large investment for a secondary system that does not directly contribute

to bottom line profits, it must be cost-justified.

Effective plant communications increase efficiency in any facility; being able to quickly locate and communicate with the desired party saves time and money. But there is much more at stake. A good communication system can help to ensure the safety of employees and the facility itself.

## NRC FINES FOR PLANTS THAT CANNOT PROPERLY GENERATE PAGE ANNOUNCEMENTS FROM THE CONTROL ROOM HAVE BEEN KNOWN TO EXCEED \$75,000.

Of course, there is one other cost factor to consider – the cost of not complying with federal regulations. In the nuclear power industry, NRC fines for plants that cannot properly generate page announcements from the control room have been known to exceed \$75,000. In the chemical processing industry, OSHA fines for similar violations have cost corporations millions of dollars.

So, while initially costly, an investment in a high-quality, properly specified intra-plant communication system is, literally, quite a sound and safe investment.

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## Altec Market Focus; TAD Speakers in U.S.

### Altec Lansing Focuses on Religious Market

Altec Lansing reports that it is expanding its sales of sound reinforcement products in the religious market by focusing on developing and manufacturing equipment especially for houses of worship. Five churches and one temple have recently installed a variety of Altec Lansing equipment. Installations include River Road Presbyterian Church in Richmond, Virginia; Bel Aire Baptists Church in Lewisville, Texas; Temple Emanu-El in San Francisco; Calvary Episcopal Church in Rome, New York; St. Patrick's Church in Victor, New York; and Greece Baptist Church in Greece, New York.

Altec Lansing has also reported that Gauss (distributed by Altec) equipment has been installed at Universal Studios in Hollywood, Olympic Stadium in Athens, and Unique Recording In New York.

### TAD Begins U.S. Production

Technical Audio Devices, the division of Pioneer Electronics, has begun manufacturing the first production models of its TCM sound reinforcement systems under an agreement with Woodworx Audio Systems of Greensboro, North Carolina. The TCMs are the first series of speakers offered by TAD, designers and manufacturers of loudspeaker components. The TCM series is engineered, accord-



Leon Sievers, senior product planner of TAD, with first TAD speakers from the company's new manufacturing facility.

ing to the company, for both touring and fixed site applications. Under the agreement with TAD, Woodworx will serve as the company's sole system assembler and manufacturer of TCM enclosures. Woodworx's facility, designed specifically for TCM production, has the capacity to produce 200 to 30 fully configured systems per month. The Greensboro facility will also be the site for final system testing, packaging and quality control. System design, prototyping and initial testing will continue to be performed at TAD's facilities in Long Beach, California and Japan. A dedicated, high speed data communications link between CAD workstations at TAD's Long Beach headquarters and CAM systems at Woodworx allows TAD to remotely test and evaluate new speaker systems.

### Georgia Dome To Get IQ

The Georgia Dome, a new 70,000 seat stadium scheduled to open this fall, will use Crown's IQ System 2000 for computer control of the sound system. Ancha Electronics is installing the audio system at the domed facility. Jay Foster of Ancha is project manager for the installation. The Georgia Dome features 22 satellite speaker clusters to handle the main PA duties. The clusters will be suspended from the ceiling. The 99 power amplifiers required for the job are located in two amp rooms on the stadium's east and west sides in the upper deck. The IQ system will be interfaced with an AMX controller.

### Mt. Hood Jazz Festival System

The Mt. Hood Jazz Festival in northern Oregon featured a JBL Professional digitally controlled sound system. A JBL Factory Team assisted Seattle based MorganSound in the setup of the system which featured JBL digital controllers, speakers and components, and Soundcraft mixing consoles.

Left to right:  
Bill Ryan, ITVA,  
Chris Potter, Shure  
Professional Products,  
Joe Maiella, ITVA.



MorganSound's 70,000 watt system included five delay columns placed across the festival's expanse. Seven ES52000 Digital Controllers drove the system, incorporating 26 Array Series cabinets, 44 Concert Series cabinets, and 4 SR 4700 Series cabinets. Charlie Morgan, president of MorganSound, said, "Each year, it's a terrific feeling to know that we're participating in an event which benefits the city of Gresham and the Mt. Hood Community College in so many ways." The JBL Factory Team which helped with load-in, setup and load-out is made up of JBL executives and is headed by Ken Lopez, VP of Sales.

### NHCA Seminar Slated

The National Hearing Conservation Association will hold its Third Annual "Excellence in Hearing Conservation Seminar" at the Hobby Airport Hilton in Houston, Texas September 17. The one-day seminar features topics on noise measurement, effective noise control, personal hearing protection, training and motivation, audiometric testing programs, and audiometric data analysis.

