

# SOUND & COMMUNICATIONS

Volume 39 Number 8

August 25, 1993



## AND THE BEAT GOES ON

Club USA has quickly become part of the chi-chi Midtown Manhattan club scene. An old burlesque house, Club USA forced the sound contractor to strut his stuff – and design sound that works with the club's concept. **38**

### IN THIS ISSUE

- **THE CONSULTANTS SPEAK**  
Computer control, DSP, and easy on the end user. In 1989, we asked several acoustic consultants to predict how the nineties would fare, acoustically. Four years later, we again asked the same consultants for their comments. And again, they reviewed their predictions and made some new ones — in "Whither the Nineties." **12**
- **PRO SOUND FOR TOURING ARTS**  
How about a users manual for a venue? The Metrodome in Minneapolis considers itself just that as it tries to make information available to touring sound companies on what works best in the venue. **54**

## CLUB PRIMER

As club entertainment increasingly is of the prerecorded type, you may be thinking of how to design and club system. This article goes out on specifics. **46**

## CES-FEST

The Consumer Electronics Show brought to forefront the query: What is consumer electronics? In the midst of many changes in the industry, our observer saw much to note at the high end, home theater and theme park end of work. **28**

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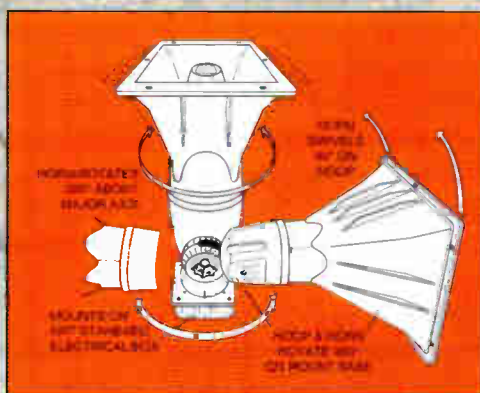


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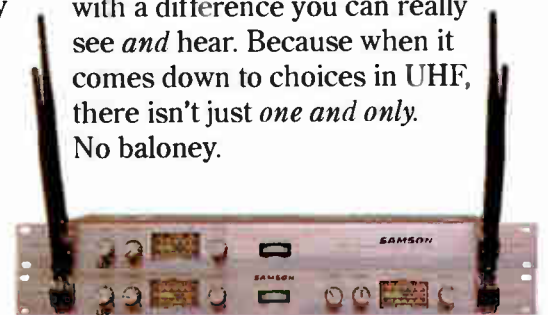
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# Theoretical Specs From Real Limits

## MUCH ADO ABOUT PART TWO

I just finished reading part 2 of Neil Shaw's article on Digital Delays. I found it very informative and I applaud the subjective review approach that Mr. Shaw used in presenting the material. However, I would like to present a point of interest that Symetrix ran into while designing our 402 Dual Output Room Delay: It is impossible to get theoretical 18 bit dynamic range specs from an 18 bit digital unit. Most manufacturers seem to create specs based upon the theoretic limits of digital physics but don't verify the spec with actual tests. This makes comparisons made by specifications alone not valid. Mr. Shaw does mention that spec comparisons are not enough.

An example of this is the published dynamic range specs for 18 bit units which is usually seen as 108 dB (6.0206 dB per bit=108.37 dB). In theory, this math make the spec look good. In reality, a linear analog-to-digital converter can only toggle its last bit at one half of the least significant bit voltage, resulting in no more than 105 dB.

Instead of fighting the spec game, we elected to go to a 19 bit A/D converter to be able to truthfully match the published specs of other units.

Mr. Shaw does a good job of protecting himself by using words like "ideal delay performance," but he also used the "quick" math in Part 1 of his article where he states that an "ideal" 16 bit unit would have a 96 dB dynamic range. In reality, this would be 93 dB.

This discrepancy is somewhat trivial to the overall theme of the article and is not meant to discredit Mr. Shaw, who I feel did a very good job in comparing units. Instead, I wanted to point out that

you can't always believe something just because it is printed in the literature.

Jon Bosaw  
Director of Sales & Marketing  
Symetrix  
Seattle, Washington

*Mr. Shaw responds:*

Dear Jon,

*Yes! I agree, it is impossible, even for the marketing department, to actually get full 16 bit, 18 bit or 100 bit dynamic range from any 16 bit, 18 bit or 100 bit device that is manufactured on earth. The discussion in Part 1 of the article was only a very brief discussion of, and introduction to, the theoretical limits that equipment designers are striving for. As can be seen in the series of performance graphs presented in Part 2 of the article, some digital signal delay units have more dynamic range than others, and that is the point. The manufacturer's spec sheet is only the beginning in the selection of a unit. If the application is critical, then, as former President Reagan said, "Trust, but verify." It is the system designer's obligation and duty to ensure that the device chosen will actually do what it is supposed to do, notwithstanding what the manufacturer's spec sheet says. In part 3 of the article, which will appear in a future issue, I will discuss how to define what you need in terms of specifications for several typical applications and then how I would go about selecting a unit. In regard to the "quick" math, yes, in practice you can only get  $\pm 1/2$  least significant bit accuracy. I was trying to keep the math simple to get the point across, and that's why I chose an "Ideal" unit! Thanks for your comments.*

Neil A. Shaw  
Menlo Scientific Acoustics  
El Segundo, California

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# The News From New York — In Chicago, New York and Dallas

I keep trying not to talk about shows, conventions and meetings. But the fact is that industry shows, conventions and meetings guide and exhibit this business.

Some trade shows become more important; others less important as an industry changes.

This summer's Consumer Electronics Show was a case in point. There was never a summer CES like this. Traditional exhibitors like Sony, Pioneer, Yamaha, Hitachi, and Toshiba didn't exhibit. Traditional semi-exhibitors like RCA and Philips did in fact exhibit. Of the major Japanese companies, only Panasonic was there in force. And their major showings were a Dick Tracy type wristwatch and a game player (3DOs). The summer CES people, to their credit, held a PCC (for personal computer communications) convention within the CES at McCormick Place. And this gained some traffic (although not noticeably from dealers who needed any product here and now). CES is also billing the summer show as a meeting of new technology. This has always been true: The Design and Engineering exhibit has traditionally been at the summer show (in a side room though, not on the floor as in recent shows). Next year, the summer CES will run for three days only, with no consumer day (which was tried for two years). But based on this past summer CES, McCormick Place is no longer the hot place for new models of televisions and new formulations for audio.

Harman International chose summer CES (at "Harman House" a downtown mansion) to announce its acquisition of AudioAccess, along with the appointment of Chris Stevens (AudioAccess president) as president of

Harman Kardon. Chris is also, you'll remember, the head of CEDIA, and the owner of Phoenix Systems (also to be absorbed by Harman we're told). We're also told that Carey Christy, the founder of Infinity (acquired several years ago by Harman), has left the company. And that Harman is about to formally acquire a large microphone company. So the consumer and pro — and all bases in between — are presumably covered. As an aside, Comdex saw some Peavey speakers hooked up to computers. Multimedia for everyone.

Speaking of multimedia, the AES which meets in October in New York



has chosen multimedia as its concept topic.

In relation to the upcoming AES, Len Feldman is the chairman of the October convention in New York. We announced that fact — as a scoop — on our AES-TV News program last year. Through the years, Len has been a stalwart friend. He was a writer for Testa Communications' very first magazine many years ago — Modern Recording. And he has been my pal and sidekick in our televised Product Previews through many conventions.

(I've seen the hands of Len and me on MTV; MTV has picked up our footage.) Together we introduced such CES not-to-be-forgotten products as the Panasonic bread bakery and the Casio DJ product for kids, along with some gear that Len especially liked such as the Crown amplifier shown last year. We televised, for the first time in the world, DCC, DAT, MD, and so on and so on. Len's sense of humor and engineering chops have been a boon to our TV shows during CES and AES. And we'll be back at AES — along with our TV show.

Back to multimedia. Sony's showing in Japan last month of graphics and video on MiniDisc is a very interesting indication of a possible future of multimedia. The Mini Disk for Data is not the same as the MD for audio, and a price has not been set. The Data MD will, however, be small and accept audio, still frame video, and in the future full video — when the drives are delivered. Next year? Anyway, Sony Recording Media (remember the tape division?) has made an impressive overall pitch for its presence in non-tape media. And though it doesn't take a crystal ball to see the lessening of the influence of tape; one can see Sony positioning itself for the next century (as they so cleverly did for this decade with CD).

We'll report more on shows, maybe next month. Remember the International Association of Auditorium Managers meets in October in Dallas, and is offering a day of information on acoustics. Chris Jaffe has reportedly organized the day.

Best Regards,

Judith Morrison, Editor in Chief

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*By Rob Baum*

With a rapidly changing market at its hands, Summer CES has had to change with the times. And there was a great deal to see in home theater. While on another front, the format battle rages on.

### 38 **AND THE BEAT GOES ON AT CLUB USA**

*By Val Dempsey*

After many incarnations, New York's old Minsky Theater has reemerged as the hottest club on the super-trendy circuit. Atlanta's Seriously Sound was called on to design sound and lighting to complement the campy and sexy surroundings.

### 46 **THE CLUB PRIMER**

Many factors have to be carefully considered when designing and installing a club system. We hope you can get some ideas out of our tome on the subject.

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SOUND  
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## Edwards Theatres



*QSC Amplifiers are featured in Edwards Theatres, including their flagship Newport Cinema, the largest screen on the West Coast.*

## Mann Theatres



*Mann's Chinese, the most famous movie house in the world, is only one of the Mann Theatres that relies on QSC amplifiers.*

## Pacific Theatres



*The Pacific Cinerama, another Hollywood landmark, is powered by QSC Amplifiers, as are other theatres in the Pacific Theatres chain.*

## United Artists Theatres



*United Artists, developing a new generation of theatres like the UA Greenwood in Denver, is using QSC Amplifiers to move into the next century of entertainment.*

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Some of the other theatre chains featuring QSC Power Amplifiers: ACT III Theatres, Allen Theatres, Associated Theatres, Budget Cinemas, Central States Theatres, Century Theatres, Cinema World, Cineplex Odeon Theatres, Classic Cinemas, Dickinson Theatres, Douglas Theatres, General Cinemas, GKC Theatres, GTI Theatres, Harbors Theatres, Loew's Theatres, Malco Theatres, Manos Theatres, Marcus Theatres, Mulone Theatres, Muvico Theatres, National Theatres, Neighborhood Cinemas, Pitt Theatres, Rhyon Theatres, U.C.I. Theatres, Warner International Theatres, Western HTS Cinemas, and many, many more...



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# NEWSLETTER

## **REORGANIZATION AT AUDIO-TECHNICA**

As part of an Audio-Technica Corporation international reorganization, Mr. Kazuo Matsushita has been appointed president of Audio-Technica U.S., Inc. Philip J. Cajka and Kenneth Reichel have been promoted to executive vice president and chief financial officer, and executive vice president, marketing respectively. Other officers of the Stow, Ohio audio products firm are Fred Nichols, senior vice president; Jacquelynn Hebrock, vice president, product development and Dean Slagle, vice president operations.

Jon Kelly has left the company. Buzz Goodwin, marketing manager, and Gary Elliott, sales manager, remain in the pro division.

## **AUDIO ACCESS NEXT HARMAN ACQUISITION**

Harman International has reached an agreement to acquire AudioAccess and Phoenix Systems, in addition to appointing Christopher Stevens, general partner of AudioAccess and owner of Phoenix Systems, the president of Harman Kardon, Inc. The appointment was announced by Tom Jacoby, president of the Harman International Consumer Group. Stevens is president of CEDIA and helped found it. Phoenix Systems sells custom installed audio/video systems. AudioAccess is a supplier of multi-zone, multi-source audio and video distribution equipment.

Rumors persist that Harman International will also acquire a major microphone maker who has also acquired several companies, but no firm data is available as of press time.

## **AUDIO TEKNOLOGY SPLITS**

Management of Audio Teknology have split. Chris Strahm, former ATI president has resigned and formed Linear X Systems in Portland, Oregon with Vickie Sheppard, also formerly of Audio Teknology. Linear X markets LEAP and LMS, and will be in the hardware business. Current distributors remain in place.

Audio Teknology, headed by Larry Droppa, who was a founding partner and vice president, continues to manufacture the Paragon mixing console, and has moved to Columbia, Maryland. Management additions include Shane Morris as chief design engineer. ATI has appointed Audio Independence, Ltd. as its worldwide sales agent, handling all sales and marketing functions for the Paragon and future ATI products. Dan Abelson, Audio Independence president, previously served as vice president for ATI. ATI can be reached at 410-381-7879. Linear X can be reached at 503-620-3044.

## **LONE WOLF GETS FUNDING**

Lone Wolf, Inc. has announced that it has completed an equity financing and strategic alliance with Paul Allen, the "co-founder of Microsoft Corporation." According to Lone Wolf, Allen invested "an undisclosed sum in the closely held, private company and was the sole investor in the offering. Additional agreement with Allen provides cooperative R&D with Lone Wolf's networking technologies and cross-licensing of enhancements between his affiliate companies. This agreement includes Interval, the Palo Alto based multimedia think tank.

## **NEW VERREX OFFICE**

Verrex Corp. has announced the opening of a new regional office at 1800 Diagonal Road, Suite 600, Alexandria, Virginia. The company is headquartered in Mountainside, New Jersey. Verrex, in business since 1947, opened its Virginia office to offer the company's products and services to government agencies as well as to the large business community in the region. Steve Bartron, director of business development, will promote the sound and audio-visual systems business with emphasis on video teleconferencing. Bartron was previously with US Sprint and Unisys.

# NEWSLETTER

## **AUDITORIUM MANAGERS TO MEET**

The International Association of Auditorium Managers will hold its convention in Dallas from October 17 through 19. Special seminars on acoustics will cover audience-to-performer relationships, acoustics of the stagehouse, audience chamber acoustics, sound isolation, noise control, and sound reinforcement.

Among the speaker are Chris Jaffe and David Robb of Jaffe Holden & Scarbrough; Charlie Boner of Boner Associates; Dana Houghland of David L. Adams Associates, and Bill Cavanaugh of William J. Cavanaugh Consultants.

## **HIBINO BUYS DATADISPLAY**

California based Hibino Audio-Visual USA has officially acquired DataDisplay Corporation of Chicago. Glen Yokota, president of Hibino, said that DataDisplay will serve to broaden the company's "knowledge base and to more nationally target its audio-visual market."

Founded in 1984 and based in Chicago, DataDisplay has been specializing in large screen display of computer generated information. Installation include the Chicago Board of Options, WBBM in Chicago, and the 17-cube videowall behind the bar at Michael Jordan's restaurant in Chicago. Mike Canfield, president and founder of DataDisplay Corporation, assumes the position of vice president of the Chicago branch office. Yokota added that the acquisition "marks our immediate involvement in virtual reality due to DataDisplay's development of 'The Cave'" (most recently seen at the NAB show in conjunction with Silicon Graphics.) With the addition of a Chicago branch, Hibino says that its offices now represent the largest pool of rental video monitors and cubes in the United States.

## **NSCA ANNOUNCES CONFERENCE**

The National Sound and Communications Association has announced an owners and managers conference to be held at Amelia Island Plantation, Florida from January 20 to 23, 1994. Jay Johnson of Central California Electronics, Education Chairperson, indicated that the conference is devoted to subjects helping owners and managers of commercial electronic systems contracting companies to control their businesses. The formal topics to be covered will be: Training, Attracting and Retaining Good People; How To Prevent Employees from Becoming the Competition; and Small and Profitable vs. Large and Ugly — How to Carefully Structure Growth. Registrants are asked to send their problems in advance for discussion by those attending.

## **IMA PROVIDES FORUMS**

The Interactive Multimedia Association (IMA) has announced the formation of Media Convergence Forums designed to overcome barriers surrounding the convergence of multimedia technology in the publishing, broadcast, consumer electronics, telecommunications and entertainment industries. The first in the series, the Book Publishers' forum, was established as a result of needs expressed by industry leaders at the jointly sponsored NAB/IMA Multimedia World, recently held in Las Vegas.

## **PALTEX AND EMC ANNOUNCE DUET EDITING**

Paltex International and Editing Machines Corporation (EMC) introduced Duet, a "between the lines" editing system at the 1993 International Television Symposium in Switzerland. "Until now, video producers have faced a very difficult decision," explained Paltex Chairman and Managing Director Roger L. Bailey. "Do they move into disk-based editing, with the knowledge that, at some point, they'll need to post their show on tape; do they purchase a tape-based editor and give up the editorial flexibility that a disk-based system offers; or do they incur the expense of buying two editing systems and, in the process, duplicate most of the components and capabilities to get the editorial power they require? Duet provides the answer, off-line and on-line editing in a single platform, hence a 'between the lines' editing system." Duet is comprised of Paltex's EDDi Pro vision Video Tape Editor and EMC's PrimeTime Non-Linear Editor.

# Why you should buy an FBX to do nothing to your sound.

By Doran Oster, President, Sabine Musical Mfg. Co.

Until the invention of the Sabine FBX Feedback Exterminator, engineers had no practical alternative for controlling feedback other than the 1/3-octave graphic EQ — a 35-year-old technology.

**"What's wrong with EQs?"** Nothing — if you need to "shape your sound". On the other hand, if you're using an EQ to eliminate feedback, you may as well think of it as a "sound sponge". In fact, EQs "soak up" a lot more sound than you might realize. Practical experience proves that EQ filters are much too wide for chasing feedback and end up muting the program.

**Here's why:** 1/3-octave EQ filters are actually one full octave wide! Think about this: If the filters were only 1/3 octave wide, there would be no filtering

**Wouldn't it be great** if your EQ filters could be ten times narrower? Then they could eliminate feedback without a perceptible change in the sound. What if you could get more gain before feedback? Well, the Sabine FBX does all that — and the FBX's fully digital adaptive filters do it automatically!

**N**ow, you may say, "If the room is set up properly with an EQ, I don't have a problem." But maybe you do, and don't realize it. Try this test, and prove it to yourself. After you finish your next installation, patch in a CD player and play your favorite CD. Now punch the EQ in and out of line. We think you'll agree it sounds like there's a blanket on the speakers when the EQ is in. That's your EQ soaking up the sound.

culates the frequency of the feedback and, in less than a second, places a very narrow digital filter



The Sabine FBX-900

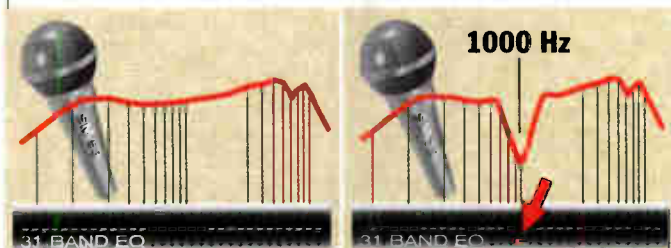
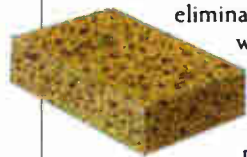
(ten times narrower than a 1/3 octave EQ and up to 20 dB deep) directly on the resonating frequency. **The FBX automatically eliminates feedback without muting the sound. And you get more gain before feedback.** Think of the FBX as an EQ with 20,000 sliders run by 1,000 top-notch engineers. It's just that simple.

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**Are all sound professionals crazy** to use EQs to control feedback? No — up until Sabine invented the FBX, there was no practical alternative. Parametric EQs have narrow filters but are too slow and cumbersome for live sound.

**Moving even a single EQ slider ruins your frequency response!**

between the fixed sliders. I'm not just talking about cheap EQs — even the best EQs share this problem. **In fact, if you pull your 1000 Hz slider down 12 dB, it actually removes 46% of the power going to your speakers between 500 and 2,000 Hz!** Pull two or three sliders, and you wipe out the overtones of your voice, causing you to sound nasal and your monitors to sound muddy.

They cause phase shifting, and drift with temperature. Pitch and phase shifters ruin the sound and can't be seriously considered.

**W**hich brings us back to the new Sabine FBX Feedback Exterminator, the only option that really works. Put it just before the power amp in the audio chain, and it automatically senses feedback. Then it automatically cal-



**"Think of the FBX as an EQ with 20,000 sliders run by 1000 top-notch engineers. It's just that simple."**

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# WHITHER THE NINETIES? ANOTHER LOOK BY ACOUSTIC CONSULTANTS

By Jeff Colchamiro

**“By the year 2000 . . .”  
As that magic number  
approaches, where  
is technology going?  
And where is the sound  
and communications  
industry going?**

In late 1989, we asked this question to a group of consultants and ran a series of articles in 1990 with their responses to the question: “Whither the nineties?”