The Association has given out two recent awards. The Outstanding Hearing Conservationist Award was presented to Alice H. Suter, an audiologist and consultant in Cincinnati. Rena Glaser has been named recipient of the Michael Threadgill Award. Glaser serves as the Supervisor of 3M Corporation's hearing conservation program.

### Shure Wins Awards

Shure Brothers has received the International Television Association 1992 Technical Achievement Award for its FP410 Portable Automatic Mixer. According to the ITVA, "The FP410 has the technical attributes that have significantly advanced the 'state-of-the-art' in the communications industry, especially in multiple microphone applications."

In other news, Shure Brothers was named a finalist in the Rochester Institute of Technology/USA Today Quality Cup Competition for Individuals and Teams. A ten-person team involved in the manufacturing of the SM57 and SM58 microphones was selected as one of 16 finalists from a field of 432 entries.

### Apogee Sound Installs

Apogee Sound has announced several installations using its products. A central cluster of nine Apogee AE-3s2 and one AE-2 system has been installed in the 4,500 seat Memorial Fieldhouse on the campus of the University of Puget Sound. Dick Summers of Puget Sound Audio handled the job. The Sony Jumbotron at the World Expo in Seville is outfitted with Apogee speakers. Ten 3X3S2 speakers and eight AE-12S2 subwoofers flank the Jumbotron. Twelve AE-5s are arranged in three clusters to provide sound reinforcement for the front audience area.

ATM Group has completed an installation in the La Mirada Theatre for the Performing Arts in



Carson, California. The 6000 watt complement fills the 1260 seat theater with a center cluster of four AE-5s, two AE-5 horn assemblies, two AE-10s and two AE-3s for downfill. Other equipment includes Crest amplifiers, TDM Design equalizers and ART delay lines. Chuck McCarrol is La Mirada's chief audio engineer.

The State Theater in New Brunswick, New Jersey, has completed phase one of their new Apogee loudspeaker installation. The system was designed by Bob

Green of Jaffe Acoustics with equipment provided by ProMix.

#### Tannoy in Glasgow

One hundred Tannoy CPA 5 loudspeakers were recently installed in Glasgow International Airport. According to Derek West, sales manager of Tannoy U.K., the CPA 5's were "particularly appropriate for this installation since the CPA 5s produce highly intelligible speech which is essential for areas of high ambient noise such as airports."

#### PC/Television Shipping

50/50 Micro Electronics has announced that its "PC/Television" product is shipping. The product includes an add-on board for IBM compatible computers that incorporates a 119 channel tuner. Standard coaxial cable can be connected directly as well as an external TV antenna. Other input devices can also be used. The company is targeting business applications for PC/Television as video presentations, point-of-purchase kiosks, interactive TV training and interactive viewing stations.

#### Audioconferencing System, Distribution

Polycom, Inc. has announced the introduction of SoundStation, and a distribution agreement with Teleconferencing Technologies, Inc. SoundStation, the company's first product, is the first in a line of products from Polycom. The company was launched by Brian Hinman, former vice president of engineering and co-founder of



*Polycom SoundStation has a built-in keypad and full duplex operation.*

PictureTel Corp. Other executives of Polycom were previously at Harris, Mitel, and Verilink. The SoundStation has full duplex sound and a compact design. It is priced at \$1,195. According to the company, "breakthrough teleconferencing solutions" are based on Acoustic Clarity Technology, a proprietary set of advanced digital signal processing algorithms, allowing true full duplex transmission using a combination of adaptive echo cancellation and mild echo suppression that adheres to recommendations for teleconferencing by the CCITT standards organization.



## GO FOR GOLD IN PONTE VEDRA BEACH...

If you're looking to make a sound investment in the future of your business then you'll want to make plans now to attend the International Business Music Association's 22nd Annual Convention, October 14-17, at the Marriott Sawgrass Resort.

Yes, this October, IBMA has plotted a program for everyone: old time experts and new-time networkers. This year's convention is made for us all.

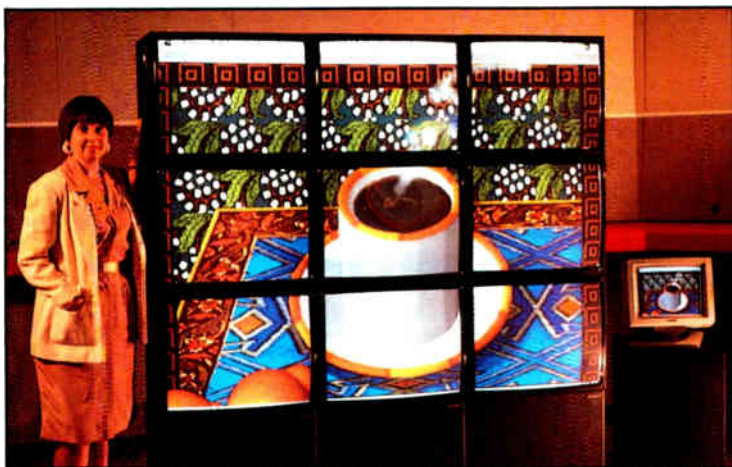
How about GOING THE EXTRA YARD with Jerry Markbreit, followed by a seminar on SATELLITE COMMUNICATIONS? Or maybe you'd rather learn what's going on with CABLE RADIO. No problem.

Need more? Find out how to BUILD YOUR RECURRING REVENUE STREAM or HOW TO BETTER MANAGE YOUR TIME.

And so it goes (for the GOLD, that is!). A welcoming reception, barbeque on the beach followed by our own beach olympics and plenty of fun and games we'll call opportunities to see old friends and make new ones. It's all here in Florida, in October.

So GO FOR THE GOLD. But prepare for a great surprise because this year's IBMA Convention will provide an unequalled opportunity for communication, education, fellowship, exhibits and supplier meetings...all combining to provide the tools for success.

To find out more about IBMA or how you can take part in this exciting event contact IBMA Headquarters, 9140 Ward Parkway, Kansas City, Mo. 64114, (816) 444-3500; FAX (816) 444-0330.



### Montreal Celebration

Impact Audio Visuel, Inc., a Montreal-based firm started by Stephen Isenberg in February 1992, is providing the Videowall installation for Montreal's 350th birthday celebration this summer. The videowall installation is at the new amphitheater in Parc des Isles on Ste. Helen's Island. The main stage of the amphitheater is recreated via two on-stage 64-monitor videowalls (12 feet high by approximately 16 feet wide). In addition, to ensure that the 70,000 person crowd has an unrestricted view of the show, a 25 monitor videowall is positioned on a tower in the center of the field. The videowalls are controlled from the on-location CBC mobile production unit, which feeds images to the units and tapes the shows.

products. It features built-in 525/625 switchability and "the technical headroom to provide an evolutionary path to future advanced television formats such as the proposed 16 x 9 13.5 MHz system."

### Multi-Room Video

Channel Plus has announced that its Coaxial Cable Panel provides a central point of distribution for multi-room video installations. The 3100 Series Coaxial Cable Panel delivers a high quality picture to eight locations from up to seven sources. To compensate for different input signal levels and losses due to cable length and frequency, the 3100 Series panel combines Channel Plus broadband amplifiers with splitters, combiners, taps and a tilt compressor. Channel Plus says all the installer has to do is hook up "F" connector cables to the panel.

### Southwestern Bell Adds Services

Southwestern Bell Telephone has added two new video services - Business Video Service I and II. Both services offer point-to-point, two-way compressed videoconferencing. Business Video Service I is provided at a lower transmission rate. Monthly service charges are \$805 and \$910.

### DCT Introduced

Ampex Corporation has announced the market introduction of its DCT CCIR-601 digital component system. Deliveries are to begin in the third quarter. The system consists of a new format 19mm tape drive, companion tape cartridges, post production switcher, edit controllers, digital effects system and interconnect

### MediaWall Display

RGB Spectrum has been displaying its MediaWall multimedia presentation system for trade shows, convention centers, museums, passenger terminals and other environments with high ambient lighting. MediaWall is designed to accept computer graphics, animation and scanned in images from a Macintosh or PC through a direct digital connection. The system can be controlled by Hypercard and Macromind Director along with other programs with the ability to control external devices such as tape recorders. In its ultra high resolution operating mode, MediaWall displays images up to 3200 x 2400 pixels. It's a modular system supporting up to 36 monitors or projector cubes driven by a single computer. A basic configuration, including a computer interface card, a controller unit and nine monitors, is priced "under \$40,000."

### Codec Development System

An open set of video boards for use in video codecs has been released by the Finnish company VistaCom. The VistaCom VCI/OEM are open architecture video codec boards allowing manufacturers to create low bit-rate video codecs for embedded use. The development system incorporates an AT compatible computer, a set of development and test software, and an evaluation set of VistaCom codec boards.

### REP NEWS

#### Yorkville Names Reps

Yorkville Sound has named Lou Ruskey and Tony Colantonio as sales representatives for its lines of professional audio and musical equipment in New England. They currently represent Yorkville in New York and the Mid-Atlantic states respectively. Colantonio covers Connecticut. Ruskey covers the rest of New England.

#### Sony Security Rep

Sony's Business and Professional Group has appointed I.D. Sales & Associates as manufacturers representatives for Security System products. I.D., headquartered in Plainview, New York, serves the metro New York and northern New Jersey territory. Principals are Ivan M. Fried and Dean Segrin.

#### University Honors Reps

Excellence Marketing of Eden Prairie, Minnesota, has been awarded Representative Firm of the Year, and Starin Marketing of Chesterton, Indiana, has received the Silver Horn Award from University Sound. Ken Simons is president of Excellence. Jim Starin is president of Starin Marketing.