Recently, we thought we’d have them evaluate their own psychic abilities. We caught up with the same consultants we quoted in 1990 and had them take a look at what they had said. Most of them found that their predictions are coming true, but perhaps not as quickly as they had hoped.

As we did in the original series of articles, we are printing the consultants’ responses verbatim to let them speak for themselves. But first, a quick summary.

In their original predictions, many of the consultants wrote about computer control, digital signal processing and modular equipment. Most of them followed up these earlier predictions, but are now able to explain some of the problems with using this technology. As one consultant explained, “Technology is so far ahead of the end user that sound systems are continually being

misused.” Combining digital and analog equipment was another problem the consultants noted: “We are beginning to learn to integrate digital technology and computer control in inherently analog systems.”

One consultant’s prediction, however, occurred ahead of schedule. In 1989, Dominique J. Cheene dared to predict “Some strange stuff is happening . . . the Dallas Cowboys have won Super Bowl XXX” but also added “That’s impossible, the Cowboys could never make the playoffs!” If the Cowboys could go from a 1-15 season to 1992-3 Super Bowl Champions, then perhaps all of these predictions are quite possible by the year 2000.



**JAMES GUNDLACH  
GUNDLACH AND  
ASSOCIATES  
NAPERVILLE, ILLINOIS**

Upon re-reading the short article I authored in 1990, it occurs to me that perhaps I would be well advised to change my profession to soothsayer. in the order of that article: it is obvious that many of the products which have been recently introduced are more

the result of technological capabilities of the manufacturers rather than the result of research in the area of market needs. Many firms are trying to recover their costly investment in digital design and manufacturing capability without taking the time to figure out what problems really need to be solved.

**PERHAPS I WOULD BE  
WELL ADVISED TO  
CHANGE MY  
PROFESSION TO  
SOOTHSAYER.**

DSP is certainly coming to the forefront. At the last NSCA, Ramsa introduced its WZ-DM30 multiprocessor, TOA introduced its MiniSaori, and Peavey continues to offer a product which is DSP based. The Yamaha DMC1000 console is fully digital and DSP based. The DSP30 from Gold Line, some Audio Precision products, the TEF analyzer, and products using the Ariel DSP boards are leading the way in test equipment.

IED has taken the DSP concept into a “full-system” realm which frequently results in IED providing factory assembly and testing of essentially the full sound system. In many cases, an IED UDAP system really only needs the microphone inputs at the loudspeakers to be added to what comes from the factory, and the system is complete.

Manufacturers such as BEC and OptoDigital Design are providing digital solutions to problems previously

*Jeff Colchamiro provides research assistance to Sound & Communications.*

solved with copper multi-channel microphone snakes.

Lone Wolf, as well as several other companies, is trying to improve the software control of various system components in such a manner as to provide universality so that various manufacturers' components can be melded into a single system.

We are now only about three and one-half years into the '90s and the changes are coming at a furious rate. Digital audio is not yet cost-effective for the smaller systems but is becoming very cost-effective in larger applications. It is curious that the smaller systems are tending to have a higher box count than the large systems since the larger systems can take advantage of DSP products which combine the functions of many small boxes in one

master DSP based unit.

For the next couple of years, things are going to be exceedingly muddled. While digital snakes offer increased noise immunity and reduced connector size and count on a stage, they don't talk very well directly to all digital consoles. Software control offers a great deal of flexibility. However, in many cases, operation actually becomes more clumsy because it is necessary to go through layers of menus simply to achieve the equivalent of turning a single knob in the old analog systems. In many cases, the hardware for a volume control that was a \$5.00 pot in an analog system becomes a \$150.00 accessory in a digitally controlled system. Some of the new and exciting products are coming from manufacturing firms whose size and

youth have to make one wonder whether the company will be around to service the product as little as five years from now.

It seems to me that the inevitable result of digital systems operating under software control is that manufacturers will be taking more and more total system responsibility. In the past, if a manufacturer made a one-third octave equalizer whose input and output circuits were well engineered, that equalizer could be substituted for any one of dozens of other one-third octave equalizers. Once a system is DSP based, it doesn't make sense to implement one-third octave equalization in a separate hardware box, but rather to implement equalization as one part of the software programming of the system. As DSP engines become more

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powerful and cost effective, more and more of the "system" will be resident in one or multiple DSP processors and the "system" will become a software project. All of this tends to lead to far fewer individual pieces of equipment and fewer manufacturers being represented in any given system. As I see it, this will tend to force manufacturers into the position of being systems

manufacturers instead of equipment-piece manufacturers.

The muddled way will continue through the nineties. It took many years for the industry to arrive at a rather uniform approach to the implementation of analog audio. We are beginning to learn to integrate digital technology and computer control in inherently analog systems. Before that

process is mature, we will have to learn to design and install systems which are essentially 100% digital. We will be playing with double-edged swords for many years. It is an old curse that reads "May you live in interesting times."

**IAN WOLFE**  
**ACOUSTICAL DESIGN**  
**GROUP, INC.**  
**MISSION, KANSAS**

I found it interesting reading to review my predictions for the sound reinforcement world in the '90s. Three years is not really enough time to truly test our forecasting ability. Therefore, most of my predictions have not yet occurred. A few, however, have shown some interesting promise. Allow me to elaborate:

**Computer Control:** This clearly is becoming the dominant method for operating and configuring sound systems. With the laptop computer readily available (and affordable), manufacturers have developed numerous audio devices that can be configured with the computer and left to function on their own once the computer is removed. I had predicted "numerous items of equipment, from various manufacturers, operating together under the control from one computer system." Not a bad guess, and with Crown's IQ and the MediaLink from Lone Wolf, this is becoming a reality.

**Digital Signals:** I had predicted digital audio from microphone to power amplifier by the end of the century. Not yet, but still a good prediction. The AES is establishing protocol standards that will "open the floodgates."

**Education:** I had made a plea for improved education, but alas, no "knight in shining armor" has of yet descended upon us. I continue to feel this is a vital aspect of our industry that must develop if we, as audio professionals, expect our industry to grow. Technology is so far ahead of the end user that sound systems are continually

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being misused. This is particularly evident in religious facilities and public venues such as convention centers and sports facilities.

**Product:** I predicted the evolution of product designed for specific applications as opposed to multi-purpose. This has not occurred yet. My other predictions relating to smarter products (diagnostics, readouts, etc.), and modular concepts are slowly approaching reality. More and more product can be field-configured via an LCD or other type of readout on the device itself. Modular product is very common but I have yet to see the cardframe that allows several manufacturers to share. Maybe I'm too optimistic about the manufacturing community.

**Listeners:** I had predicted that a more knowledgeable listener (via compact disc and Hi-Fi) will demand more from sound systems. This continues to be true and I'm sure will always drive a growing portion of this market. I'm pleased to see that "home theater" systems have become popular. The general public now can listen to high fidelity sound in their home. Why not at church . . . or at the ball game . . . or at the community center . . . Need I say more?

**CAD:** I had predicted that computer-aided design (CAD) will be commonplace. This is rapidly becoming a reality. We continually share drawings "electronically" with architects and engineers. While the hand-drawn plan is still popular, it is fading to the computer-drawn version.

So, overall I'd say my forecasting for the '90s is on track. Let's look again in seven years and see how we did!

**RON SMITH  
RS AUDIO VIDEO  
INGLEWOOD, CALIFORNIA**

Digitalization will continue with miniaturization and unification of business and personal electronic systems.

For example, microcomputer cards and disc/data machines will work like electronic wallets and can access su-

percomputers via satellite or telephone line and can send and receive voice, data, pictures, video, audio (stereo) and fax all in one palm size machine.

**ERICH M. FRIEND  
CRAWFORD FRIEND  
FORT WORTH, TEXAS**

Thanks for the follow-up article. It was interesting to re-read that which was previously published. As near as I can tell, my crystal ball was pretty well tuned. We are continuing to see more computer driven interfaces like the Lone Wolf system and Crown IQs, as well as theatrical sound system control standards developed by Charlie Richmond and sanctioned by the USITT. Most importantly, we are seeing support for open architecture standards in lieu of highly proprietary interfaces.

Also on schedule is the implementation of more digital signal processing. The new products from Yamaha, White Instruments and JBL are evidence of that. We have also seen better interfaces emerge between personal computers and test equipment. The MLSSA, Ariel DSP and TEF 12 products make measurements and system adjustments much more precise. My new prediction is that the word "equalization" will gradually fade from usage due to its gross understatement of the system adjustment process. "Operating parameter optimization" seems to be more descriptive, albeit a mouthful.

The last prediction I made regarding the application of "wonderbox" PA systems is also on schedule. I predicted it would be the late '90s before they evolved to the level of engineered systems, and this seems to be the case. The boxes are getting better sounding, but they are still being grossly misapplied by well-meaning but inexperienced designers that have been brainwashed by sales hype.

**NEIL SHAW  
MENLO SCIENTIFIC  
ACOUSTICS  
EL SEGUNDO, CALIFORNIA**



# THE RUGGEDNESS OF OUR CD PLAYERS ISN'T A RETROFIT.

I've been asked to look at my predictions as reported in the February 1990 issue of Sound & Communications. There were succinct prognostications:

1. There will be a consolidation of markets.

This is evident in the wider variety of services offered by contractors and the reduction of manufacturers. We've seen the growth into more varied communication technologies from the basic sound systems offered in the past. Contractors now offer the client audio, video, computer and wireless as part of a package. A simple system today may require telecommunications services — audio and video teleconference capability as well as other ISDN services, integrated video — both NTSC, computer and ATV; communications links that offer copper, fiber and wireless technologies; and, the increasing implementation and consolidation of computer control of various systems into one platform. In terms of consolidation of manufacturers, the past several years have seen the acquisition of many smaller manufacturers by larger ones. Examples of acquirers are Harman, Mark IV, Siemens and AKG.

2. Increased computerization and increased interface of pro sound equipment with a computer and other equipment.

In regards to this forecast, all I need mention is MediaLink, Nexsys, QSControl, RS-422, RS-232, and MIDI, among others. We see control by and with computers offering the flexibility and repeatability never before available to the system end user. This added value also translates to better system installs, with easier serviced follow up, for the contractor.

3. There will be the pressure of M.I. people (manufacturers) becoming pro.

This is most evident with manufacturers such as Rane. Look at the Rane NEQ-56 Network Equalizer. These manufacturers, who have moved from the minor to the big leagues, have helped both consultant and contractor

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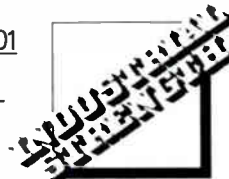
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The high-performance CD-401 (\$849\*) incorporates TASCAM's award-winning ZD circuit to eliminate low level distortion and ensure sound quality that meets the most demanding standards.

The CD-401's fader-start feature allows play to start automatically on fade-in and stop at the completion of a fade-out. The CD-401 is available with optional hard-wired or wireless remote.

For more information, call or write TASCAM, the company whose Industrial Strength product line also includes cassette decks and mixers.



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by providing cost effective equipment for use in our designs that offer superior performance at reasonable prices. These products have filled a void between the studio and touring quality gear and commercial quality gear.

Now as to future predictions — the winning lotto numbers are . . .

**KEVIN C. MILLER  
MILLER HENNING  
ASSOCIATES, INC.  
MCLEAN, VIRGINIA**

Almost all of the predictions likely were (and possibly still are) impacted by the significant recession. Except for the impact of the recession, most of the previous comments are being realized. There is a definite trend to an increasing availability and use of audio and video teleconferencing. This is primarily due, as predicted, to the reduction in complexity and cost of these systems along with the improvement in the performance of the fully duplex audio conferencing systems. There has been a rather rapid evolutionary improvement in these systems with no revolutionary breakthroughs to date. There is also an increased reliance and use of similar communication systems such as fax and E-mail.

The quantity of newly built arenas, auditoriums, churches, and other similar structures was, of course, limited during the recession. The facilities that were built, however, did incorporate audio and video systems of significantly enhanced performance compared to the systems implemented in similar spaces only 10 years ago. This, again, is due to the reduced cost and technological improvements. The increased reliance on computerized systems and presentation of this data, as predicted, is affecting the audio/video systems that are being incorporated into boardrooms and other similar facilities.

The significant complexity and interconnection of the various types of equipment and associated communications networks is causing a con-

tinued increase in reliance on the manufacturer's involvement. This is necessary to assure that equipment is properly selected, utilized and interconnected. The nature of the firms involved in this field continues to be a mix of small, medium, and large and will likely continue this trend as predicted. We note that as the equipment becomes more packaged, there appears to be a trend to apply packaged systems to existing rooms without properly designing the room to accommodate the function. Thus, room acoustics are often degrading the performance that otherwise would be available from some sophisticated audio/visual conferencing equipment. As noted at the end of the previous comments, the development of revolutionary concepts such as the transporter system (Beam me up, Scotty) have not yet been perfected and thus has not created any significant impact on the industry.



**NORAL D. STEWART  
STEWART ACOUSTICAL  
CONSULTANTS  
RALEIGH, NORTH CAROLINA**

As noted in 1990, my primary interests are in acoustics of buildings and noise control. I predicted improved measurement and analysis techniques, and more use of acoustical consultants by architects.

Architects and the community in general are using consultants more to improve designs, prevent and resolve problems. Business has clearly increased since 1990. However, much of my increase has been related to noise in communities.

Microprocessor-based instruments and computer programs to analyze acoustical problems are becoming more widely used. This trend will and must continue. These tools are needed to improve efficiency of the few trained and experienced acousticians available to serve the growing demand. However, these new tools do not produce instant experts. Their use by people not aware of their limitations must be a concern.

Our knowledge is continuing to expand. Of particular importance now is the work of the Concert Hall Research Group. Consultants and manufacturers of acoustical products are helping support travel to many large concert halls by a group of researchers. They are evaluating measurement techniques and documenting acoustical characteristics of these halls. They are now making measurements in occupied halls. This will increase our knowledge of measurement techniques and acoustical characteristics of rooms. It also will help us understand the relation of these characteristics to design features and perceived qualities in rooms of all types.



**JERRY HYMEN  
HYTECH SERVICES, INC.  
AURORA, ILLINOIS**

My involvement in electro-acoustics and audio systems is limited. However, I see a trend and an opportunity. We will see greater use of sound masking systems to establish privacy even in closed offices. The new prob-

lem and opportunity for the 1990s is related to the growth of outdoor amphitheaters. Unfortunately, many of these are located where frequent concerts are disturbing to neighbors. The opportunity is in a system to provide quality sound to the audience while reducing the sound propagating outside the venue.

Ten years ago, my biggest concern of the future success in providing quality programming to listeners was the proliferation of sub-standard (automotive) loudspeakers being used as distributed sound sources in ceilings of restaurants. Now, we are finding lower net costs of product, wider availability, and better distribution leading to superior quality equipment utilization in the audio chain.

Lately though, there is more evi-

dence of inexperienced users of top-notch equipment, than there appears to be of earnest Audio Engineers operating minimal quality, but the best equipment they could muster for the job. Every day I hear more instances of improper operating techniques: over limited (level pumping) newscasts on our Chicago NBC affiliate station, poorly aligned coverage angles in musicals at downtown theater sound reinforcement systems, and blatant, destructive clipping (perhaps intentional) at such events as introductions of Chicago Bulls basketball players at Chicago Stadium.

It's especially embarrassing to me, as a two decade member of the Audio Engineering Society, that more isn't being done toward reeducating the working sound systems engineers

on correct use of the now most-complicated system configurations in use today. Most occupations which affect a great number of people require some sort of licensing, continuing education or demonstrated proficiency in the operator's field. With the great possibility of hearing damage to near-field listeners in the outdoor music venues, licensing should (and predictably will) become an issue from a safety standpoint.

Traditionally, employers have relied upon the individual technician's training prior to employment. Now, continuing education seems to be a necessary reality. Without a legal mandate for this education, only conscious individuals can be relied upon to be up-to-date in their knowledge and abilities. Only if all field operators are con-

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**DUNCAN J. MCCULLOCH  
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The situation regarding poor installation practices mentioned in our 1990 comments has been alleviated somewhat. However, much effort in this area is still required. It is too easy to submit to the temptations of the low price bid, and overlook the details required for a good installation.

The advent of digital audio processors has been the single most significant development in the past few years, and I believe that future products will depend more on software than hardware. We are approaching

the illusive "black box" which can be anything from a mixing amp, to a limiter, to an equalizer, to a delay chain, to a "whatever," just by changing the operating program.

Programmed devices will also serve to be their own security locks, since the uninitiated will be unable to access, and therefore change, the operating settings. Computer control of large installations will be much easier to achieve, particularly with respect to the changing system parameters for different types of performances, and even "on-the-fly" changes for complex performances.

Look for exciting advances in this area in the near future. The communications protocols still have to be properly established by the industry, but that will come in time. I think the limiting factor will

probably end up being the configuration of the in/out connections.



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tics" to rise for the remainder of the decade in order to keep pace with the ever competing global economy.

**ANGELO J. CAMPANELLA  
CAMPANELLA ASSOCIATES  
COLUMBUS, OHIO**

Communications will continue to integrate country and world. Expect third world growth in all documented

technologies. Basic business transaction characteristics will not change. Transactions thought to be remote will become commonplace. Treat the client in another country as you would a client next door. Common market competition will be considerable, with ISO 9000 being a screening tool. All business growth should include an international agenda.

Common computer information exchanges will be via satellite and global.

Videoconferencing, popular among government and industries where group (and committee) meetings are pandemic, is now enhanced with appropriate, well-mounted microphones.

Interface with contractors worldwide. IEC, ISO and CEN standards are applied. Dollar value will grow with experience and achievement. Airport security and noise monitoring are growth industries.

**DOMINIQUE J. CHEENNE  
C & C CONSULTANTS  
LINCOLN, NEBRASKA**

Looking back at the projections that I had made regarding the state of the professional audio industry in the '90s back in late 1989, I was not too far off... So I will take another plunge and give your readers my views on what the industry has in store for the rest of the decade.

Acoustical design: Definitely an increase toward better designed facilities with acoustical consultants involved during all phases of the project. This will be required since regulations regarding noise pollution and acceptable noise levels in the environment (public and private) can only become more stringent. As such, engineering schools are going to have to adapt their curriculum to address these issues and we can expect to see more qualified people entering the field. Another trend in acoustics will be the use of better computer models and digital signal processors (DSP) to provide realistic simulations of what a space will sound like before construc-

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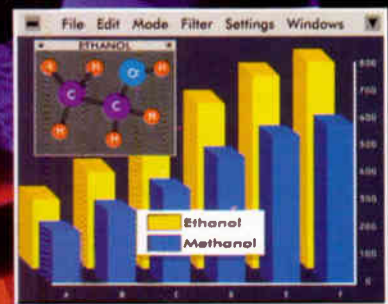
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World Radio History

tion starts. If the attendance at the recent ASA meetings to the sessions on auralization is an indication of where the industry is turning, this prediction (made in '89 by the way. I'm just tooting my own horn . . .) will prove true very soon. This also could mean that the big architectural firms might start to view the acoustical consultant as a potential full-time member of their firm, and as such we might witness a lot of merging between firms.

One thing for sure is that the perceived standard of sound quality will continue to go up. Audiences are becoming more critical of sound at concerts, in stadiums, and in auditoriums and this is the best thing which could happen to this industry. Let's face it: \$25 for a ticket, \$5 for a hot dog, \$3 for a beer, the last thing that one needs is not to be able to hear (or understand) the announcer!

Audio & Video: HDTV in, regular TV is out. Now that an agreement for standards appears to be a reality, we should see the first hardware hit the stores in less than two years. Software will follow rapidly and we can expect HDTV programs to try to take advantage of the higher resolution during the initial development of the customer base. However, unless TV moguls clean their act and start to put some intelligent programs on the air, we can expect a lot of customers not to spend \$3,000 or \$4,000 just to see "Wheel of Fortune" in improved video resolution. Maybe Sony's purchase of Time-Warner industry will yield good programs when the first XBR4700HD model hits our shores . . .

Audio Format for TV should not change appreciably in the next few years. Dolby is in to stay and they deserve it because they have a superb program of advanced R & D: That investment paid off and will keep on doing so. I expect THX and other formats to capture only a very small piece of the home theater pie. THX is good, but it is poorly marketed and hard to justify for potential buyers.