#### IMP Systems Names Reps

IMP Systems Inc. has appointed the following sales representatives: Carlberg-Warren and Associates for California; Burcaw Company for Michigan.

#### Meyer Sound and Group One Agree

Meyer Sound Labs has announced the appointment of Group One Ltd. as the exclusive national representative for its full line of professional loudspeakers, recording studio products and SIM system II acoustical measurement system. In addition to Meyer Sound, Group One handles sales for DDA recording consoles, Upton Automation, and Milab microphones. Jack Kelly is president of Group One.



## SECURITY SYSTEMS

(continued from page 21)

other factors that should influence your choice of this particular component. Be sure the panel can be uploaded/downloaded, allowing you to extract or input information from a remote location, enabling remote programming, troubleshooting, even taking a non-paying customer off line. The price difference between an uploadable/downloadable panel and one without this feature is negligible.

There are other important factors to look for, such as factory support. Does the manufacturer maintain an 800 number for your technician to call in case of trouble? Do the control panels support either a zone indicator or alphanumeric

type of keypad? Are they available in various sizes – usually denoted by the number of zones – so that you may tackle large or small jobs without switching manufacturers?

### IN CONCLUSION

The security business is an interesting and challenging one. The sound contractor is in a unique position to enter this field by virtue of his skills and present facilities. It is really not *that* far removed from your current field of endeavor; it might even find you new customers for your other systems.

A listing of manufacturers of alarm equipment may be found in the Sound & Communications 1992 edition of the Blue Book. For your convenience in locating sources of supply and central station

### ALARM WHOLESALERS CENTRAL STATIONS

|  |   |
|--|---|
| <b>Ademco Distribution Inc (ADI)</b> stores throughout the U.S. 1-800 221-8922 | <b>Affiliated Central Inc</b> Brooklyn, N.Y. 1-800 233-6261     |
| <b>AFY Security Distributors</b> N.J., PA., Ohio 1-800 228-0330                | <b>Amcest Corporation</b> Roselle, N.J. 1-800 492-4051          |
| <b>Arius</b> stores throughout the U.S. 1-800 432-3232                         | <b>Nationwide Monitoring</b> Brooklyn, N.Y. 1-800 221-0826      |
| <b>D &amp; H Distributing</b> stores throughout the U.S. 1-800 877-1200        | <b>Emergency 24</b> Ill., D.C., Mich., Cal., Fl. 1-800 344-3624 |
| <b>King Alarm</b> N.J., N.Y., Pa. 1-800 526-0162                               | <b>Texas Security Central</b> Texas (3 cities) 1-800 365-0130   |

operators, a partial listing of alarm wholesalers and monitoring stations follows. The wholesalers listed are national in scope, as are the central stations. (Your accounts are monitored via an 800 toll-free line.) ■

## SATELLITES

(continued from page 33)

way. Microwaves are easily deflected by physical objects including walls and even foliage, and a functioning satellite dish must have a clear line of sight to the satellite whose transmissions it's supposed to receive. Attic installation is only possible if done in the context of an elaborate trapdoor arrangement for raising the dish to the roof level where line of sight can be established.

### That has been done by highly qualified installers in elaborate, cost-is-no-object installations.

That has been done by highly qualified installers in elaborate, cost-is-no-object installations, but the tactic hardly lends itself to routine installations. And flush mounting a dish against the side of a building is ridiculous because it does not permit the dish to move freely, though I've seen this type of installation

suggested more than once in consumer periodicals, and even recommended by less than knowledgeable installers.

Finally, the customer should be made aware that satellite systems require periodic installer maintenance and recalibration. Even the most rigid mountings exhibit some drift over time, and systems should be inspected and

adjusted at least once a year. Current satellite equipment is quite weatherproof, but moisture can find its way into cable connections, and once precipitated, can badly degrade the signal since microwave energy can be reflected by water.

In our next installment, we'll cover installation procedures for satellite systems. ■

## CALENDAR

### Upcoming Events

#### SEPTEMBER

**Piezoelectric Devices Conference:** Kansas City, Missouri. Contact: (202) 457-4930. September 15-17.

**Image World:** New York, New York. Contact: (800) 800-KIPI. September 21-25.

**RF Technology Expo East:** Tampa, Florida. Contact: (303) 220-0600. September 22-24.

#### OCTOBER

**Audio Engineering Society (AES):** San Francisco, California. Contact: (212) 661-2355. October 1-4.

**Fiberoptic Splicing and Termination Workshop:** Washington, D.C. Contact: (508) 347-7133. October 5-9.

**Custom Electronic Design & Installation Association (CEDIA):** Dallas, Texas. Contact: (800) CEDIA-30. October 7-10.

**Fiberoptic Splicing and Termination Workshop:** Dallas, Texas. Contact: (508) 347-7133. October 12-16.

**Int'l Business Music Association (IBMA):** Ponte Vedra Beach, Florida. Contact: (816) 444-3500. October 14-17.

**Instruments Society of America (ISA):** Houston, Texas. Contact: (919) 549-8411. October 18-23.

#### NOVEMBER

**International DJ Expo:** Chicago, Illinois. Contact: (516) 767-2500. November 9-12.

**SMPTE:** Toronto, Ontario, Canada. Contact: (914) 761-1100. November 10-14.

**COMDEX/Fall:** Las Vegas, Nevada. Contact: (617) 449-6600. November 16-20.

**Design Engineering Show:** Anaheim, California. Contact: (203) 352-8372. November 19-21.

**Networking '92:** Kortrijk, Belgium. Contact: (617) 235-8095. November 24-26.

#### JANUARY 1993

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

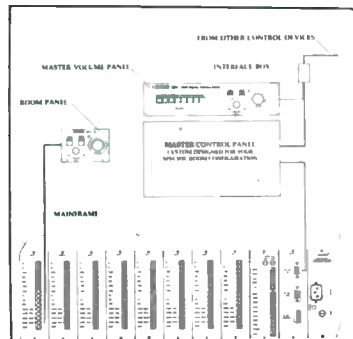
**North American Music Merchants (NAMM):** Anaheim, California. Contact: (619) 438-8001. January 15-18.

**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.

## Room Combining; High-Powered In-Wall

By Steve Jacobs



### Combining System

Oxmoor Corporation has introduced a room combining system for multi-room sound systems. The "MCS" Room Combining System combines up to eight rooms in any combination. A non-volatile memory feature preserves system settings in the event of a power failure.

An operator can combine the audio of up to eight rooms and synchronize their remote volume controls, select sources from the combined rooms and mute speakers at head table locations, with the use of the Master Control Panel.

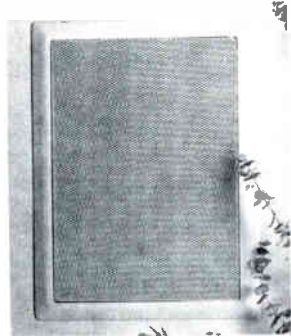
A self-powered, 5.25-inch rackmount mainframe is the heart of the system. The mainframe contains Logic, Audio and Control cards. The Logic card has a balanced input and a volume control for a Music Page source. An Audio card is used for each room or zone to be controlled. Communication between the Master Control Panel and the Control card in the system mainframe follows PA-422 protocol.

Circle 1 on Reader Response Card

### In-Wall Debut

Cerwin-Vega has debuted the two-way W series in-wall speaker system. The W-7 In-Wall System features a 7-inch woofer with a Butyl rubber surround and a

Steve Jacobs is the Associate Editor of Sound & Communications.



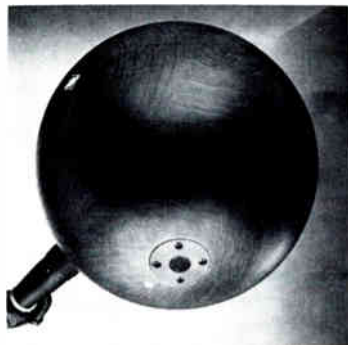
The Cerwin-Vega W-8 in-wall speaker system.

tweeter that's a one-inch polycarbonate dome. The frequency response is 40-20,000 Hz.

The W-8 In-Wall System uses an 8-inch "long-throw" woofer and a one-inch ferrofluid-cooled dome tweeter. The speaker has 125 watts of power handling capability.

The systems feature overall system protection and are self-resetting. In addition, the units have removable metal speaker grilles, a matte white finish and clamp-in wall mounting frames.

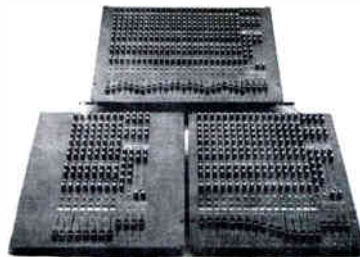
Circle 2 on Reader Response Card



### Stereo Miking

Neumann has introduced the KFM 100 stereo microphone. The KFM 100 contains two pressure microphones flush mounted on a wooden sphere, diametrically opposed from each other. The sphere is 20 cm. in diameter. The microphone is designed to reproduce the acoustic depth of the environment and has a low frequency response down to 10 Hz.

Circle 3 on Reader Response Card



### The Phantom Ships

The Phantom Series Mixing Consoles from A.R.T. are shipping. The Phantom Series 1608, 2408 and 3208 are designed to perform in live and studio situations.