Home installations will keep on including the basic home theater as part of the initial room layout. Nothing really fancy, big screen, surround, and center channels. Maybe access to Videotex channels or even to the new products from AT&T, although I think that we might have to wait toward the very end of the decade for the required infrastructure to emerge everywhere.

As far as new audio media are concerned, the customers will decide what new format they will accept and which one they will reject and the decision will surprise even the most informed industry insiders . . . Remember that Beta was the better format, better price, better sound, smaller shell, more hardware available, and look at what happened . . . Just because someone was able to convince the customers that a longer recording time was needed?!!

In a nutshell, that is where I see our industry turning for the next seven years. A better educated workforce and higher standards of quality from customers. This has already happened in the automobile industry where even basic models incorporate very good sound systems. The low end junk is gone because customers know that it was junk, and the same phenomenon will happen at all levels in the audio and video industry.



**DAVID M. BELLANCA**  
COMMUNICATION TASK GROUP  
BUFFALO, NEW YORK

As we previously stated in the last contact, with the increasing CPU

technology-based products emerging into home and conference room installations, we find the need for more on-site training to the end-users or clients.

We have been witness to many sale-only oriented companies going out of business in the past two years. Without a knowledgeable sales staff of professionals able to use each product that is sold, many more companies will face the hard times that are currently a problem for this industry.

CTGI can fortunately say that these problems have not affected us. In fact, this year's sales have already exceeded last year's in just the first six months. We feel this is due mainly to the staff knowledge of products and the proper placement of these products in the field. One fact is for sure: the end client must be able to use any new products with confidence and speed.

Box sale houses are also going to suffer greatly when all the federal and state sales tax laws come into effect later this year and into 1994. In short, the one sales pitch most of the box houses have is that there is no sales tax when purchasing out of state. This will no longer be so. All purchasers will have to pay the sales tax due from the state of sale. So, basically, the sales force with the best overall product knowledge and usability will be strong in the upcoming years.

As for the direction of gear itself, CPU-based products with instant recall and mass media storage are the latest tech advancement. These products will enhance user ability to upgrade and expand systems in the future. Once again we stress that the companies with computer knowledge will become stronger.

One final area that has been expansive is that of Disability Act resolution. Many clients are now trying hard to comply with federal laws for hard of hearing, or hearing impaired enhancement systems. We have recently placed several large systems in the venues for



the World University Games being held right now in Buffalo.



**ED LOGSDON**  
**DAVID L. ADAMS ASSOCIATES**  
**DENVER, COLORADO**

The audio industry is lagging behind other electronics industries such as computers, medical, aerospace and military by at least eight years if not more. In the next few years, fully digital "local audio networks" which will

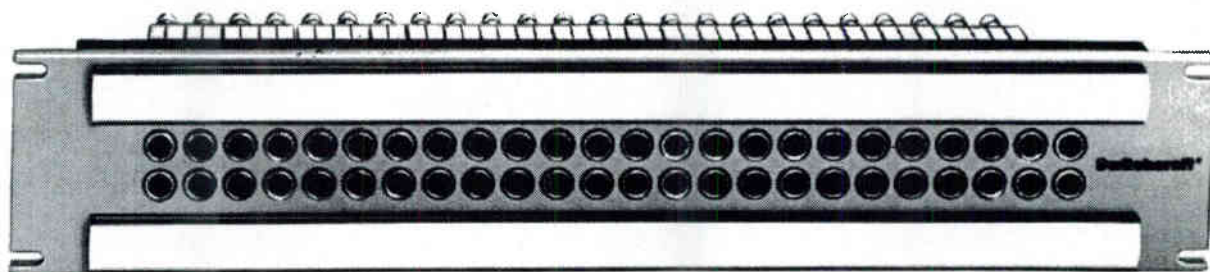
transport audio, video and control signals on a single twisted pair or optical fiber will become as common as LANs for computer systems. The use of fiber optic cable in place of copper will become more prevalent as the cost of fiberoptic interfaces (transmitters/receivers) decreases and the cost of copper increases.

The survival of new control technology depends on two items; can the various equipment manufacturers agree on a common protocol so that all of the pieces can be linked, and how easy it is to implement for the end user. No matter how sophisticated system requirements seem to be, humans respond better to straightforward, easy to understand, control systems. Just compare a microwave oven with nothing more than an electro-mechanical timer and a "go button," to a newer

microwave with alphanumeric input pad and a dozen or so different special cooking levels or settings. The earlier unit could easily be operated by someone who never operated a microwave before whereas the more "high-tech" microwave may be frustrating enough to resort to using your toaster oven instead.

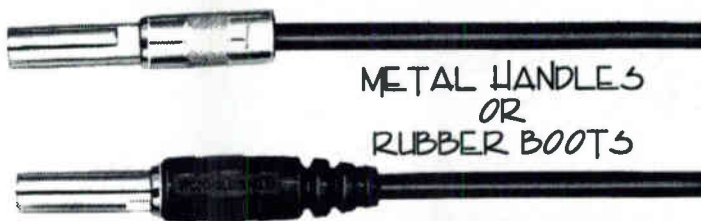
Loudspeaker technology seems to have gone full circle. Manufacturers such as EAW are developing full-range, horn loaded loudspeaker cabinets which offer better pattern control over a wider range of frequencies. The use of coaxially mounted devices is again showing up in new loudspeaker designs. These concepts are similar to earlier loudspeaker developments except the cabinet sizes have been reduced and power handling capabilities have increased dramatically. ■

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# The Summer Consumer Electronics Show

*Useful Technology in Chicago*

BY ROB BAUM

It seems that there is an endless succession of trade shows. Before I catch up with my work from the last trip, the next one is coming up. There are just too many shows. I guess I am not alone, as the consumer electronics industry has made it clear that the Summer Consumer Electronics Show is one show that a lot of people would rather do without. For the last few years, the big audio and video manufacturers have been progressively dropping out of the summer show. These are tough times for the big Japanese companies, with quite a few established brands disappearing from the U.S. market. Perhaps you remember Akai consumer products, now gone from the U.S. market; certainly NEC is a heavy duty player, but they no longer market color TVs in the U.S. And Yamaha is recently gone from auto sound, while just before the CES Alpine pulled out of cellular phones and dropped distribution of the high-end audio line Luxman. I could go on, but you get the idea. It is not really that the show has a problem, more like the consumer audio/video industry,

and Japan in particular. It just costs too much to make the stuff in Japan, and then have to give it away for peanuts here in the cut-throat U.S. market. And the yen/dollar situation is the worst it has ever been. Auto sound won the "best boycott of the show," while high-end audio at the Hilton got the "most improved attendance" award.



*Rob Baum and RCA spokes-dogs Nipper and Chipper discussing RCA woofers.*

Like NAMM, which changed the format and date of their summer event, the EIA and CES show management has tried to reshape the show to the changing industry. A subset of the

show, the Personal Communications and Computing Show, is representative of the new categories of consumer products. Cellular phones, portable faxes, home office equipment, handheld personal assistant "artificial intelligence" computers and "communicators" — perhaps this is eating up the discretionary income of consumers that were buying NEC TVs, Akai tape decks and Luxman amplifiers in years past.


## HOME THEATER

High-end audio was displayed in the Chicago Hilton and both exhibitor participation and attendance was strong. As always, the quality of some equipment was very high (as were the prices). The most notable development in the high end market for sound contractors is still the shift toward the home theater market. There are several pieces of gear required for home theater in my opinion: a surround sound decoder (Dolby Pro Logic or THX), large video display, often of widescreen proportions (direct view or projection), surround speakers, subwoofers, and extra amps. Surround sound decoders are sometimes built in to receivers or preamps, as in the NAD 910.

In an outstanding display of cost-no-object home theater, a mostly Cello

---

*Rob Baum is a Mechanical Engineer whose professional experience includes CBS Records and Apogee Sound. Rob works for Menlo Scientific and consults for the audio industry.*



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# In Chicago — and Elsewhere



1

1  
The combination of TTI's Turbo Duo video entertainment system (right) and BMB's Karaoke Ninja (left) create a home entertainment system for music, digitalk video games and karaoke.



2

2  
JVC's NV-55BX4 55-inch wide screen 16:9 rear projection television.



3

3  
From Bogen Communications, Friday — The Personal/Office Receptionist.

system was on display. Cello electronics and speakers, a Pioneer CLD-95 videodisc player, a Faroudja LD-100 line doubler that doubles the apparent vertical resolution of the picture (\$14,950), a tweaked AmPro 4200 industrial high resolution projector (\$35,000), and a 10-foot wide Stewart Filmscreen Studiotek 130 screen were all in a room seating about 40. The surround sound decoder was a Lexicon CP-3. No apologies were needed for the standard NTSC videodisc signal: It looked very bright, detailed and stable. In fact, this was the best large image I have ever seen.

Note that the best way to set up and check a home theater system, short of having a rack of \$10,000 worth of video gear on site, is to use the meticulously compiled laser disc "A Reference Standard" (\$70), put together by Joe Kane, for Reference Recordings (San Francisco, CA). I have a copy and will take

a closer look in an upcoming issue of Sound & Communications.

Dolby or THX surround sound typically uses six speakers (front left, center, right, at least two surround speakers, and a subwoofer). The demand for all these speakers has brought out the heavy-hitters in high-end audio. Two

**No apologies were needed for the standard NTSC videodisc signal: It looked very bright, detailed and stable.**

true high end planar speaker firms featured in-wall and wall-mount versions of their excellent speakers for the home theater market. Apogee Acoustics (Randolph, MA, not the Apogee Sound of Petaluma, CA), manufacturer of full range ribbon loudspeakers, dis-

played the Ribbon-Wall, which uses a conventional woofer. Martin-Logan showed the electrostatic Stylos \$2750/pr and Logos center channel \$1700. More modestly priced surround speakers were displayed also, such as the Alpha, at \$200/pr, from PSB of Pickering, Ontario.

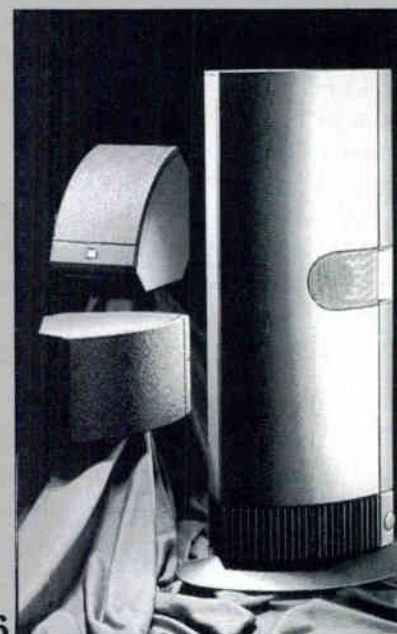
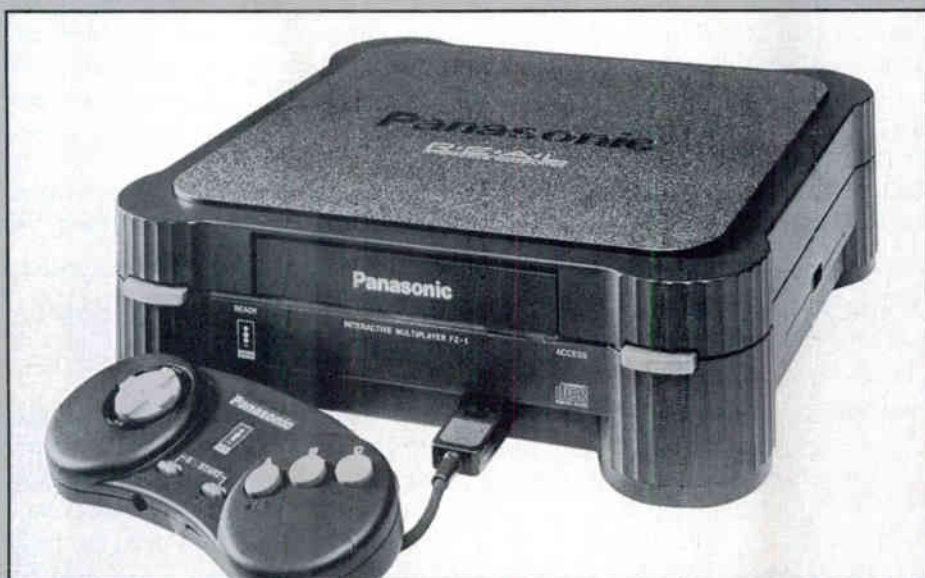
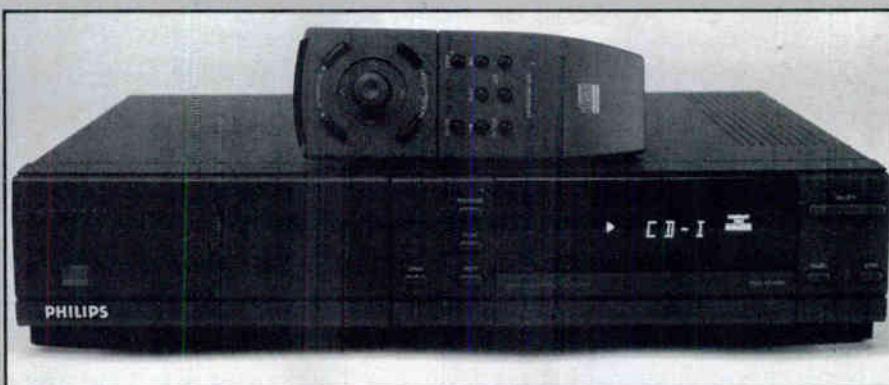
Sonance, the original hi-fi in-wall speaker manufacturer, showed its extended line which now includes easy-mount systems ("Flex-Bars") for standard retrofit installs. The installer cuts the appropriate hole in the drywall, angles the speaker in, and tightens the screws on the baffle. The Flex-Bars and the baffle firmly sandwich the drywall and hold the speaker in place. Sonance also has developed the STS-1 Staple Template, which is really a guide for the sheet rocker. The STS-1 is stapled across studs or joists, has centering marks and even directions for the drywall, imprinted in English

# during CES

4  
*Philips' CD-Interactive player.*

5  
*Panasonic's 3DO Interactive Multiplayer.*

6  
*From JBL's Sound Effects wireless home theater system, the BassWave and a pair of SAT 3s.*



and Spanish. The drywall makes the indicated cutout and the installer mounts the speaker like an ordinary retrofit job.

All those extra speakers require additional channels of amplification. Multi-channel amps are suitable for home theater as well as multi-zone audio systems. The NAD 906 (6/5/4 channel amp, 30 W x 6, \$650 list) is a modestly powered multi-channel amp. Proton displayed a six-channel amp, the AA-1600 (60 W x 6, \$700 list).

Parasound which is strong in both residential installations and high-end audio, showed its new THX-certified multi-channel amp, the HCA-1206 (6/5/4 channel amp, 120 W x 6, \$1800 list). Many of Parasound's amplifiers have been designed by audio engineer John Curl, best known in pro audio for having worked on the early development of Meyer Sound's electronics.

Subwoofers is a rapidly growing

product category, driven by home theater. Pro firms like Klipsch (powered subs) have gotten into the act, as well as hi-fi stalwart Fried of transmission-line fame. Parasound displayed the GMAS-18 subwoofer. The 18-inch sub comes in consumer and contractor configurations complete with a rack-mount 800 W amplifier with built in

## **All those extra speakers require additional channels of amplification.**

crossover electronics and equalization. The GMAS 18 will be available using the proprietary AuraSound radially oriented neodymium magnet geometry driver which boasts a three-inch linear excursion underhung coil and an equally stunning price (about \$5000), as well as a less expensive ver-

sion with an enormous ferrite magnet and two-inch excursion.

## **FORMAT BATTLES**

If you haven't heard, Minidisc or MD is the new format developed by Sony that uses a mini-CD. It is not compatible with conventional CD players, is expensive (\$500+ for a personal portable player, to \$700+ for record/playback models). Of course, this is still one tenth the price of a CD-R recorder! Considering that MD is still in the critical market acceptance stage, it was surprising that Sony was not exhibiting. But Sony has taken a low profile for the last few summer CES shows.

Sanyo took an aggressive stance on MD at the show, although they have postponed their home MD record/playback deck. For club use ("discos"), I see MD as an attractive media. The combination of the electronic

View of McCormick North exhibits at Summer CES.



shock buffer memory, almost instant start and 1 second track access, in conjunction with the recording capability, has real application to club installations. The portable models just won't make it in commercial installations, and none of the suppliers seem to be in a rush to bring out a home deck, although Sony introduced a MD broadcast cart machine at the NAB show. In fact, postponement has been a popular word in the MD vocabulary, with Denon delaying its portable MD player for another six months. The reason given is the very limited number of prerecorded MD discs, as well as the high price of Minidiscs. The

Minidisc blanks cost a fortune also, with pricing being about \$15+!

Yet, if I were to be betting on whether MD or DCC will survive, I would go with MD. DCC has got some tough problems, including fabrication and life problems with their 9 track thin film head. Imagine trying to align a 9 track head with the thin tape width of a cassette on a consumer tape machine! The tape duplicators are not too

happy about DCC, and prerecorded tapes are going to be expensive. The high retail price, about \$1,000, will limit consumer acceptance until the price comes down, but the semi-pro home studio and club users are not going to like the long track access time of the first crop of products, nor the second or so interruption when the tape reverses. Compare this with at least an hour of straight recording and

### The American Loudspeaker Manufacturers Association (ALMA) Speaker Workshop at the CES

By Mike Klasco


While 50,000 retailers journey through the CES show, various special interest groups also use the show as a meeting place. One such group that I am sure almost none of our readers is familiar with, even though their work influences the quality of all your jobs, is ALMA — The American Loudspeaker Manufacturers Association. ALMA consists of the companies that fabricate the baskets, cones, voice coils, etc. as well as the other companies that glue these parts together. This year ALMA held an educational workshop on Loudspeaker Thermodynamics. This is the first in a series of educational workshops for speaker engineers sponsored by ALMA. This workshop was held at the summer CES in Chicago and focused on improving the power handling of loudspeakers.

The workshop addressed materials and techniques that are now available to aid the speaker engineer. Also discussed was how speaker engineers can increase excursion, increase thermal power handling, stabilize performance characteristics at higher sound levels, and improve reliability. Specific


solutions such as bobbins that are thermally conductive but not electrically conductive, high temperature voice coil wire insulation and adhesives, new magnetic geometry for high excursion linear travel, ferrofluids for woofers, high heat emissivity plating techniques, and other fabrication and materials solutions were explored. Additionally, test and measurement procedures were demonstrated using the Bell Labs/Ariel SYSid acoustic analyzer to objectively quantify these enhancements.

Industry suppliers were invited to comment and supplement these overviews. Speakers included David Clark, a consultant from DLC Designs and one of the developers of one of a new EIA (Electronic Industries Association) power handling test procedure; Steve Tartarunis of Ferrofluidics Corporation, who spoke on power compression testing and measurement of spectral contamination; and Anil Kohi of Dupont, who discussed Nomex cones and domes. These talks were followed by comments, questions and discussions by the workshop participants.

For further information on ALMA, contact Andy Larsen at (708) 255-3003.




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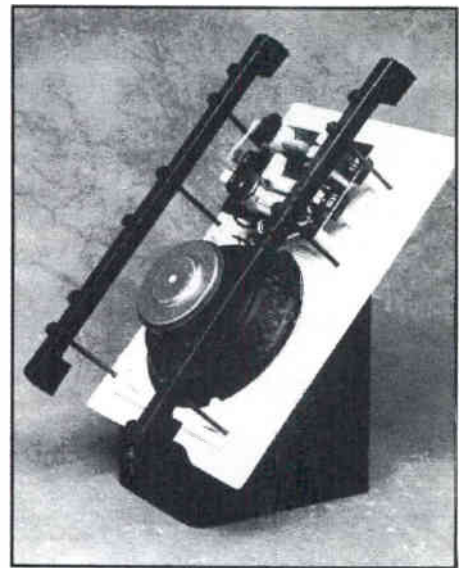
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1 second access time of MD, not to mention that MD is a non-contact medium, free of tape and head wear. And you will not ever have to worry about your irreplaceable master unraveling tape into the mechanism! On the other hand, DCC is backward compatible with analog cassettes, totally immune to shock, and provides fidelity

beyond what is needed for any commercial installation, both in the digital record/playback as well as the analog playback mode, better than any conventional cassette deck. For that matter, MD also exceeds any requirements of any commercial job, and at better than 80 dB S/N is within a few dB of DCC.