The 2408 has 16 XLR channels plus eight additional line channels that can serve as dedicated tape returns with panning and soloing. In live applications, the phantom 2408 offers four monitor mixes, four auxiliary mixes, 24 x 4 subgrouping and independent controls.

The 2408 fits into a 19-inch rack with the wood side panels removed.

Circle 4 on Reader Response Card



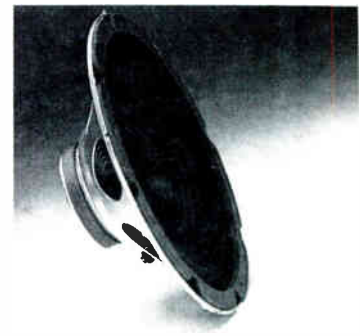
### Commercial Power

The DS-300 series commercial sound power amplifier from Compact Power Company has been designed to drive 25-, 70-, or 100-volt distribution lines.

The unit is convection cooled and has isolated and balanced inputs and outputs. Other features include low- and high-pass filters, regulated DC power supply, 85 percent power transfer efficiency and LED status indicators.

The adjustable Sat-Sense current limiter feature can adjust 50 to 100 percent of maximum power output to protect low-wattage speaker systems or line transformers from saturation.

Circle 5 on Reader Response Card



### Upgrading

Atlas/Soundolier has announced the Model C5 eight-inch conventional loudspeaker. Designed for voice transmission, music and signal reproduction in commercial, industrial and institutional applications the C5 replaces the C5 conventional and C5W dual-cone models.

The new model includes a whizzer cone and offers an extended frequency response of 30 Hz-18 kHz. The unit is available with seven factory-installed matching transformer options.

Circle 6 on Reader Response Card



### Video Multiplexer

The International Fiber Systems (IFS) VT5000 Series video multiplexer combines four standard video signals in a single 62.5/125 optical fiber over distances up to 10,000 feet. The video signals are realtime, full motion and full color. Using IFS modulators and demodulators additional audio and data signals may be combined with video channels.

Circle 7 on Reader Response Card





### Sub-Miniature

Audio-Technica U.S., Inc. has introduced the MT830R Sub-Miniature Omnidirectional Condenser Microphone. The MT830R can be worn in hair or behind loose weave clothing. It can be hidden in the knot of a tie or worn as a lavalier.

The mic has a frequency response of 20-20,000 Hz and is designed for theater, sound reinforcement and broadcast applications. Available as the MT830CW, it can be used with the Audio-Technica ATW-1031 wireless system.

Circle 8 on Reader Response Card



### Hypercardioid Boundary

AKG Acoustics, Inc. has introduced the C 547BL, a hypercardioid boundary microphone. The mic has been designed to be visually unobtrusive. The C 547BL is designed so that the sound does not change when the speaker's head moves.

Rejection of low-frequency noise is achieved through the use of a switchable bass-cut filter, a transducer shock mount and isolating rubber feet. Incorporation of a low impedance, RF suppressed output has helped to eliminate stray field interference.

Circle 9 on Reader Response Card

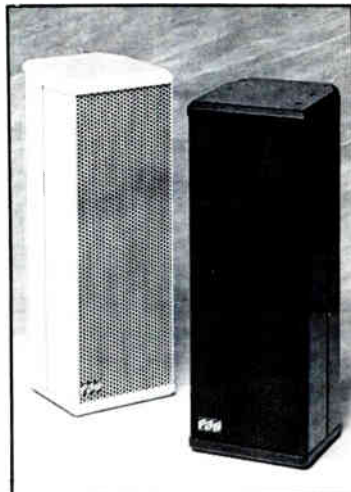
### Distribution System

Sonance has introduced a multi-function component, the AC-1. The device can sequentially activate a series of amplifiers or other components via switch or line-level sensors. It acts as a distribution amplifier with separate output level



adjustment and also function as a power conditioner, providing three-stage protection.

Circle 10 on Reader Response Card



### Weather-Resistant Speakers

PAS has introduced the PermTec series of weather-resistant speaker systems. The speakers come in powered or unpowered versions and in either black or white finish. Applications include theme parks, restaurants, golf courses, cruise ships and amphitheaters.

PermTec speakers feature weather-sealed enclosures of extruded aluminum channel with ABS plastic end caps. Each speaker contains two five-inch cone drivers constructed of die-cast aluminum frames and a 40-ounce, magnet-assembly, one-inch, edge-wound, copper voice coil assembly. The high frequencies are handled by a phenolic horn tweeter.

Circle 11 on Reader Response Card



### Mics for Musicians

Shure Brothers Incorporated has introduced its BetaGreen microphone line, comprised of five models designed for the aspiring musician.

The BetaGreen line includes three dynamic and two condenser microphones to handle home recording and live performance applications. Prices range from \$60-\$220.