*Sonance S3500 speaker with flex-bar brackets.*

## VIDEO

Consumer direct view TVs have been getting bigger, with higher resolution, and lower prices. Just a few years ago sets with 25-inch diagonal CRTs were pricey, but year by year the commodity pricing overtook 28-inch, and then 31-inch monitors. Mitsubishi has had the 35-inch direct view market to itself, but now Hitachi has moved in, and pricing is heading downward. At the moment, \$2,000 is the approximate retail for a 35-inch monitor. With the enormous quantities of 32-inch to 35-inch sets being produced, pricing for the large CRTs will come down and commercial installation products should eventually reflect this.

**Pricing for the large CRTs will come down and commercial installation products should eventually reflect this.**

RCA/Thomson was showing wide aspect ratio televisions, and although some other video suppliers have postponed introduction of this type of product, RCA is moving ahead. The early problems of the "enhanced resolution" video processing were not evident at RCA's display and these and other advances were detailed in an exclusive interview with RCA spokesdog, Nipper.

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## MULTIMEDIA AND CD

The activity in multimedia and CD is intense, but confusing. Kodak has not gotten the market awareness they had hoped for with their photo CD system. Film is developed and transferred to CD media that can be played back by the Kodak CD player (of course the player must be connected to a TV). The photo CD system also can play

### The photo CD system also can play conventional CDs through your sound system.

conventional CDs through your sound system. Kodak has dropped pricing down to where their photo CD players are only a few hundred dollars retail, comparable to conventional CD play-

ers. The Kodak PhotoCD images looked quite good.

But Kodak's products are lost in the noise of competing, incompatible CD technologies, such as CD+G which supplies the text and music for Karaoke addicts, JVC's new CD format which boasts video data compression for full motion video and audio on a CD (according to MPEG-1 standards), CD-I interactive CD for multimedia, CD-Rom, etc., etc. — and none of these special formats are compatible with each other! Yamaha's Gold Stan-

dard for higher performance multimedia audio is gaining acceptance with a number of companies.

## MULTI-ZONE SYSTEMS

Multiplex Technology showed their multi-room video system, Channel Plus. The system ties together all video sources, such as VCR, laser discs, satellite or unobtrusive in-wall closed circuit cameras. The cameras sold as part of the system mount directly into a double gang junction box and look more like motion detectors.



Denon's Karaoke system.



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Kodak's PhotoCD player PCD-5870.

Any video source may be selected from any TV just by switching channels, since each source is fed through the system on a channel not used by local broadcast or cable companies. Each TV can show something different. A videotape can be played throughout a house, with occasional switching to check internal or external security cameras, for example.

Xantech showed a large variety of modular building-blocks for custom installers of multi-zone audio and video systems. Among Xantech's many products was an in-wall learning key pad

### **A videotape can be played throughout a house, with occasional switching to check security cameras.**

controller ("Smart Pad", \$300 list). It is a microprocessor-based learning IR remote in a simple wall mounted key pad. The Smart pad connects to Xantech's control bus via three wires. After the keystrokes are entered on the Smart Pad, the microprocessor sends the appropriate DC command pulses down the wires to the connecting block, which repeats the commands using IR (infrared) LEDs. The advantage is that commands can be entered by keystroke in environments where IR sensors do not work, such as direct sunlight or bright, nearby incandescent lights.

A modestly priced CCTV security system was displayed by Tote Vision. Their \$799 retail audio/video security system, model HO-212, permits two-

way audio, comes with a 12-inch b/w monitor, and a 1/3-inch CCD camera with 16 mm "C" mount lens. Up to three more cameras can be switched from the monitor. Also shown was a video intercom, which lets a person see who is at the door before letting them in. With a two-way intercom, four-inch b/w screen, model HO-400 (\$750) uses existing doorbell wiring and is activated with a button.

### **CLEVER CONSUMER PRODUCTS**

Bogen is moving into consumer electronics with a nifty digital answering system called Friday (\$500/2-line, \$400/1-line, extra memory \$129). Designed for the home office and small business markets, Friday is basically a slick-looking 8-inch x 6-inch telephone answering system with four voice-mail boxes, call forwarding, fax/PC switch, and music-on-hold option in a well thought out package. The extra memory module increase digital stored message length from 18 to 36 minutes. Aside from home office applications, this product would also work for small commercial installations. Friday should be available by September.

Virtual Vision again displayed its slick looking sunglasses with a built in LCD display that appears to be a TV screen floating in space (\$900). Long waiting lines indicated strong trade and public interest. A wireless version is under development, opening up more possible applications, such as supplying captions to hearing-impaired movie theater patrons, or informative text in presentations, museums, or theme park rides.

### **PERSONAL COMMUNICATORS AND COMPUTERS**

One of the shows running concurrently within CES was the Personal Communications and Computing Show (PCC). The show collected the latest in portable, mobile and wireless PCC products with on-line services and service providers. Products like AT&T's pen-based wireless "communicator" computer were shown. By combining cellular phones, faxes, modems, pagers, electronic mail, pen-based portable computers, and ultimately voice and video messages,

### **The show collected the latest in portable, mobile and wireless PCC products.**

these communicators may evolve into an indispensable, universal mail box/computer. These products are in a stage of rapid development, and may very well be in all of our futures, but right now they are a little too clumsy and expensive for me.

Finally, one of the halls at the main convention center was filled with video games, some featuring interactive full motion video from CDs. While the technology is ambitious, the visual quality is jumpy and mediocre. I was also underwhelmed by the "multimedia" games at 3DO and competitive booths.

Will Summer CES survive? This year high-end audio voted *yes*, mainstream audio/video voted *no*, auto sound voted a resounding *no* and multimedia (games, etc.) voted *yes*, so stay tuned. ■

# World's most frequent flyer!



Model AT853R/W

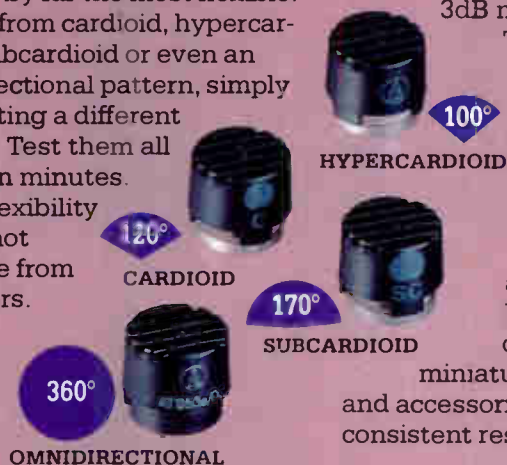
Shows Actual Size

Model AT853R

Sure you'll see other brands hanging around from time to time, but when it comes to self-supporting miniature condensers, the Audio-Technica AT853 series, now in its fourth generation, has been the overwhelming choice of both contractors and end users for years. The reason is simple: It works so well. And for some very important reasons.

## Full Choice of Pickup Patterns

When it comes to pickup pattern choice, the UniPoint® AT853 series is by far the most flexible. Choose from cardioid, hypercardioid, subcardioid or even an omnidirectional pattern, simply by inserting a different capsule. Test them all on-site in minutes. That's flexibility simply not available from the others.



## Quiet Please

Our advanced electronics and capsule design insure very low self-noise. Listen carefully to ours and to theirs. You'll *hear* theirs. And so will your critical customers.

## New AT853R High Output Remote Power Model

The standard AT853a output level is higher than most others. But the AT853R phantom-only model eliminates the battery compartment and offers up to 3dB more sensitivity.

Two more compromises avoided!

## Consistency, Consistency, Consistency

The AT853 series is part of a complete UniPoint system of matched miniature microphones and accessories. The result is consistent response, polar pat-

tern, and output from every microphone in the area. You get the same great sound above the choir, mounted on a lectern, or used to reinforce musical instruments. Sound system operation and EQ are simplified for superior, trouble-free day-to-day results.

## Very Refined Sound

Over the years we've been able to fine-tune every aspect of the AT853 series. You can readily hear the difference engineered into this tiny microphone. It's a difference that spells customer satisfaction and builds your good reputation.

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# The Beat Goes On

## *An Old Broadway Showplace Reinvents Itself As The Hippest Club In New York*

BY VAL DEMPSEY

**I**t started life as the Mathusek & Son Piano Factory in the late 1800s. After successive incarnations as a musical theater, a burlesque house, a porno movie theater, a strip joint, a Broadway theater (for the second time) and a first run movie theater, the former Minsky Theater on the corner of 47th Street and Broadway has emerged as the leader in New York's trend back to huge, over-the-top mega-clubs. Impresario Peter Gatién, who also owns the Limelight, one of Manhattan's longest-running after-dark success stories, along with the Palladium, USA and the soon-to-be-opened Tunnel, has turned the one-time factory into a five-level, 29,000 square foot play house where tourists and the "bridge-and-tunnel crowd" mingle with bizarrely dressed Manhattan club kids.

Gatién, whose flair for putting clubs together is matched only by his real estate savvy, picked up the building after a planned restaurant conversion fell through. "The landlord had gutted the building and put on a new roof," recalls USA's Operations Manager

*Val Dempsey is President of the contracting division at Seriously Sound Industries of Atlanta, Georgia; which he runs with his partners Lee Bicknell and David Lowell.*



*The dance floor at Club USA.*

Brian McQuiggen. "We put in new floors, and totally redecorated." USA was nearly a year in the making. Construction bills have been estimated as high as \$8 million.

The investment seems to be paying off handsomely. On any given night you can find up to 2,500 of Gotham's flashiest dressers and hippest partiers inside, hoping to get next to supermodels like Nicole Miller or Naomi Campbell, rappers like Marky

Mark, film stars such as Julia Roberts and Danny DeVito or all-around celebrities like Brooke Shields. The ropes outside are usually just as crowded, but if you can get past the first doorman (USA has eight), there's plenty to do besides scanning for fabulous faces. You might head upstairs to the cone-shaped, Thierry Mugler-designed V.I.P. room with its 60 foot ceilings. If the DJ should cue up a beat that grabs your feet, you can get down on the

# ARCHITECTURAL ACOUSTICS SOUND SOLUTION

PROJECT: CHURCH SANCTUARY



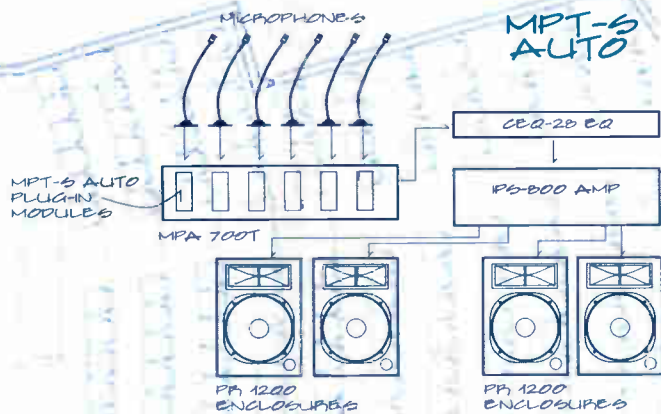
MPA 700T

## CLIENT'S REQUIREMENTS:

- ✓ ABILITY TO MIX 6 MICROPHONES WITHOUT AN OPERATOR
- ✓ BETTER AUDIO CLARITY

## SOLUTION:

- ✓ MPA 700T MODULAR MIXER
- ✓ (6) MPT-S AUTO + AUTOMATIC MIC MODULES
- ✓ PEAVEY CEQ-20R EQUALIZER
- ✓ PEAVEY PB 800 POWER AMP
- ✓ PEAVEY PB 1200 SPEAKER ENCLOSURES



Looking for the most innovative and cost-effective audio equipment for your permanent sound installation needs? May we suggest Architectural Acoustics, Peavey Electronics' comprehensive line of audio products that gives the professional sound contractor the winning edge he needs to compete in today's permanent installation industry. Supplying everything from state-of-the-art, 36-channel mixing consoles to steel-reinforced loudspeakers with built-in mounting points, Architectural Acoustics is ground zero when assessing your project requirements. Think of the AA advantage in terms of three operative words: **PERFORMANCE**, **VERSATILITY**, and **PROFIT**. Architectural Acoustics—the sound solution.

## PERFORMANCE

When it comes to **performance**, the MPA 700T and MPT-S Auto fit the bill. The MPA 700T is a 6-channel mixing system equipped with the requisite features to satisfy the most demanding installation requirements. Each channel has a level control, and the master section has low and high EQ controls. In addition, the MPA 700T features a separate program input with level controls, which may be used as an auxiliary input or seventh channel. A bicolor status LED indicates when signal is present or when clipping occurs. The MPT-S Auto is a mic-input module that enables you to turn a modular mixer / amplifier into an *automatic* mixer / amplifier. In conjunction with the MPA 700T, this handy plug-in module quickly solves your mixing dilemma.

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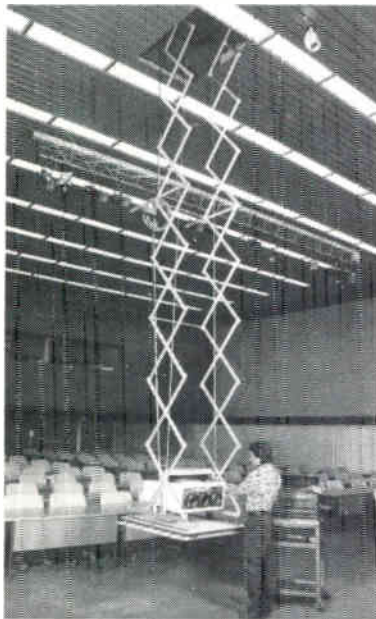
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- Speakers • Lighting • Other Equipment

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Patent Pending

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*The stage at Club USA has EAW KF850s flown on either side, tucked under the stage wings.*

dance floor in seven seconds flat — just hop on a burlap sack for a thrill ride through a 96 foot strobe-lit tube that drops 25 feet from the V.I.P. level to the main dance floor. If you suddenly don't feel like dancing, check out the futuristic billboards designed by Eric Goode and Serge Becker, who made Area NY's hottest club of the '80s. While waiting for the opportunity to purchase liquid refreshments, you can examine the sex toys, fake Rolexes and medical implements displayed under glass at the bar, whose neon sign reads JEWELRY FILM CIGARETTES SEX CANDY ADULT BOOKS CURRENCY SUNGLASSES MAGAZINES I.D. CARDS. Sip your drink while lounging on black leather body forms designed by Jean-Paul Gaultier. Or take the elevator down to the Big Bottom room and mellow out. The overall concept? "Times Square meets 'Blade Runner,'" according to owner Peter Gatien.

Of course, top-quality sound and lighting systems are the engines that drive any club, no matter what the theme. "I've been running clubs all my life," Brian McQuiggen says, "and I used to do all the sound and lights myself. But with four clubs running at once, we're too busy to handle it ourselves any more." We were pleased to

have our bid and design proposal accepted, but also a tiny bit nervous. After all, this is the highest-profile venue in the media capital of the world. If we failed to deliver the kind of impact Peter and Brian were looking for, the whole world would know about it.

Peter Gatien was more confident than we were. Before he became the king of Manhattan clubs, he owned and operated Limelights in Miami and in Atlanta, our home base. Seriously Sound and the Gatien organization first worked together on an Atlanta supper club called Petrus. They knew our approach to sound and lighting design, and were sure it would complement USA's concept.

Our main challenge was the 1,700-capacity main dance room. It's basically a short-throw room, but there is a balcony with space underneath. On the opposite end is a twelve-foot-deep stage, which is used for fashion shows, track acts and even live concerts. The sound system would have to function equally well for both dance music and a variety of live acts — Prince has already played a surprise set at USA, and the New Year's Eve headliners were Cab Calloway and drag queen RuPaul.

To accommodate live music, this

# ARCHITECTURAL ACOUSTICS SOUND SOLUTION

PROJECT: SPORTS BAR /  
RESTAURANT



PZS 80



PR 605T

ALM 166  
MICROPHONES

PR 605T X 19  
ENCLOSURES



PZS 80  
ZONE MIXER/AMP



JUKE BOX



TAPE PLAYER



TAPE PLAYER

## CLIENT'S REQUIREMENTS:

- ✓ DIFFERENT MUSIC STYLES TO DINING ROOM, BAR AND ARCADE
- ✓ TO BE ABLE TO PAGE INTO DIFFERENT AREAS

## SOLUTION:

- ✓ PZS 80 ZONE MIXER/AMPLIFIER
- ✓ (19) PR 605T TWO-WAY, HI-FIDELITY ENCLOSURES WITH ON BOARD TRANSFORMER
- ✓ (2) PEAVEY ALM 166 GOOSENECK MICS

## VERSATILITY

Need *versatility* in your permanent sound installation project? Consider the PZS™ 80 multi-zone mixer and PR™ 605T speakers. The PZS 80 is a 5-channel mixing system with assignment capability to 4 independent zones. Each channel offers low and high EQ, level control, and zone-assignment switching. Channels 1 and 2 include low-Z mic inputs and paging capability, while channels 3-5 may be used for various music sources. The PZS 80 eliminates zoning balance problems by providing master output level controls for each zone. LEDs appear on each of the 4 zone master controls to indicate activity and clipping, enabling you to keep each zone within its output limits. Connect PR 605T speakers in strategic spots, and you can fill virtually any acoustic space with sonic pleasures.



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# CLUB READY

Gem Sound. Your single source for quality, budget-priced club sound products.



### Professional DJ Turntables.

Gem Sound offers a choice of direct-drive or belt-drive manual turntables. Both models feature sliding pitch controls, servo-mechanical braking, shock isolating feet and remote start for hands-free start and stop operation.

### High-output Power Amplifiers.

Whether its the economical PA500 rated at 125 watts per channel, or our top-of-the-line PA1555 with MOSFET technology and bridgeable mono output, all



Gem Sound power amps feature fan cooling for safe, dependable operation.

### Mixers, Equalizers and Crossovers.

Gem Sound offers a full line of DJ mixers with features and functions to satisfy virtually any program mixing application. For signal processing, Gem Sound has a complete line of 19" rack mountable mono and stereo and 1/3 octave band equalizers and stereo crossovers.



### Bi-amp and Full Range Speakers.

Gem Sound's *Producer Series* is designed for demanding club and mobile sound applications. The E12T features a 12" Electro-Voice bass driver and Motorola high frequency speaker components. For high output, multi-bi-amp applications, E15T and E215T are offered on the feature genuine Electro-Voice 15" bass drivers and Motorola tweeters.



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*USA's huge, over-the-top approach is graphically emphasized, while the sound is not as obvious.*

room is designed as a standard concert setup, with the speakers hung on either side of the stage. We didn't have to put in much thought before deciding that EAW KF850 Virtual Array systems would be flown next to the stage; Eastern Acoustic Works is our preferred line of loudspeaker systems for professional applications. EAW's Virtual Array Technology has a number of advantages for club installations. VA enclosures are quite compact for such high-output systems (the KF850, for instance, can deliver 135 dB peaks). KF850s are used successfully by everyone from the Boston Symphony to 10,000 Maniacs to The Cult, so we knew they would fit perfectly with USA's eclectic music policy, which embraces everything from retro, progressive and alternative rock to techno and house. The KF850s wide acceptance on concert touring riders was another plus factor, since live acts coming into the room would be comfortable with the system.

We hung four KF850s in 2 x 2 arrays on either side of the stage. Slamming the dance floor so hard, the sound carries under the balcony without any problem. Although we had to reinforce the ceiling to carry the weight of the

arrays, the oversized scale of USA's graphics actually makes the KF850s look quite small. You have to search to find them tucked under the stage wings.