Circle 12 on Reader Response Card

### Nostalgic and Futuristic Juke

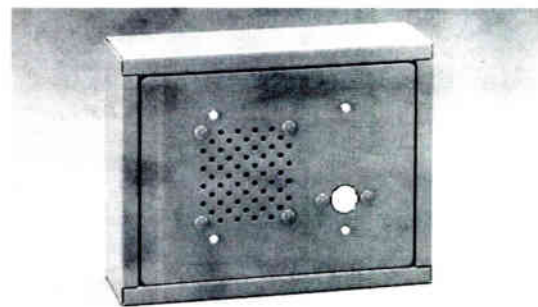
Rowe International has introduced its 1993 compact disc jukebox. The LaserStar CD-100C, offi-

cially named Laserstar America, features nostalgic and futuristic styling.

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### Rackmount Computer

The BGW U86 is an IBM compatible rackmount microcomputer system. Standard features include a motherboard with a 80386DX 40 MHz microprocessor, upgradeable to 80486. The motherboard contains 4 meg. of fast page RAM, upgradeable to 64 meg.

Housed in a 3U (5.35-inches high) rackmount chassis, the standard package features a TEAC 5.25-inch and a 3.5-inch floppy disk drive. An optional desktop front panel is offered for applications not requiring rack mounting.

Circle 14 on Reader Response Card



### Dimmer Controller

Ness has introduced the SC-1230 0-10 VDC 12-channel dimmer controller. Each channel has two control functions: momentarily "on" and 0-10 V (0-100 percent) dimmer control. In addition, each channel can be routed to one of three scenes.

The unit has a master blackout control. In addition, there are three

master dimmer controls for scenes A, B and C making it possible to fade in and out from scene to scene. Circle 15 on Reader Response Card

### SLM/RTA

Larson Davis Laboratories has introduced the model 2900. The unit is a combination sound level meter with a battery-operated dual channel realtime frequency analyzer providing 1/1 and 1/3-octave



digital filters, as well as FFT analysis with resolution to 800 lines. Included is an RS-232 interface and 1 MB of non-volatile memory.

Optional equipment includes a pink/white noise generator, external 3 1/2-inch floppy disk drive and a color display with mouse control.

Circle 16 on Reader Response Card



### Video Transmitter

The PT-100uB is a fiberoptic video transmitter, from Meridian Technologies, that plugs directly on the BNC connector of a 75 ohm CCTV camera. It is powered by the camera or a 12 VDC power supply.

Circle 17 on Reader Response Card

### High-Rise Stand

Peerless Sales Company has introduced the High-Rise video Pedestal Stand. The device uses a col-



umn made of steel tubing to support monitors from 20 to 27 inches at elevations of four, five, six or seven inches.

The pedestal's base, which is bolted to the floor, makes use of vertical bracing laid out in a triangular pattern. Bolting kits are available for concrete or wood floors.

Circle 18 on Reader Response Card

### Rack Lighting

Littlite has introduced the high-intensity Raklite RL-10. The Littlite Raklite is designed for mounting at the top of a rack of audio or lighting equipment. It comes with a 12-inch flexible gooseneck, five watt halogen bulb, dimmer rheostat, six-foot cord and transformer.

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## PEOPLE

### Barnes Joins Pioneer; Burdett Joins Niles

#### Pioneer Marketing

Bud Barnes has joined Pioneer Laser Entertainment (PLE) as Director of Marketing. Barnes has previous experience with PLE's product lines while supervising the PLE account as Vice President, Management Supervisor at DCA, Inc. In his position, Barnes is responsible for strategic planning for PLE's Laser Karaoke and LaserJuke products, and new product development.

Prior to joining PLE, Barnes was Advertising Creative Manager at Nissan Motor Corporation U.S.A.



Barnes

#### Niles Creative Services

Albert (Al) Burdett has become

Niles Audio Corporation's first Director of Advertising and Creative Services. A graduate of the University of Connecticut with a BFA in Graphics and a concentration in Marketing, Burdett worked as an art director for Saatchi & Saatchi Geneva and for U.S. companies in marketing promotions, packaging and direct mail before starting his own design firm.

#### CFO at AMX

AMX Corporation has named David C. Shiring chief financial officer of the company. Shiring is responsible for overseeing the allocation of company funds; tracking the manufacturing of goods; and supervising



Shiring

accounting, human resources and the MIS staff.

Shiring brings in excess of 14 years of financial experience to AMX. Shiring has a master's degree in business administration from Arizona State University and a bachelor's of science degree from Pennsylvania State University.

#### Fiber Options Manager

Fiber Options, Inc. has appointed Fred E. Scott product manager for broadcast systems. Scott joins the company with over 15 years in the television-broadcast industry, with expertise in product planning, development and management. Prior to joining Fiber Options, Scott



Scott

spent 11 years as the director of engineering for Hitachi Denshi America, Ltd. where he directed a staff of engineers.