With the main portion of the musical spectrum well taken care of, we turned our attention to the all-important bottom end. A club without solid, punchy bass is a club without dancers, so we listened to a lot of subwoofers before deciding what to install. EAW has been known for innovative low frequency systems for over two decades, and he continues to produce systems that are on the cutting edge of technology. The original installation included four EAW BH882 double-18-inch bass horns built under the stage. But when it comes to club sound, particularly a mega-club like USA, we like to make a *big* impression. Fortunately EAW introduced a system that was just what we were looking for: the BH852 double-15-inch bass horn. As soon as four of these horn-loaded low frequency cabinets joined the BH882 "Berthas" underneath the stage, we had the 150 Hz hump that a dance crowd wants to feel. Brian McQuiggen is very impressed with the performance of the EAW system. "I had



# ARCHITECTURAL ACOUSTICS SOUND SOLUTION



## PROJECT: DEPARTMENT STORE RENOVATION

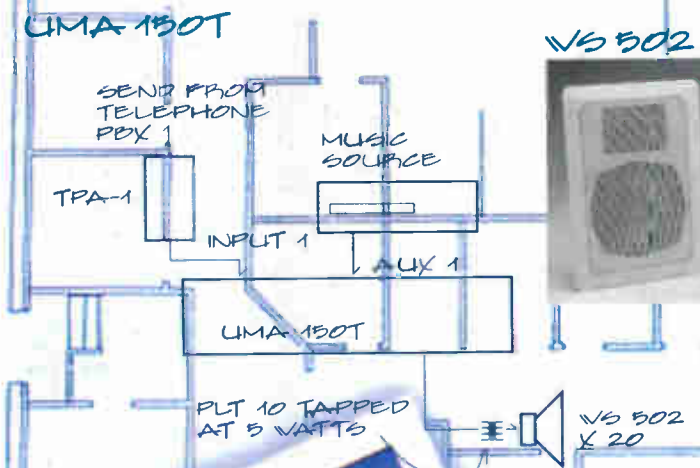


### CLIENT'S REQUIREMENTS:

- ✓ TO PAGE (VIA TELEPHONE OR MICROPHONE) THE SALES FLOOR FROM ANY DEPARTMENT
- ✓ BACKGROUND MUSIC (MUSIC ON HOLD)
- ✓ PAGE NEEDS TO MUTE MUSIC

### SOLUTION:

- ✓ UMA 150T w/ PEAVEY TPA-1 TELEPHONE PAGING ADAPTOR
- ✓ PEAVEY PLT 10 TRANSFORMERS
- ✓ (20) WS 502 FLUSH MOUNT SPEAKERS



## PROFIT

The **profit** potential inherent in Architectural Acoustics' extensive line of high-quality, reliable audio equipment is **considerable**. **Case in point:** the UMA<sup>™</sup> 150T. The 150T is a 4-input mixer / amplifier that features 2-band active EQ, contour select, external master volume capability, selectable automatic muting of AUX 1 and / or AUX 2, 600-ohm balanced output, and AC convenience outlet. This unit supplies 150 watts RMS at 4 or 8 ohms, or to a constant line of 25 or 70 volts. An optional rack-mount kit is available. **Case in point:** the WS<sup>™</sup> 502. The 502 is a full-range, 2-way speaker system designed for use in wall or ceiling-mount situations. A 5 1/4-inch polypropylene woofer and 1-inch dome tweeter combine to provide sonic clarity in a convenient package. The WS 502 delivers 50 watts continuous power into 8 ohms. Frequency response is from 68 Hz to 17 kHz, with a sensitivity of 88 dB at 1 meter with 1 watt input. **It's simple arithmetic: UMA 150T plus WS 502 equals profit margin.**

MADE IN THE U.S.A.

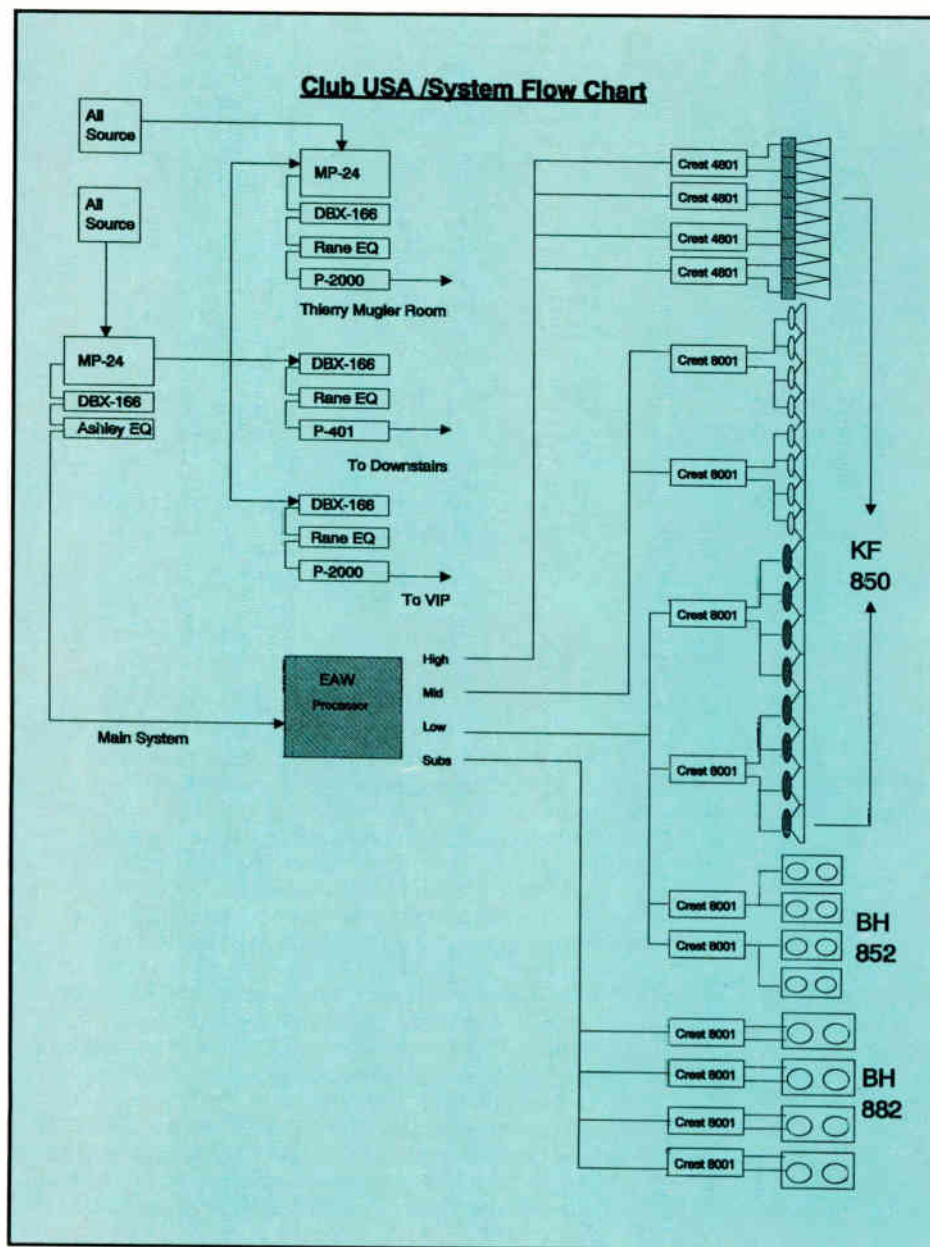
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Club USA system flow chart.

never used EAW because I thought it was too expensive," he says. "But Seriously Sound delivered it as part of a package that fit our budget."

Seriously Sound installations are designed with plenty of power and headroom. We chose Crest 8001 amplifiers to drive the sub-bass, low frequency and midrange sections of the main dance floor system, with Crest 4801s for the HF compression drivers.

Signal processors include dbx com-

pressors and noise gates along with Ashly and Rane equalizers. All the processing and power amplifiers are housed in the DJ booth. The Rane MP24 DJ Mixer can play any type of source material the DJ wants, from the Technics 1200 turntable, Tascam tape decks and CD players. The stage is ready to go live at any moment, with a snake that can be patched into the main and monitor boards.

The electronics may be considered

expensive for a club installation, especially the power amps. But we felt that the headroom and reliability of Crest Professional Series amplifiers were worth the initial investment. Under-engineering a system may save money in the beginning, but it leads to costly maintenance and problems down the line.

Elsewhere in USA we used Yorkville speakers and amplifiers. Elite EX2000 speakers and AP3000 amplifiers are installed in the Thierry Mugler V.I.P. Room upstairs, along with SW800 subwoofers for extra punch. In the Big Bottom lounge downstairs, we installed EX401s.

Club USA's lighting is as topnotch as the rest of the facilities. There are 16 Intellibeams along with Multi-Rays, DataFlashes, three F100 foggers and a total of 96 500 Watt and 1000 Watt PAR64s — plenty of high-end gear for dramatic effects on the Leprechaun 1536 console. Dave Smith, our Chief Engineer, is a lighting designer, programmer and rigger, so he was involved in every aspect of the lighting installation. He not only designed the lighting system, he set up the trusses and wrote the lighting programs. A lot of ideas were pitched and a lot of people contributed before the final design emerged, particularly Steve Dunnington, who engineered USA's tubular slide and consulted on the lighting rigging.

When Tunnel opens, Peter Gatien expects to be entertaining roughly 50,000 people every week — 8,000 of them in USA alone. No wonder he's been called "New York's reigning king of megaclubs." Seriously Sound is proud to have won the assignment to design and install Club USA's sound and lighting systems. I think the success of USA proves the validity of our ideas and the correctness of our equipment choices, but we learn something on every job, and each one "could be better." We are eager to put the lessons we learned while working on USA to use on future projects. ■

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THEY DO IT

BETTER.

THEY DO IT

FOR LESS.

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Unique Interactive Knee Control circuitry combines the musicality of soft knee compression with comprehensive hard knee control. Special Interactive Gain Control Peak Limiter circuitry enables simultaneous Clipper and Program limiter functions while serving as a zero attack, distortion-free absolute gain threshold.

**INTELLIGATE** The Intelligate is an Expander/Gate/Ducker with Ultra Transient Response circuitry for instantaneous attack. Proprietary high performance Class A VCAs provide exceptional audio quality. Precise key filters permit frequency-sensitive keying.

Like the Composer, the Intelligate includes Interactive Ratio Control Expander circuitry to eliminate "chatter" on or around threshold. Both units feature servo-balanced Neutrik 1/4" and XLR inputs and outputs, precise metering and a 5 year warranty.

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# The Club Primer

## *Understanding The Application In Order To Design And Spec*

**S**tanton Electronics is in the process of publishing manual for "club" sound systems. We thought the contents would be interesting to our readers, and have received permission to reprint some of the manuscript, which follows.

— *Mike Klasco*

The design and specification of a sound system for club use requires a through understanding of the application of this equipment. Many issues, such as size, cost, reliability, not to mention sound quality, must be carefully considered.

If a mobile system is being designed, you must make sure that the equipment will fit into your customer's transportation, that it is not too heavy to handle for the crew (or lack of crew), and that the components and the cases will survive the wear and tear of transportation.

Permanent installation club sound systems have their own special problems, especially speaker hanging considerations, location, and aiming, in addition to complementing the room's ceiling height and acoustics.

This article is intended to help the reader determine how to divide the equipment budget, select the components, set up the equipment and even trouble-shoot the installation.

### SYSTEM DESIGN AND THE BUDGET

#### *Starter Systems*

A "starter" system should not be a "throw-away." Remember, with a very limited budget, your customer will want to eventually expand his or her system — not replace it.

With a modest budget of about \$3,500, about half should be spent on the "front-end," that is, the turntables, mixer, mic and headphone, and console. The remaining money should be split 60/40 between a pair of speakers and an amplifier. Absolutely forget about digital sampling, signal processing, subwoofers and other non-essential items — it is bad enough that you do not have enough budget to supply a backup set of amplifier/speakers. The immediate upgrade path should be a second amplifier and a second set of speakers.

With a second set of speakers your customer can take on bigger jobs, yet with the smaller jobs they will still have the flexibility of not taking all of the equipment. In selecting the second set of speakers, you should take into consideration a number of goals. Ideally the second set should be from the same speaker product line as the first speakers so the overall sound characteristic is consistent. But you might want to have speakers of different cov-

erage (dispersion) characteristics. For example, medium throw coverage for when the speakers are setup on the shorter wall, and a wide coverage speaker (120 degrees) for when the speakers are set up along the long wall of the room. When using both sets of speakers, you will want to follow the same recommendations, with one set of speakers along the front of the room, and the second set along the side walls. This will provide more even sound coverage, not blast the dancers toward the front, yet allow the audience to escape to the rear when they want to get away from the most intense action.

Regardless of the size of job, you will always want to take both amplifiers in order to insure redundancy.

<b>\$3,500 BUDGET SYSTEM (RETAIL)</b>	
<b>Front-End</b>	<b>Amplifier/Speaker</b>
\$400 mixer	\$1250 speaker system
\$700 turntables	\$750 amplifier
+ cartridges	
\$100 mic and headphone	
\$300 case	
<b>Up-Grade Path</b>	
\$2000 for second amplifier/speakers	

### MEDIUM SIZE SYSTEMS

With a \$10,000 budget as a target, lets look at how this might be spent. About one-third can be on the front end of the system: the mixer, signal sources (turntable, mic, cassette

deck). One-thousand dollars of the front end budget should go for the mixer, which would be ten percent of the total budget. In this price range, you should expect to get top-quality construction, absolutely clean sound quality, and you might want to have signal processing features such as sampling and effects such as the Apex Exciter.

\$10,000 SYSTEM	
<b>Front-end</b>	<b>Amplifiers-Speakers</b>
\$1000 mixer	\$4000 speakers
\$900 turntables + cartridges	\$3000 amplifiers
\$300 mic, headphone, etc.	
\$500 case or console	
\$300 cassette deck	
<b>Upgrade Path</b>	
\$1700 for double transport CD player	

The amplifier and speakers should represent the remaining investment, with the speakers probably costing a

little more than the amplifiers. Should you buy one big amplifier or two medium amplifiers to power two sets of speakers? Consider this situation: would you rather be in a plane with two engines or in a single engine plane when an engine fails? Additionally, multiple sets of speakers on a single amplifier result in low impedance loads, which further reduce amplifier reliability. Regardless of the brand of power amplifier, or how robust its construction technique, etc., there is no better safety factor for the DJ than redundancy, which means a system with multiple amplifiers.

### SELECTION OF AUDIO COMPONENTS

#### *The Turntable*

The turntable must perform both as a mixing tool for the DJ as well as a

critical component in the sound system. For the DJ, the turntable must come up to speed quickly, and the tonearm must be easy to handle and cue with. Other desirable characteristics include defeatable quartz lock so the DJ does not have to fight the motor control when he manipulates the platter, and easy to operate controls. An example of products that "miss the boat" are turntables with pushbutton speed controls that require the DJ to repetitively press the speed control button until the correct speed is reached, rather than the more common slide control that is placed at the desired speed and the DJ can go on to other matters while the turntable catches up.

But the turntable must also satisfy the technical requirements of the sound system, and these parameters

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Locating the needle (stylus) at the desired cut is a skill that the DJ must develop. To help them visually “sight” the tip of the needle, a fluorescent stylus housing is helpful.

Many mixing techniques require that the sound characteristics for both turntables are closely matched, and ideally the phonograph cartridges should be bought as matched pairs, factory tested to have the same output

levels, channel separation, and frequency response.

The cartridge body should be metal, and connected to the turntable grounding system in the headshell to reduce hum pickup. The stylus is located on the end of a thin metal alloy tube, the cantilever, which carries the audio signal in the record grooves back to the cartridge. The wall thickness must be thin enough to accurately respond to the groove modulations, but not so thin that backcueing or heavy handling will damage the cantilever. (For instance, Stanton offers the 500 AL for the most extreme heavy duty styles of turntable cueing techniques, the “industry standard” 680EL for normal DJ mixing techniques, and the 890 AL for the most critical sound quality applications.)

### THE MIXER

#### *Low-End Mixers:*

Today the local audio and “MI” (Musical Instrument) stores are filled with many “wanna-be” mixers. These products are designed on a knobs-per-dollar basis, with all the product’s budget on the front panel, rather than in the guts. It is very seductive to sell the most impressive looking mixer at the lowest price. But remember, the club goers only judge your jobs by what it hears — not what the DJ sees in the booth. Better you invest your customer’s money in a well laid out mixer with low distortion, quality parts and good design, than in a mixer where the sound quality and construction has been compromised so that a few more features could be offered. Since the mixer is the most critical component



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in the sound system, it does not make sense to try to save \$100 or so in this part of the system. Even if only \$2,000 is being spent on a starter system, an extra \$100 on the mixer is only five percent, probably less than the sales tax!

Many mixers look alike, appear to have similar features and specs, yet carry a wide range of price tags. Are the more expensive mixers a rip-off? While it is impossible here to discuss detailed engineering criteria for reliable and quality mixers, we will touch on the slide control as a good example. When selecting the critical input slide controls and transition slide, the life of these parts can be specified, with long life controls (higher number of uses before failure) costing proportionally more. Slides on a DJ mixer are subjected to much greater mechanical stress than normal hi-fi equipment, and even the shaft length and knob design can affect reliability. Dust protection is another factor, with the cheaper manufacturers leaving this out completely, while fabric dust protection is less effective with use. Rubber seals for the controls is the best, but most expensive approach. While it is unlikely that many DJs would know this when they purchase their first mixer, a reputable manufacturer designs for long term reliability, while the less quality oriented manufacturer designs for features that sell the product off the sales floor, and good luck to the unsophisticated buyer.

**Medium-Priced Mixers and High-End Mixers:**

A mixer should be a well thought-out balance of good construction and performance with enough flexibility and features to satisfy the serious DJ. Layout should be balanced, with controls where the DJ would expect them to be.

**Main Inputs:**

The most popular format is level controls for each of the main inputs which work with a cross fader. Regardless of how reliable a slide control is

used for the cross fader or transition slide, it should be user-replaceable without having to remove the front panel. If the DJ's style includes Transformer Switching scratch techniques, then look for a pushbutton to either side of the transition cross fader slide that enables this effect. A low cut switch for each mic can help control popping and boominess when the DJ

talks too close to the mic. For the DJ who uses the mic heavily, look for a mic talkover (level ducking circuit) and separate tone controls on the mic inputs.

**Program Equalizer:**

A single slider should control both left and right channels. This is the preferred approach, as the DJ rarely wants to upset the tonal balance be-

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Channel	Frequency
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B15	949.000
B21	947.750
B22	949.750
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B24	951.250
B25	948.500
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tween channels — this will also degrade the stereo image. Usually, when separate sliders are provided for each channel, a knobs-per-dollar mentality has taken control of the design, rather than what would work best for the DJ.

### *Cue System:*

The cue system should be easy to use. Inputs should be pushbutton selectable. The headphone output should have enough level to drive most any low or high impedance headphone to full output.

### *Sound Quality and Construction:*

The sound quality must be excellent, with noise and distortion inaudible. The mixer should be able to drive a number of power amps that are on a long cable without distortion or overload. Construction and parts quality are critical and should be excellent. The front panel should be thick with a subchassis panel behind it both for mechanical strength and protection of the circuit boards and components inside the chassis. The operation and feel of all the controls should be of high quality. Inside, the circuit board layout and components should be high-grade and wiring and soldering should have good workmanship. Neat layout helps keep repairs less expensive.

What about outboard power supplies? Here are the trade-offs:

### *For:*

- A mixer that keeps the power transformer outside the chassis will always have less hum, especially when playing records.

- The transformer adds too much depth to the mixer, making installation into portable consoles a problem.

### *Against:*

- With a detachable power supply that plugs into the wall socket, you are absolutely dead if you forget to take the gizmo. No power supply — no sound.

- An outboard power supply is seen as cheapening the image of the mixer.

The reliability of the mixer is the most important consideration. A good, reliable mixer is the most critical in-

vestment — your customer can always add outboard processors later. But with a low-priced multi-feature/no guts mixer, if it fails, they are down for the count! The cost of the sound system going out during a gig is not only in money, but also to reputation as well as intense mental stress.

### *Signal Processing In Mixers:*

#### **DIGITAL SAMPLERS**

A sampler is an electronic tape recorder, except that instead of recording to tape, the music is stored onto digital memory. A sampler can play back pre-recorded sounds. "Snapshots" of sounds can be captured and manipulated. DJs can use samplers for pulling off sounds of a record in play for looping or stuttering effects. For DJ mixers with built-in samplers, four to eight seconds (or more) of music can be sampled. The less expensive quality mixers with built-in samplers have only 12 bit systems which are a little noisy, but workable, while the better units have 16 bit systems which are "CD quality." Stay away from selling low-end mixers with toy samplers based on circuits from electronic telephone answering machines which are only four bit systems. If the manufacturer's literature does not specify performance separately for the sampler — beware!

#### **SUPER CREATIVE SIGNAL PROCESSING TOOLS**

With the popularity of recording studio re-mixes and the steadily decreasing price of electronic effects devices, a few of the more innovative DJs are beginning to explore signal processing tools. These new multi-effects processors, samplers, drum machines, sequencers and the like have created new opportunities for musical innovation and technical skill. Mixing and remixing skills, combined with signal processing, allow the DJ to direct a pre-recorded orchestra. Some of these new techniques have found their way into clubs and live performances; some



have been incorporated into commercial recordings.

If the device will be used in front of an audience as part of a live mix, then operational features like pre-sets and straight forward control layout are important. Post-production work for remixes is quite a different story, and then the added flexibility of programmability is more significant. In either case, most signal processing equipment is designed either for musicians to use during live performances or for semi-pro or pro recording studios. The equipment for musicians may have the operational simplicity that you need for use when you are mixing in front of an audience, but a lot of these live performance-stage use oriented products are not stereo and lack the cleanliness you need for dance music. Especially stay away from processors intended for electric guitars and foot pedal devices. The noise level in these may be too high for club or remix work. Remember, using an effects device on a guitar is not the same as sending the entire recording through the device. A good bet for club use is the multi-effects devices used for live sound reinforcement work, which tend to be both easy to operate yet are clean.

### CD PLAYERS FOR DJs

With vinyl rapidly fading from sight, DJs have had to make their move into CDs. The most popular CD player format for clubs is a rackmount double CD transport and a rackmount controller. The required ingredients DJs want include: slide control for variable speed, pitch bend, separate sets of controls for each transport, instant start, well laid out controls, and totally vibration proof transports.

Having the CD player splitting into two rackmount units allows flexible installation. The double CD controller can be mounted above or below the mixer, while the double CD transport can be mounted elsewhere.

While a number of "disco" CD play-

ers for DJs will fall into this mold, still other configurations will surely be introduced.

Speed control on CD players for DJs is all important. The less expensive players lack any sort of speed control, while others use pushbuttons which are unworkable for DJs. Slide controls, rotary controls, or joy sticks have found good acceptance.

#### *Status Indication:*

CD Players can tell the DJ a lot more than a turntable. (For example, on the Stanton CD-33, large LED displays can indicate what is happening, including separate large readouts to display the track number you have selected. Next to these is the readouts for track time remaining (or it can display how long the cut has been playing, total time remaining on the disc) and beneath all this is a bar graph (one for each transport) for the percent of remaining time on the track.)

### FUTURE TECHNOLOGY FOR DJs

New technologies are arriving that will have dramatic influence on DJs. The first is the CD-R — recordable CDs; the second is MD — the Mini Disc, and the third is DCC, the digital compact tape cassette. CD-R, MD, and DCC are in stores now, although none of these units are yet available in a product that has been optimized for DJs. Sony has recently announced a broadcast cart style MiniDisc deck for October delivery.

### SYSTEM SETUP AND TROUBLE-SHOOTING

#### *Spare*

Remember to always include spare needles, headshells with cartridge, fuses, and cables when you propose a package system. These are indispensable items.

### FEEDBACK

Feedback can get into the system though the turntables, mic, CD players, and even the cassette deck. Basic-

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ly, feedback results when the output of the components of the sound system is somehow fed back into its input.

#### *Turntable Feedback:*

The most common problem is turntable feedback. Turntables can skip due to the floor shaking caused by dancing, as well as the deep bass from the speakers. In either case, the sound and vibration energy reaches the turntable and causes the cartridge to mistrack the groove in the record. The disruptive energy can travel to the turntable in two ways, through the air (this would mostly be the bass from the speakers), and second, through the building structure.

Getting the turntable to track records better, even when the sound levels are high, can be a combination of some simple as well as complex solutions. "Disco Duty" phonograph car-

tridges are sturdy designs, as they must withstand backcueing. A side effect of this capability is that they need higher tracking force than cartridges intended for home use. By using too light a tracking force, the cartridge's ability to accurately play a disk when the sound system is at a high level is not so good. The first fix you should try is to increase the tone arm's tracking force toward the upper range that the cartridge manufacturer recommends. While you may worry that this will wear out the records, the reality is that a cartridge tracking at 3.5 grams causes far less record wear and sounds better than the same cartridge mistracking at one gram. But remember not to exceed the manufacturer's suggested maximum force.

Increasing the tracking force will often help the turntable work at higher

sound levels, but does not provide much help from bouncy floors. The rubber feet and internal suspensions on most turntables (such as the Technics) are simply too stiff to prevent skipping if the floor is not stable.

#### *Mic Feedback:*

Mic feedback is caused by the sound from the speaker finding its way back into the mic. If the speakers are

**The reality is that a cartridge tracking at 3.5 grams causes far less record wear and sounds better than the same cartridge mistracking at one gram.**

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near the console, try re-aiming the coverage of the speaker away slightly from the mic. Consider using a more directional mic, such as a hypercardioid, or even a noise-canceling type. Keep in mind that as the mic's pick-up pattern becomes tighter, the DJ's "mic technique" must improve and the distance between him and the mic should be closer and more consistent. If the talent likes to bounce around the mic when he or she talks, then forget about highly directional close-talking mics, as the voices will disappear whenever they move away from the mic! One neat solution is a single earcup cueing headphone that has a directional mic mounted from the headphone. But before changing mics, try turning down the mic volume, having the DJ move closer to the mic, and don't forget to install a foam pop filter over the mic.

#### **AMPLIFIERS**

Amplifiers for mobile and club use must be rugged and reliable. Hi-fi amplifiers are just not optimized for the physical and electronic rigors that

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pro sound requires. For mobile use, aside from rack mounting, the chassis must be strong enough to withstand constant transport. Fan cooling is an absolute, regardless of how much extra heatsink the manufacturer claims he has provided. Easily accessible fuses are a must. You do not want to have to remove the amplifier from the rack, let alone take off the cover, just to replace a fuse!

### SPEAKERS

Club applications require specialized professional speakers, with somewhat different requirements for permanent and mobile situations. How does a club speaker differ from others?

*Speaker features to look for . . .*

### MATERIALS

Plywood offers various benefits, in-

cluding good strength and light weight. Plywood speaker enclosures are often (but not always) stronger than particle board, which is helpful for both hanging in permanent installations and dragging around by the

**Fan cooling is an absolute, regardless of how much extra heatsink the manufacturer claims he has provided.**

mobile DJ. Particle board construction is less expensive than plywood, but much heavier. A new type of construction using a combination of many layers of thin cardboard combined with

resin glue is extremely strong, light, and not expensive.

For permanent installation, cosmetics such as high gloss paint can be used, especially if the speakers are located out of the way of cigarette butts, alcoholic drinks, and so on. For speakers that will be constantly moved, any sort of finish will get beatup and quickly look ragged. One solution is to buy heavy fabric covers for traveling that are removed for performances.

Avoid grille cloth; look for a metal grill to protect the drivers. For portable speakers, the handles should be recessed to avoid damage and the locations of the handles should be balanced. Don't be shy — pick up the speaker and carry it; you would try out a new pair of shoes! Another desirable

*(continued on page 64)*

## 'PEOPLE HAVE SAID IT HAS IMPROVED THE SOUND 100%'

Recounting the incredible history of the Virgen De San Juan Del Valle Shrine in San Juan, TX helps to understand this new contemporary church. When the original Shrine was dedicated in 1954, the ornamentation it contained was described as "lavish". Special bells by La Savoy of Paris, a massive crucifix carved in wood and murals followed the tradition of European Cathedrals by Bartolome Mongell of Spain.

In October of 1970, all of this splendid architecture and art was destroyed when a low flying airplane exploded into flames on the roof of the Shrine. In a matter of minutes the fire was out of control and the Shrine was a total loss except for the tower.

In 1980, an estimated 50,000 people from the U.S. and Northern Mexico converged upon the small community to witness the dedication and opening of the new edifice. This church, which holds 3,000 for mass, has a simple interior design to augment the beautiful 40ft mosaic on the back wall of the Shrine with Jesus presenting His Mother. It is the focal

point of the contemporary interior. It is estimated that 15,000 people visit the Shrine every week.

After many years of using two different approaches to the loudspeaker utilization, the pastor was unhappy with the lack of intelligibility. It was equally frustrating to worshippers. Herman Goren of Circle Industries, Inc. offered a three week demonstration of three Soundsphere Q-12 Speakers. The results warranted the installation of permanent fixtures achieving clear voice announcements for the congregation. The Pastor, Fr. Peter Cortez, states, "People have said it has improved the sound 100%. I am very pleased with this system."

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# THE ACOUSTICS OF ROCK MUSIC PERFORMANCES

By Steven J. Orfield and Richard G. Pierson

**Rock concerts have been, extremely popular world-wide; yet people who attend those concerts would be the first to admit that their expectations as to the quality of the sound at those concerts is not particularly high.**

They will also tell you, based on experience, that the larger the concert venue, the lower their expectations. Since the size of the concert venue is usually proportional to the importance of the performer, it is unfortunately true that the most sought after tickets are often in the poorest acoustical environments.

While attendees are spending significant sums to attend concerts, they fully realize that for any given song, the CD that they could buy of the same song performance would be infinitely better in quality than the live performance. Two interesting questions thus arise regarding concerts: why are people going and why are the concerts often so poor.

The extreme bass equalization and emphasis of bass lines in the music suggests part of why people attend; they are there for the experience, and part of this experience is the "feeling" of the music and the excitement of the crowd which they receive from the concert. This conclusion would argue



*Central Acoustical Testing Position at Pink Floyd concert.*

for closure on the issue, the assumption being that quality is not easily obtainable in a large venue. Fortunately this is not necessarily the case. The same rationale which determines the quality of large rooms for permanently installed sound system design has similar influence on the case of the large rock music venue. The same conclusions which determine the quality of most music in most cases determines the quality of rock music, based on so many news reviews of concerts. Very simply, the clearer and more intelligible the signal is and the more it recreates the bandwidth (frequency response) of the performance, the better it will be judged by listeners and professionals alike.

This article deals with one of those large venues, the Hubert H. Humphrey Metrodome in Minneapo-

lis, and with a study performed by Orfield Associates, with the assistance of students at the Hutchinson Technical College, for the Metropolitan Sports Facilities Commission, the public body responsible for the Metrodome. Additionally, Community Light and Sound supported this testing by providing large format system components for use in the evaluation.

### THE PROBLEM SET

Large venues like the Metrodome generally find themselves on the horns of a dilemma whenever a large concert is scheduled. The Metrodome has no direct responsibility or involvement with the sound system used by any particular entertainer. Additionally, the system is not provided by the entertainer. The system used is a function of the concert sound contractor se-

*Steven J. Orfield is the President of Orfield Associates, Inc. in Minneapolis, Minnesota.*

lected and his design of a system from available components in his inventory. Thus, the Metrodome may find itself receiving very positive reviews due to the quality of system from one contractor and being upbraided in the press for the quality of a system from another contractor.

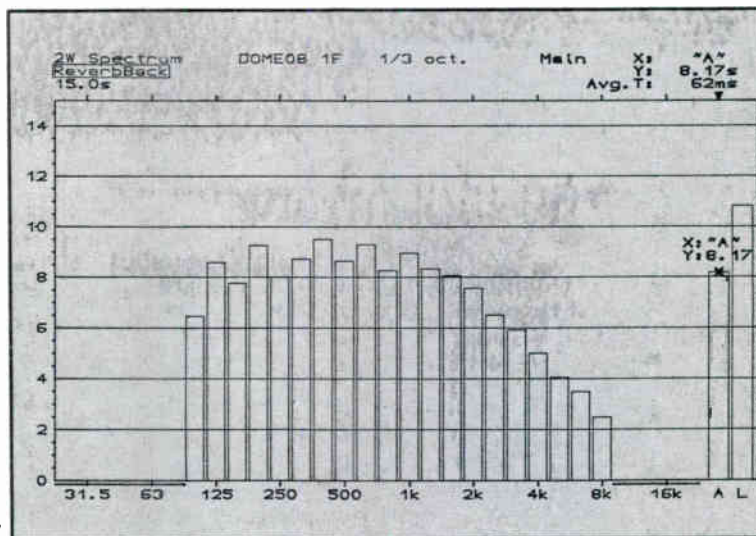
Secondly, the music system or systems sent out on the road for a given concert tour are generally required to work in many different venues; they are assumed to be appropriately designed, but their design often does not take any given venue into mind. Thus, while the concert sound contractor may know the number of seats in each given "house," he is often not familiar with and generally does not attempt to specifically tailor his system to any particular venue.

**THE MUSIC SYSTEM OR SYSTEMS SENT OUT ON THE ROAD FOR A GIVEN CONCERT TOUR OFTEN DOES NOT TAKE ANY GIVEN VENUE INTO MIND.**

Third, the entertainer who performs at the Metrodome, as well as the concert sound contractor who supports the performance, has little information on the acoustics of their venue. While they often spend significant time in setup, listening and "sound checks," they do not thoroughly analyze the venue in question, and thus the acoustical information which might prove useful to them in their design and setup is not available to them.

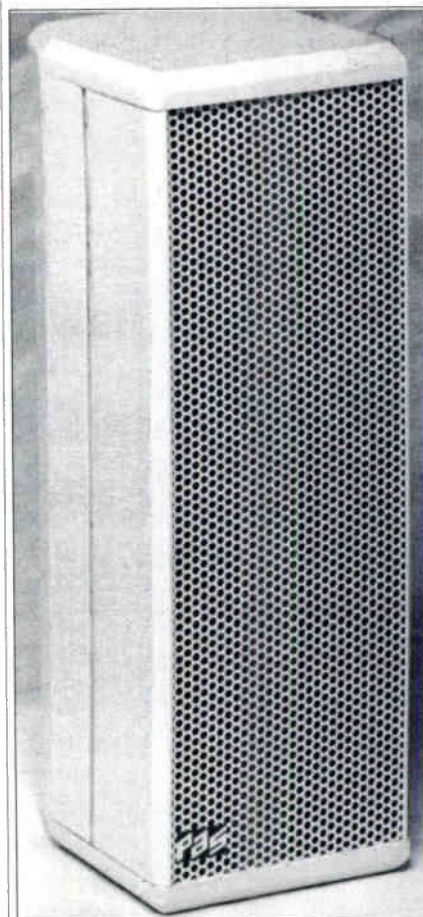
Finally, when the entertainer selects the concert sound contractor, he has immediately limited his options for music systems; some contractors have systems available which work well in large, reverberant venues, and many do not.

Thus, the problem lays out as a complex one, and the question at hand is



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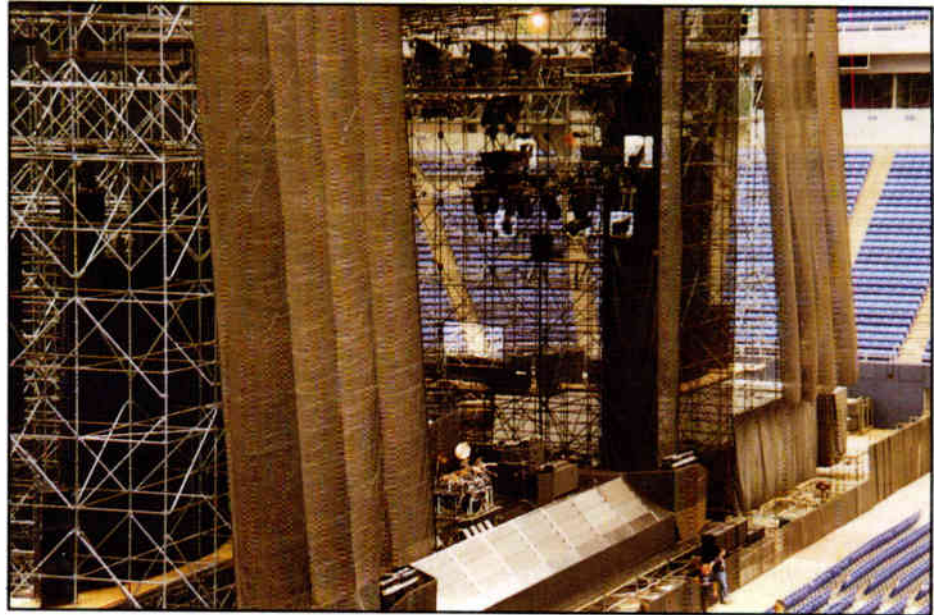
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*Pink Floyd stage setup.*

one of defining an appropriate response by the venue, in this case the Metrodome, in hopes that each concert will be optimized in whatever way that it can.

With this problem set in mind, Orfield Associates suggested to the Metropolitan Sports Facilities Commission that they might consider publishing a "users manual" on the Metrodome which would define the acoustical attributes of the Dome and would discuss and recommend that certain approaches to concert sound would work well and predictably here. This suggestion was accepted. A study followed which included recent rock concert history, Metrodome acoustics, sound system recommendations and test results.

**ROCK CONCERT HISTORY**

The Metrodome has been used for many years as a rock concert venue, and it was useful to review both anecdotal information on performances and to measure performances and characterize their quality, prior to considering the problems of large room acoustics. With this in mind, the following concerts were considered:

- Bob Dylan and the Grateful Dead
- Pink Floyd
- Monsters of Rock
- The Rolling Stones

Attendees at the Dylan — Grateful Dead concert were interviewed, and newspaper articles were reviewed. The general consensus on this concert was that the sound was "muddy" for most listeners not directly in front of the stage. Partially, this was due to the fact that the house was not sold out and partially due to the reported sound system use, a low-Q, direct radiator system.

Orfield Associates was set up to measure and analyze the Pink Floyd concert, having microphones suspended over the arena from an open broadcast booth. Additionally, staff members walked the Dome to measure and listen from major areas.

At this show, the seating was sold out and therefore, the reverberation environment was as controlled as possible. Persons interviewed at this concert generally had a good response to the overall sound, and our acoustical staff held essentially the same view. Intelligibility and clarity were quite high, with the exception of some of the

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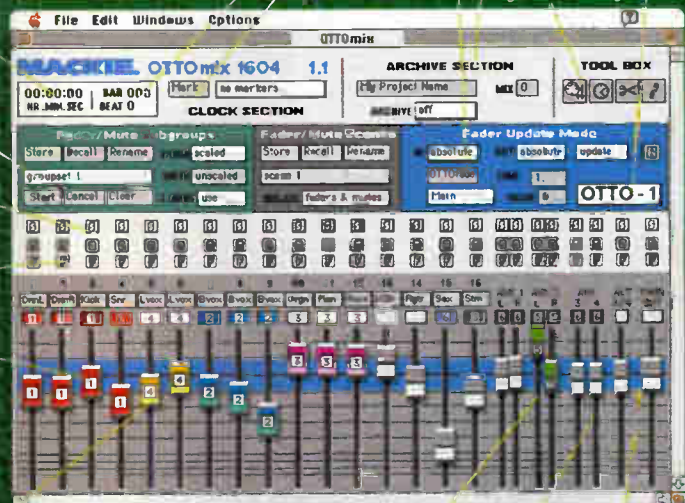
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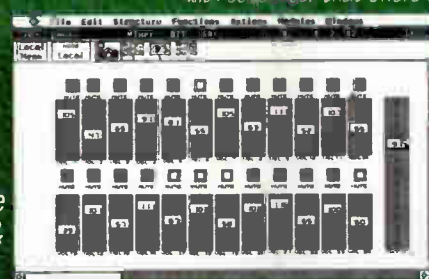


to three OTTO-ed CR-1604s for 48-ch. automation!

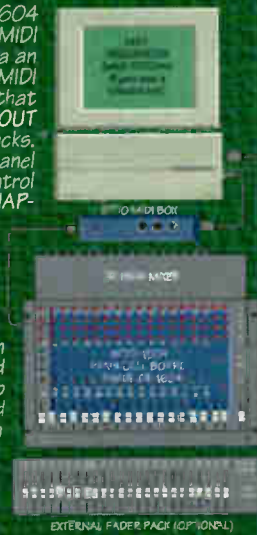
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furthest listening positions, where it began to drop off.

At this show, the LEQ (average sound level) was in the range of 101 dBA; for the last half of the concert, this increased to 108 dBA. Maximum levels (fast response) were 115 dBA. The sound contractor was Maryland Sound, and they provided a system of stacked cabinets on each side of the stage.

**TYPICAL ATTENDANCE RANGED FROM ¼ TO ½ OF THE SEATING CAPACITY. THUS, THE REVERBERATION TIME WAS LONGER THAN FOR THE FIRST CONCERT.**

Each cabinet used high-Q horn-loaded drivers, and this allowed a controlled coverage pattern and a relatively high-Q system.