#### Mincy Promoted

Infinity Systems, Inc. has appointed Tom Mincy as National Sales Manager for Home Audio Products. Mincy had been Infinity's Eastern Regional Sales Manager since July of 1989.



Mincy

In his role, Mincy is responsible for sales of Infinity home audio products in the U.S. In addition, Mincy is developing sales programs, distribution plans and dealer communications.

## LITERATURE

### Audiometric Test Rooms; Multimedia Guide

#### Acoustical Standard

The Acoustical Society of America (ASA) has published a national acoustical standard, ANSI S3.1-1991. The standard, Maximum Permissible Ambient Noise Levels for Audiometric Test Rooms, specifies and measures the maximum permissible ambient noise levels allowed in an audiometric test room that would produce only negligible masking of test signals.

Provided in the standard are measurement of ambient levels for testing at threshold levels of 125 to 8,000 Hz. In addition, specifications for maximum permissible ambient noise levels for different audiometric conditions and frequency ranges are included. The information is intended for use by those testing hearing, and for distributors, installers, designers and manufacturers of audiometric test

rooms, to insure that ambient noise in test rooms will not influence hearing measurements.

Circle 20 on Reader Response Card

#### Multimedia Directory

ICIA has released an illustrated multimedia buyers guide. The Directory of Multimedia Equipment, Software and Services lists products, software and service designed for use in interactive or multimedia systems. The 300-page directory also contains a section of service providers and consultants specializing in multimedia.

The directory is designed for users of multimedia products in areas such as education, government, training, communications and private enterprise, as well as dealers and other firms selling multimedia equipment, software and services.

Circle 21 on Reader Response Card

#### MIDI Technology

A-R Editions, Inc. has released MIDI: A Comprehensive Introduction, by Joseph Rothstein. The book is on the function and particulars of MIDI technology.

Rothstein's guide provides a description of how MIDI operates, from basics to advanced techniques. The book explores issues including a survey of MIDI applications, discussion of technical principles behind MIDI and a look at different types of instruments on the market.

Circle 22 on Reader Response Card

#### Explaining Fiber Optics

Corning's book, Just the Facts, is a tutorial on fiber optics especially for those in the telephone industry. The provides a basic overview of fiber optics, and covers such topics as technology, applications and the future of fiber.

Circle 23 on Reader Response Card



#### Digital Services

KJH Communications has released Intercontinental Digital Services, a directory of the satellite and undersea cable leased line services of the Far Eastern, North American and European carriers with information on facilities, tariffs and contacts. It's designed for those interested in private lines and occasional-use services to support international voice, data, and video applications.

Circle 24 on Reader Response Card

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• Mixers  
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• Switching/Routing Systems  
• Microphones  
• Background Music Systems  
• Repeaters  
• Fiberoptic Links  
• Lights (Dimmer Systems)  
• Security Systems

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BOSE

• YAMAHA  
RANE  
I.E.D.

SHURE BROS.  
3M

BOGEN  
REVERE INDUSTRIES  
NSI  
REVERE INDUSTRIES

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DUKANE  
ALTEC LANSING  
BOGEN

• ALTEC LANSING  
YAMAHA  
AUTO PATCH

ELECTRO-VOICE  
AEI MUSIC NETWORK

I.E.D.  
FIBER OPTIONS  
NESS  
AIPHONE

#### THIRD PLACE

ALTEC LANSING, CROWN\*  
JBL  
PEAVEY

• TOA  
PEAVEY  
BSM SYSTEMS

AUDIO-TECHNICA  
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• PA Amplifiers  
• PA Loudspeakers  
• Inground, Outdoor Loudspeakers  
• Mixers  
• Signal Processors  
• Switching/Routing Systems  
• Microphones  
  
• Background Music Systems  
• Repeaters  
• Fiberoptic Links  
• Lights (Dimmer Systems)  
• Security Systems

#### FIRST PLACE

CREST  
ATLAS/SOUNDOLIER  
BOSE

• YAMAHA  
RANE  
I.E.D.

SHURE BROS.  
3M

BOGEN  
REVERE INDUSTRIES  
NSI  
AIPHONE

#### SECOND PLACE

DUKANE  
ALTEC LANSING, JBL\*  
PEAVEY

• SOUNDCRAFT  
YAMAHA  
AUTO PATCH

AUDIO-TECHNICA,  
ELECTRO-VOICE\*  
AEI MUSIC NETWORK

I.E.D.  
FIBER OPTIONS  
NESS  
THORN AUTOMATED SYSTEMS

#### THIRD PLACE

CROWN  
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\* Indicates tie

## SURVEY METHODOLOGY

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

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