For the Monsters of Rock concert, measurements were again performed in a similar manner to that of the Pink Floyd concert. Seating was not sold out for this show, and typical attendance ranged from ¼ to ½ of the seating capacity. Thus, the reverberation time was longer than for the first concert.

The sound system for this show was contracted and designed by Audio Analysts. Representatives of the contractor noted that there were two separate systems on the road for this show. The systems were different, and the contractor suggested that they might have preferred the second system for this venue, but it was not available.

The sound system consisted of full range enclosures stacked on each side of the stage; these appeared to be low-Q, direct radiator systems which employed only high frequency horns. An array of subwoofers was located under the center of the stage. Additionally, several horns were mounted



on a tower at the rear of the floor seating area to provide high frequency coverage to the upper and lower decks at the rear of the Dome. The signal was delayed to these towers. Average sound levels were about 110 dBA. Anecdotal and survey testing and listening confirmed that the sound system was poor at most locations, lacking both clarity and intelligibility. Secondly, the wide delay tower aiming created echoes at the side deck seating due to the difference in arrival times between the main and the tower system.

**ANECDOTAL AND SURVEY TESTING AND LISTENING CONFIRMED THAT THE SOUND SYSTEM WAS POOR AT MOST LOCATIONS.**

For the Rolling Stones concert, Orfield staff observed but did not measure. This show was sold out, and interviews with attendees suggested that the sound quality was moderate. Songs were generally identifiable and were presented with a minimally adequate degree of intelligibility and clarity, even at the upper deck areas.

The concert sound contractor for this show was Showco; their system consisted of a stack of loudspeaker cabinets, arranged in an arch, located at each side of the stage. Two smaller stacks were located at the rear sides of the floor seating area and were used as delay towers.

**THE ACOUSTICAL EVALUATION**

At interest in evaluating the Metrodome was the problem of defining the relevant acoustical performance of the Dome and discussing any particular problems with this performance. In order to derive that information, acoustical testing of the unamplified space was undertaken and

was followed by acoustical testing via the use of samples of performance sound systems. The acoustical evaluation of the space included the tests below.

**ACOUSTICAL TESTS IN THE DOME**  
 Reverberation Time  
 Background Noise Level  
 Room Profile

The Dome, being a double layered air-supported structure, was very difficult to characterize for reverberation. On one hand, the available signal-to-noise ratio for reverberation test signals was very low due to the high noise level of the fan systems. On the other hand, the pressure changes due to the low frequency fluctuation of those same fan systems was quite

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*Monsters of Rock setup.*

high and thus made the reverberation measurement more difficult. Of the many testing systems which we had available, the most repeatable data was gathered with the Bruel and Kjaer system, the first 2133 system purchased in the United States. The chart below shows the results of reverberation testing.


ONE-THIRD OCTAVE RT60 MEASUREMENTS WITHOUT AUDIENCE	
100 Hz	6.5
125	8.6
160	7.8
200	9.3
250	8.0
315	8.7
400	9.5
500	8.6
630	9.3
800	8.3
1000	9.0
1250	8.3
1600	8.1
2000	7.6
2500	6.5
3150	5.9
4000	5.0
5000	4.1
6300	3.5
8000	2.5

It can be seen that mid frequency reverberation (500 Hz) is 9.5 seconds in the Metrodome. (The volume of the Dome is approximately 48 million cubic feet.) The reverberation time is longest at mid-frequencies rather than at low frequencies as is typical in hard roofed structures. This is due to the lightweight air supported roofing system which provides more low than mid-frequency absorption.


Estimated reverberation time with specific audience levels is noted below:

Number of Attendees	500 Hz RT60
0	9.5 Sec
15,000	7.6
30,000	6.3
50,000	5.2
55,000	5.0


Background noise level measurement was problematic based on the



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*RASTI and STI testing.*

same conditions; the results are noted.

### SPEECH INTELLIGIBILITY

In order to characterize the benefit of high-Q versus low-Q devices in this venue, a set of tests was scheduled using two testing systems, a Bruel and Kjaer RASTI system and a Techron TEF 12+ system with STI software. Both of these systems are intended to test derivations of the Speech Transmission Index and the Rapid Speech Transmission Index. A number of Community large format 90 x 40, 60 x 40 and 20 x 40 horns were used in this testing. The RASTI test results are typical of the testing process and provide clear confirmation of the value of high-Q devices in this venue.

### CONCLUSIONS

The intent of this process was to determine predictable methods for insuring high quality concert sound in this large venue arena; prior to this testing, the management of the Metrodome felt that they had no influence over the quality of concerts, and this study was intended to provide a first step in a proactive approach to

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LOCATION	1 - 40 X 20 ( Q = 40 )	1 - 40 X 20 ( Q = 40 )	1 - 90 X 40 ( Q = 10 )	2 - 40 X 20 ( Q = 40 ea. )	2 - 90 X 40 ( Q = 10 ea. )
1	.67	.67	.58	.59	.39
2	.61	.63	.48	.54	.36
3	.44	.40	.52	.34	.42
4	.34	.37	.40	.32	.41
5	.27	.26	.21	.65	.69

RASTI Results Graph.

helping artists and concert sound contractors to understand and appropriately use the Metrodome.

At the end of this testing process, specific recommendations were given with regard to the types of sound systems that would provide adequate clarity and intelligibility at the Metrodome. Both past concerts and testing confirmed that the Metrodome, much like most large venues, was a challenging site. It was a complex acoustical site requiring high quality sound system engineering, much like all medium-to-high reverberation environments. With proper design and operation, this venue could provide high quality rock concert experiences to the large audiences demanded by the major talent in the rock field. ■

## DISCO

(Continued from page 53)

feature is interlocking corners for stacking other speakers. Stacking the full range speakers on top of the subwoofer gets around the whole problem of hanging speakers, but remember that most subs are less than three feet high, so the midrange/tweeter on your speaker must clear the tops of the dancers heads or they will get blasted. Since many DJs are able to put the speakers on a stage or other raised platform, the height of a stacked system should work out fine.

### SUBWOOFERS

DJs need to produce excitement and energy in their performances. Often this has meant cranking up the level. Subwoofers provide a method of getting the excitement and energy needed without working at levels that are annoying to club goers and club management. (One new development to supplement subwoofers is the Aura Vibrasonic bass vibration system.) Deep bass energy strengthens

the rhythm line and helps the dancers keep the beat as well as want to keep dancing. Aside from a more exciting and powerful sound, to achieve clean sound in the bass and midrange at high sound levels, a subwoofer is a must. Why should a subwoofer help clean up the midrange?

### When reproducing the deep bass, the midrange output from the woofer will be muddy due to the large excursion of the cone.

Because otherwise, the woofer must both try to reproduce the deepest bass as well as reach up to the mid- to high-frequency speaker. When reproducing the deep bass, the midrange output from the woofer will be muddy due to the large excursion of the cone. With a subwoofer, the deep bass is filtered out from the woofer, so its

midrange response is clean. Of course, with a subwoofer, there will also be more deep bass.

### CROSSOVERS

With subwoofers, some sort of crossover is required. Usually a crossover frequency between 80 Hz and 100 Hz is recommended, and will keep the singers out of the subwoofers. Any high quality electronic crossover providing a sub output can be used to drive the subwoofer amplifier.

Using a "high-level" passive network after the power amplifier is not an ideal situation. High level networks require high voltage capacitors that are bulky, expensive, and degrade the sound quality. Of course, using a line level crossover requires a separate amplifier to drive the subwoofer.

### THE ENDING

We hope that some of your questions have been answered and the similarities and differences between live sound and club systems have been clarified. ■

# NEWS FROM AROUND THE INDUSTRY

## Atlas Discounts; Fiber Merger

### Atlas/Soundolier's Freight Discount

Atlas/Soundolier has extended its 50-percent Freight Discount on regular prepaid ground freight on Quick Shipper Cabinets through September 30, 1993. The discount applies to any quantity of qualifying Quick Shipper cabinets ordered via Fax to the Atlas/Soundolier Sales Department. In addition, orders for four or more qualifying items will receive an additional 5-percent discount off the sale price of the product.

Qualifying orders include Quick Shipper cabinets only and must be clearly marked and faxed to the Sales Department (1-800-765-3435).

### OFCI Merges

Optical Fiber Components, a Washington D.C. distributor of fiber optics has merged with Yankee Electronics of Manchester, New Hampshire. The move allows OFCI to provide systems integrators and installers of data and telecommunications networks complete support services including optical fiber, copper cabling, components and assembly and test equipment.

The new organization will focus on service and training for companies and institutions that are expanding their networks. It provides system cards, multiplexers, hubs, modems, network bridges, routers, cable assemblies and testing services and will continue to represent manufacturers of copper and optical fiber components.

### ShowBiz Expo Attendance Increase

Over 28,000 production professionals attended the June 5-7 10th Annual ShowBiz Expo, in Los Angeles. Topics addressed included film financing, writing for interactive entertainment, directing your first feature, the rela-

tionship between directors and cinematographers, shooting techniques for large format films, and the North American Free Trade Agreement and its potential effect on the production industry. In addition, the Expo's two-day Second Annual West Coast Theatre Conference featured a Keynote Event hosted by the Los Angeles Community Redevelopment Agency, announcing plans for creating a legitimate theater district in Hollywood.

Next year's Expo is scheduled for June 11-13, 1994 at the Los Angeles Convention Center, while the Third Annual ShowBiz Expo East is slated for January 8-10, 1994 at the New York Hilton.

### Benchmark in Boston

When WGBH added a second control area and studio for broadcasts from Boston Symphony Hall they installed five Benchmark MDA-102 stereo microphone pre-amplifier/DA cards and a card frame, along with the PS-202/ph dual power supply with optional +48V phantom power. The entire unit was packaged in a Future Case road case, and included a local/remote system for phantom power, the 20dB pad, and the level/overload indicators in the MDA-102s.

### Panoram Technologies Formed

Panoram Technologies, Inc., has been formed to exploit its Video Panoram technology. The seamless display technology has applications for theme park rides, museum exhibits, educational media events, and closed-circuit High Definition Video Events. The technology is designed to enhance multi-screen video displays by integrating the projections into a single, seamless image. In addition to these "Panomaker" components, Panoram Technologies offers "producer kits" that include a system of grids and production steps to assist independent producers and computer graphics artists in preparing the Video Panoram shows and attractions.

### Cresting in Hawaii

Crest Consoles' new Century Series 52-input GT console was used at Hawaii's "Na Hoku Hano Hano" Awards Show. Available in frame sizes from 16-52 inputs, the GT Console is designed for front-of-house use in touring and theatrical sound applications. Features include a mono bus, eight Aux mix buses, four bands of sweepable EQ, level, pan and mute. The show was broadcast live throughout the state from the

Sheraton Wakiki Ballroom, which seats 2000 people.

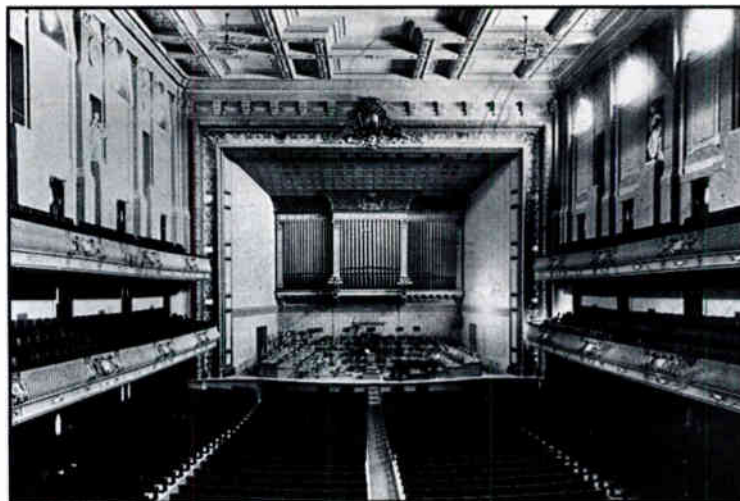
### Microlog in Delaware

Microlog was awarded a contract from Delaware's Division of Emergency Management and the Delaware State Police for Microlog's Emergency Voice Response System. The EVR will be installed at State Police Headquarters in Dover, Delaware. The EVR System contacts personnel based on programmable calling priorities. Depending on the time and day of the week the system can be programmed to call different phone numbers for each individual. In addition, the EVR can activate a paging system to contact key personnel. The system receives calls from paged personnel recording their fitness for duty and estimated time of arrival.

### Avalon Club Chooses Crown

Crown-powered main and monitor sound systems have been installed at the Avalon Club, a live music venue on Chicago's north side. Two Crown Macro-Tech 1200 and two Crown MA-600 amplifiers power an Electro-Voice MT-4A concert system, with a single low-frequency and mid/high frequency cabinet stacked to each side of the stage. The stage monitor system is made up of four E-V FS-212 wedge cabinets, powered by a single MA-1200 and MA-2400.

Crown has also developed IQ Turbo 1.0 software, designed to control an audio system. The software provides real-time monitoring and control of every audio system facet by utilizing advanced algorithms. IQ Turbo is available as a stand-alone software package, and requires a minimum of a 16 MHz, 386SX-equipped PC with one megabyte of extended memory and VCA graphics.



## Wiremold Acquires Perma Power

The Wiremold Company, through its Brooks Electronics subsidiary, has acquired Perma Power Electronics of Niles, IL. Perma Power is a producer of surge suppression products for the electronics and consumer markets. Wiremold/Brooks, is a producer of surge suppression products and multi-outlet assemblies, and will retain the Perma Power brand name and distribution channels. As a division of Brooks, Perma Power will continue to operate out of Niles, Illinois.

## Media Control at Ravinia Festival

Media Control has been named the sound contractor for all "pop" shows and several Murray The-

ater events at Ravinia Festival in Highland Park, Illinois. The sound system, already used for the "Jazz in June" series, consists of twelve flying McPherson M1-S cabinet speakers, flown in double racks of six per side. Underhung are two McPherson M-2 speakers per side for audience center and front fill. To fill the bench seating for stage left and right are two M1-S speakers per side, along with two Renkus-Heinz LR-2 subwoofers per side. The house console is a Ramsa WR-852 52 channel board with programmable mutes.

## Notifier Receives ISO-9001 Certification

Notifier/Fire-Lite Alarms, Inc., a manufacturer of fire alarm panels, has been awarded the highest level of certification of the Inter-



national Organization of Standards by Intertek, an accredited registrar. This certification is for the design, manufacture, test and supply of fire alarm controls and related equipment. Notifier underwent a four-day site assessment observing that all ISO-9001 required procedures had been carried out.

## Otari Training

Otari Corporation recently held an end-user training at The Recording Complex in Buffalo, New York. The training focused on the operational features of the DISKMIX-3 moving fader automation system and the Otari Series 54 console installed at The Recording Complex. Independent producers, engineers, and recording studio owners from Western and Upstate New York attended the training.

## JVC's Multi-Amusement Player

JVC has begun marketing its second multi-amusement player, WONDERMEGA RG-M2, equipped with a six-button cordless control pad. The RG-CP3 - a six-button control pad with a cord -

is also available. The new player is equipped with the cordless control pad, AC adaptor, audio code and video code.

The unit features 1-bit DAC and a S terminal for high-quality sound and pictures, and can automatically determine whether a disc is CD-ROM or a music CD. In addition, the system can reproduce software for CD graphic karaoke and music CDs, as well as software for conventional MEGA DRIVE and MEGACD.

## Vestex in Olympics

The Lillehammer Olympic Organizing Committee has selected the Vestex PMC-60 mixer and VT-9100PRO, WM-9100, IT-9100, wireless system. The PMC-60 is a DJ mixer with six input modules selectable from stereo phono and line inputs or three mic inputs, channel assignable and curve adjustable VCA crossfader. The wireless system is 950MHz range UHF, and consists of a VT-9100PRO receiver, WM-9100 handheld microphone, WM-9100S handheld microphone with Shure 58 element, and IT-9100 instrument transmitter.

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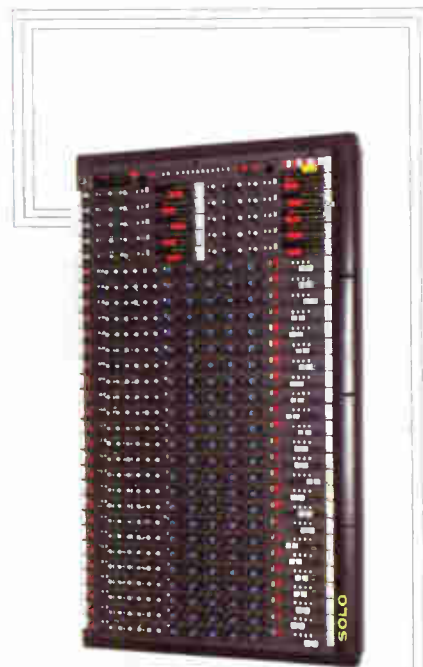
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### E-mu Meets Mac

E-mu Systems has begun shipping its SoundEngine Music Module General MIDI desktop sound module for the Macintosh platform. The unit has 384 CD-quality sounds including 128 General MIDI level 1 sounds, the ability to play up to 32 different sounds simultaneously, built-in reverberation, and serial-to-MIDI data conversion. The unit may also be used as a sound module for use with any MIDI-capable musical keyboard. Additional fea-

tures include 16 MIDI channel multi-timbral operation, MIDI in, out and thru ports, serial data input port, and a printer/modem thru port.

Included with the system are two software packages designed specifically for it by Opcode Systems. Edit One is an editor/librarian package that allows for programmability of the unit through a Macintosh front-end while EZ Vision sequencing software facilitates the playback or creation of MIDI music files.

### TTC Gets ISO-9001 Registration

Telecommunications Techniques Corporation, a supplier of communications test instruments, received its ISO-9001 registration certificates in May. TTC received registration following 15 months of preparation. The official accrediting body for TTC's registration is the Dutch Raad voor de Certificatie in Holland.

TTC develops, manufactures and markets communications test products and systems, including FIREBERD multifunctional digital communications analyzers, T-BERD T-Carrier test analyzers, and NetLens protocol analyzers.

### Sharp Chips

Sharp Corporation has begun marketing a three-chip set for MD Mini Disk playback units in Japan. The IR3R48 RF amp, LR3765 expander and LR3766 decoder are designed to operate at a low, 3.5V supply voltage. Both the LR3766 and IR3R48 come in a package size of 14-mm-square, while the LR3765 is 18-mm-square.

MD's are magneto-optical discs which can digitally record audio signals. The MD media is approximately one-half the size of conventional CD's and can replay up to 74 minutes of audio programming. The MD media is housed in a plastic cartridge measuring 68 x 72 x 5 mm.

### ID Back Up Power Supply

ID Solutions' 8000 Back Up Power Supply has been released to production. The BUPS is designed to provide power to Series 8000 bar code readers in the event that the main power supply is interrupted for any reason. The BUPS is comprised of a charging circuit for use with a 12 volt, 5 amp-hour lead acid sealed rechargeable battery. In addition, the BUPS is designed to provide continuous operation of up to four Series 8000 readers, and optional

equipment such as electric door strikes.

### Burle "Registered Firm"

Burle Industries has received "Registered Firm" status under ISO 9002/EN29003 by the National Standards Authority of the International Standards Organization. The certification covers all UK operations of both Security and Electron Tube products including warehousing, distribution, order processing, and service.

### NAD Surround Sound

NAD's first Home Theater is designed to complement conventional stereo systems with multi-channel Surround Sound. The NAD Model 910 A/V Surround Sound Processor provides Dolby Surround Pro Logic decoding as well as additional modes. The unit accepts and selects stereo audio and video signals from three A-V sources, as well as stereo audio from an associated hi-fi receiver or preamplifier.

### '94 World Congress

The 1994 World Congress on Biomedical Communications will be held in June 1994, in Orlando, FL. The meeting is a worldwide scientific meeting of all organizations that deal with communications in the health/biological related arena. Registration will be between 1200 and 1600 participants, all of whom produce art, photography, computer graphics, video, telecommunications and digital imaging in their respective departments and are responsible for the purchasing of hardware, software, and services for their respective institutions, businesses, and countries.

A Commercial Exhibition will be held during the entire World Congress that will enable companies to display their technologies to the registrants. For additional information concerning this meeting, contact Show Management at (714) 753-8680.

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## PRODUCTS

### Amp Adding

#### Rolls' Reference Amp

Rolls has introduced the RA2110, a 19-inch rackmounting 100 watt per channel, MOSFET stereo power amplifier. The unit can also function as part of a small PA system or as a midrange/treble driver in a high powered system. Features include a fault protection circuit to protect against accidental burn out, .25-inch jacks and 5 way binding posts, and a LED power output meter. The unit is also capable of 70 watts per channel in stereo mode or 200 watts in bridged mono, both into 8 ohms.

*Circle 1 on Reader Response Card*

#### University's Paging Mixer/Amp

University's Model 1710 is a two-channel paging mixer/amplifier designed for background music systems and rack monitor applications. The unit incorporates a mic/line channel for use as a page input, and a music input. The mic/line input can match either a balanced Lo-Z microphone level or a balanced line level, and features 24 VDC phantom power. The music input matches a standard unbalanced auxiliary level source via a standard RCA phono jack. An automatic muting feature mutes the music input when a signal is detected on the mic/line input. In addition, separate bass and treble controls are provided on the rear panel and affect the music channel only. Other features include level controls for both the mic/line and music inputs, a red LED power-on indicator, and a power on/off switch.

University has also introduced the US692 Dynamic Cardioid Microphone, which features a built-in Acoustifoam pop filter, and an on/off switch which enables the user to have local muting control. The mic has a three-pin XLR-type connector with pin 2 positive.

*Circle 2 on Reader Response Card*



#### Winsted's Workstation

The Winsted Corporation has introduced its new Double Cabinet Edit Desk. The console features a total of 106.75 inches of rack space. The desk has three 19.25-inch vertical racks at the back edge of the work surface that offer space for primary control access and monitors. Two 24.5-inch rack cabinets are located below the work surface for VCR's or other electronics. The work surface is black granite and 22 inches deep. The rack frames are finished in dove grey baked enamel, with side panels in black.

*Circle 3 on Reader Response Card*

#### Coherent Additions

Coherent Communications has added new features to both ConferenceMaster and Sculptured Sound. ConferenceMaster now comes with Last Number Redial, allowing one to dial the last number dialed from the keypad by pressing the Pound Key. In addition, there is Auto-Off Hook, a feature which allows the user to dial directly from the keypad, without pressing the off-hook key.

In addition, Sculptured Sound has been enhanced to give the bass register increased sound clarity. Moreover, the changes to Sculptured Sound come with no increase in the retail price of the product.

*Circle 4 on Reader Response Card*

#### Sigma's WinMovie

Sigma Designs' WinMovie is a full-motion video capture and play-back board. WinMovie is capable of capturing video at up to 30 frames per second from any

NTSC or PAL composite and S-Video device, such as a VCR, video camera or laser disc player. The unit's interface allows the board to be fully compatible with all SuperVGA adapters and does not require a VGA feature connector. It is compatible with any PC 386/33 MHz or faster.

WinMovie comes bundled with Microsoft "Video for Windows," and Xing Technology "Picture Prowler." In addition, Sigma provides WinMovie DTV utility software with the WinMovie adapter for easy installation.

*Circle 5 on Reader Response Card*

#### Electronic Woofer

Home Automation Laboratories has introduced the Radar Watchdog. The unit uses radar waves to detect potential intruders before they enter the home, and produces a digitally-synthesized dog bark.

Also new is Dynasty for Windows, a software product designed to give one access to most of the electrically-operated devices in one's home. The system supports various hardware options, including interfaces for X-10 wireless light and appliance control, infrared control of audio/

video equipment, hardwired connections for security and temperature measurement, and multimedia sound and video boards for synthesized or recorded voice messages and display on TV.

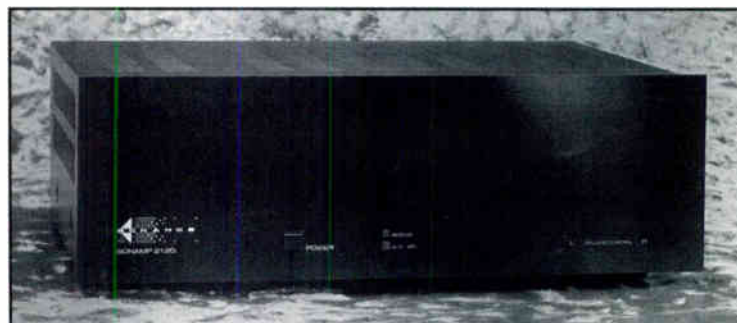
*Circle 6 on Reader Response Card*

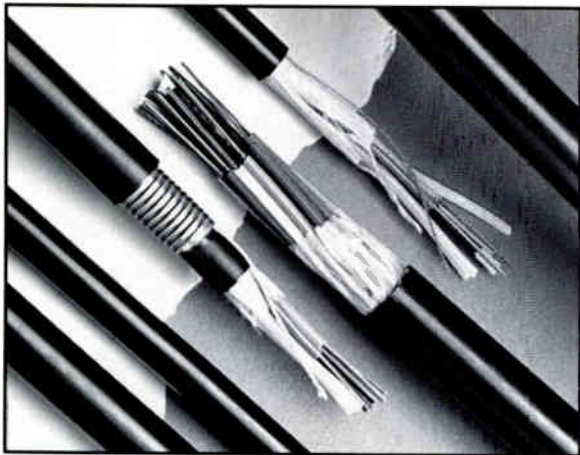
#### Speaker Mounting Systems

Sonance has introduced new mounting systems designed for its "Next Generation" line of in-wall loudspeakers. The STS 1 Staple Template is designed for new construction installations, and is stapled across studs or joists and has centering marks and directions for the drywall imprinted in both English and Spanish. The drywall makes the indicated cutout and the installer mounts the speaker like an ordinary retrofit job. In addition, Sonance has developed the S-Series retrofit and new construction brackets, both of which permit depth readjustment before and after installation and feature centering marks for speaker alignment, and wire holes for tying off speaker wire prior to installation.

In addition, Sonance has introduced the Sonamp 2120, a power amplifier designed for home theater and single or multi-room custom installation. The system delivers 120 watts per channel into 8 ohm loads, and measures 16.75-inches W x 5.38-inches H x 12.63-inches D.

*Circle 7 on Reader Response Card*





### Cooper/Belden's Fiber Optic Cables

The Belden Division of Cooper Industries has introduced fiber optic trunk cables that are available in armored and all dielectric versions and meet Bellcore and REA specifications. The multi-fiber per tube design consists of 4 to 240 single mode fibers contained in loose, gel-filled, color-coded buffer tubes. The fiber tubes are cabled around a dielectric central strength member, and the spaces are gel-filled to impede water penetration. In the armored version, the cables are further surrounded by a layer of aramid yarn, an inner polyethylene jacket, and a layer of corrugated steel armor. An overall black medium density polyethylene jacket with ripcords is featured on both versions.

Circle 8 on Reader Response Card

### Brady's Software

Brady USA has introduced CodeSoft, a Windows-based software program. CodeSoft is a labeling program that incorporates WYSIWYG technology, featuring a Windows clipboard, a mouse,

drop-down menus, and 100% graphic mode. CodeSoft also features an import manager, which imports ASCII files, logos, text, bar codes, and label names, as well as information for the quantity to print and the quantity between incrementations.

In addition, Brady has developed CartLink, an electronic device which translates label information from Brady's new CodeSoft software program to printers from mainframe computer systems. CartLink is 6.5 x 2.2 x 10

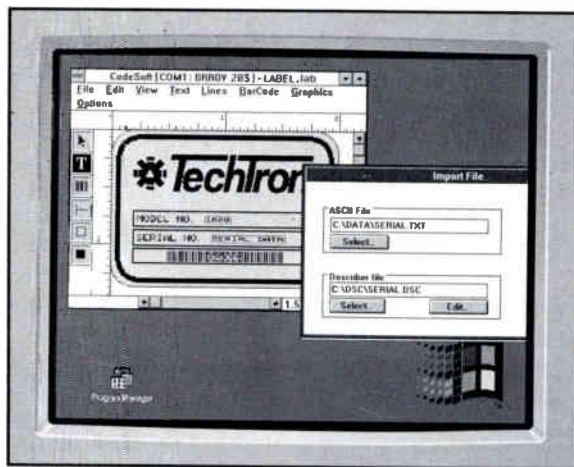
inches, requires an electrical current of 11.220 volts, and uses a printer/host connection RS 232 interface, with a twinax interface available as an option.

Circle 9 on Reader Response Card

### Midwoofer Now Separate

Soundstream Technologies' SS5.1 cast basket midwoofer is now available as a component part. The SS5.1 is a 5.25-inch midwoofer in a magnesium frame which facilitates close to a 1 inch excursion at mounting depth of two inches. The unit also features a butyl rubber surround designed to resist stiffening in cold climates and a specially treated paper cone. The SS5.1 has 50 Hz to 5 kHz frequency response, 90 dB sensitivity, and 100 watt power handling capability.

Circle 10 on Reader Response Card



### Onepower's L-Series

Onepower has introduced its new L-Series power distribution products with two models — the LC-15A and the LS-15A. The LC is designed to protect against damage to sensitive electronic equipment caused by voltage spikes. It features EMI/RFI filtration to reduce unwanted interference noise and MOV spike protection. Eight power outputs on the rear of the chassis have a combined capacity of 15 amps.

The LS contains all the features of the LC plus two retractable light tubes on the front of the chassis for rack illumination. In addition, the light tubes are dimmable.

Circle 11 on Reader Response Card

### Static Free

Equipto Electronics' static dissipators are now available for all its lines of electronic enclosures. Static control accessories include conductive laminates, conductive floor mats, table tops, conductive wrist straps, heel straps, and an electrostatic fieldmeter.

Products from the company that can be fitted with the static accessories include work stations, vertical racks with work writing shelves, sloped front consoles, printers, and terminal stands.

Circle 12 on Reader Response Card

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# Ordinarily Evolution Crawls...

# Occasionally It Flies

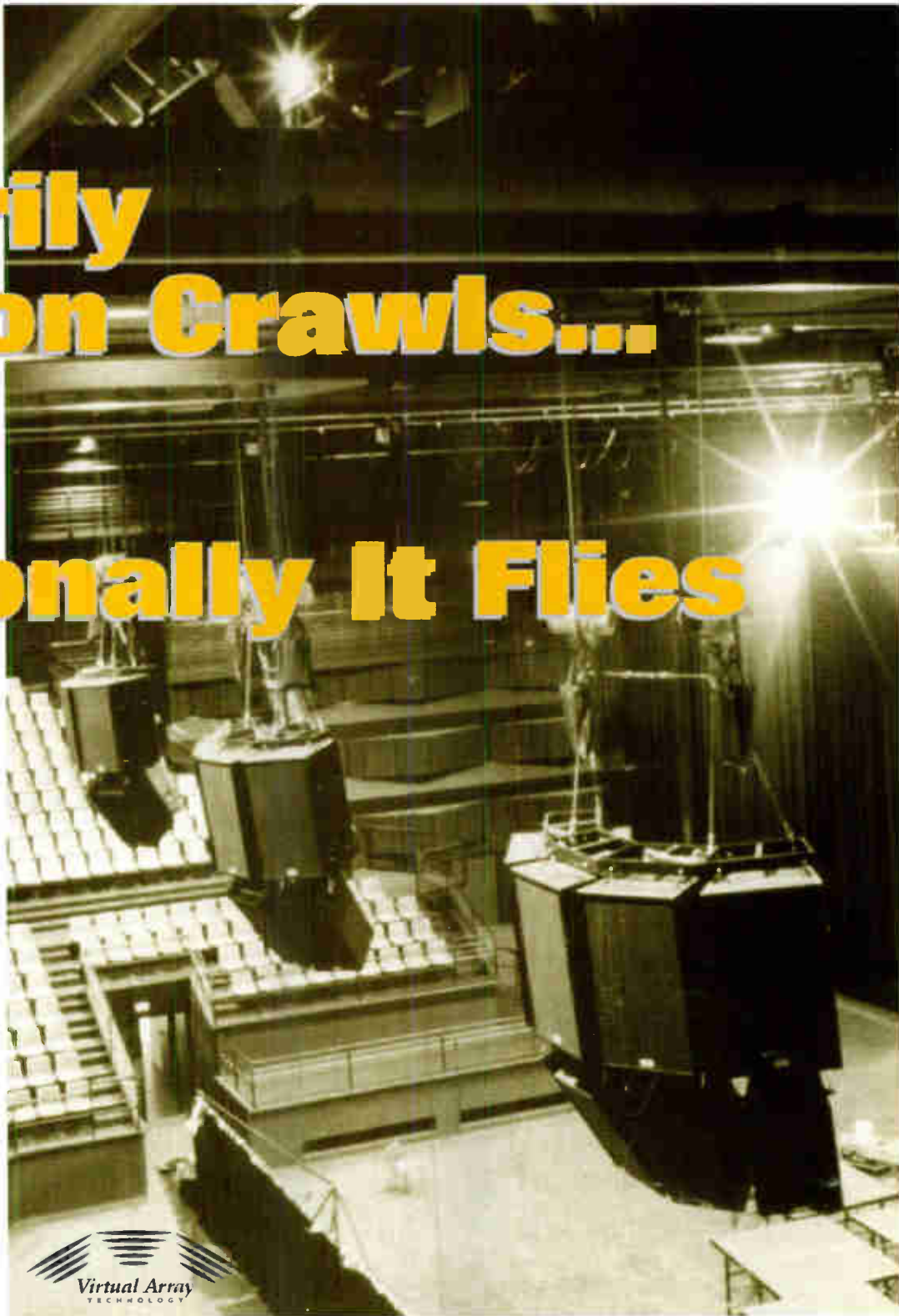
## To Succeed, Evolve

Progress emerges in many forms: one of them is a cultural center in the south of France. The Zénith de Pau actually adapts its internal architecture to the presentation. Inside dual acoustically isolated space frames, the stage, seating, ceiling and rear wall can be reconfigured for classical music, pop, theater or meetings. Integrated acoustic treatment and digital electronics maximize flexibility.

The acoustical consultant demanded an equally evolved loudspeaker system: lightweight to hang without massive support, compact to leave sightlines open, accurate and natural for acoustic music and speech, powerful to deliver the energy of rock performances. Conventional thinking had no answers. So Jean-Pierre Mas turned to EAW's Virtual Array™ Technology for practical solutions.

## To Evolve, Adapt

With a range of enclosure sizes, dispersion angles and output capacities, VA™ Technology adapts to almost any application. The new KF650i used in the Zénith de Pau, like all VA™ systems, is a true three-way design: The entire vocal range is covered by a 10" cone loaded with Kenton G. Forsythe's midbass horn and displacement plug. This astonishingly compact system is capable of 133 dB SPL and  $\pm 2.5$  dB response from 70 Hz to 20 kHz.



## To Adapt, Listen

For a decade and a half, we've been listening critically and carefully to loudspeaker components and systems. To rooms of all sizes and shapes, to music of all kinds. To the voices of our customers, audiences and end users. If you're interested in what we've learned—and how it can help your next project evolve beyond the ordinary—contact us today for more information and a demonstration of Virtual Array™ Technology.

*The KF650i evolved in demanding environments like the Zénith "Salle de Spectacle," Pau, France. Christian Malcurt, APIA, acoustician. Jean Pierre Mas, Mas Conseil, designer. Tech Audio, installer.*

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Circle 217 on Reader Response Card

World Radio History



### Sperry's Snap-Around

A.W. Sperry has introduced its new Digisnap Digital Snap-Around model DSA-600. This 3.5 digit digital system's features include an AC current, AC voltage, DC voltage, resistance, diode test, continuity buzzer, data hold, and also meets IEC-348 Class II standards. It comes packed with test leads, battery, and a carrying case.

Circle 13 on Reader Response Card



### New Power Supplies

Converter Concepts has introduced the ST25 Series, a group of fixed frequency, universal input power supplies. The Series is available in single or triple output configurations. Multiple output versions are isolated allowing the user to configure output polarity. Other features include power fail detect, main output remote sense, and protection for overload, short circuit, and overcurrent. Further available options are open or closed frame construction, and the choice of terminal block or square pin termination. The Series carries safety agency approvals from UL, VDE, and CSA, and also meets VDE Class B EMI requirements.

Circle 14 on Reader Response Card

### Panduit's Label Software

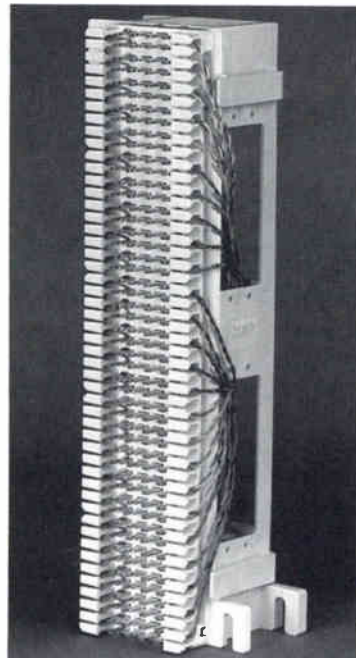
Panduit Corporation has introduced a low-cost version of the PAN-MARK label printing software. PAN-MARK LT is designed for dot matrix printers, and is both keyboard and mouse driven. It can be used for alpha and numeric serializations and will copy data within the label, from label to label, and from file to file. PAN-MARK LT requires an IBM or compatible PC with a hard drive and 640K RAM. The program will use expanded memory if available.

Circle 15 on Reader Response Card



### Siemon's Connecting Block

The Siemon Company has introduced an enhanced version of the S66M1-50 for use with 100



Mbps networking applications. The Category 5 S66M1-50 is suitable for use with 4/16 Mbps

Token Ring, 10BASE-T, and 100 Mbps TP-PMD, as well as other high speed applications. The original unit was enhanced by adjusting the spacing between pairs and by revising the quick clip to minimize reactive imbalance between pairs.

The Category 5 unit is fully compatible with all industry standard accessories, including tools, test adaptors, mounting brackets, bridging clips, plug-on over voltage and over current protectors, and line status indicators.

Circle 16 on Reader Response Card

### IRD's Software for Windows

IRD Mechanalysis has introduced its IQ200 Condition Monitoring Software. The IQ2000 uses the graphical interface of the Microsoft Windows operating system to simplify Predictive Maintenance tasks, such as route management, custom reports, and notification of alarm conditions. The software is built on an open architecture Oracle RDBMS that is fully compliant with ANSI, and lets one send data to other Windows programs such as word processors, graphical presentation packages, or maintenance management systems also running under Windows.

Circle 17 on Reader Response Card

### TrueTime's Algorithm

TrueTime has introduced the SATHOP Algorithm for its Model GPS-DC MK III, a Global Positioning System Synchronized Clock. The Algorithm is designed to dramatically reduce the effects of Selective Availability, which degrades positioning accuracy of the GPS system. The SATHOP Algorithm sequences through all available satellites, averages the data, and uses the results to discipline oscillators closer to pre-SA performance levels.

Circle 18 on Reader Response Card

### Check the T-Berd

Telecommunications Techniques Corporation has intro-



duced a DS3 and DS1 G.821 Performance Measurement Option for its T-Berd 310 SONET/DS3/DS1/DS0 Communications Analyzer. The results establish standard performance parameters based on available and unavailable time. These parameters are used during out-of-service installation and maintenance procedures for DS3 and DS1 transmission equipment. The G.821 results can be field upgraded into both new and existing T-BERD 310 test sets.

Circle 19 on Reader Response Card

### Nobels Additions

No1-OF-HAMBURG has added three models to its Nobels Compact series of battery powered utility boxes. The MIX-41C is a four channel mono mixer with four impedance converters, four



adjustable preamps, four volume controls, and master volume control. The SPLIT-4 works as an active signal splitter and volume control, and incorporates an impedance converter, adjustable preamp and four outputs. Nobels' PRE-C combines a preamp with 3-band equalization. The PRE-C also has an impedance converter and features bass, mid, treble, and volume controls. The three units are also offered by Nobels with a distributor's own name and branding.

Circle 20 on Reader Response Card

## LITERATURE

### NCAC Directory; North Hills Note

#### Consultants Directory

The National Council of Acoustical Consultants has made available their 1993 directory of members. The directory includes more than 120 member firms and offers a description of each association's purposes, a matrix of specialties and an outline for selecting an acoustical consultant.

Circle 21 on Reader Response Card

#### Intro to Wideband Transformers

North Hills Signal Processing's new application note, "Wideband Signal Transformers" is a four page introduction to wideband transformers (DC to 1 GHz). Topics covered include Ideal Transformers, Practical Transformers,

Effect of Mismatch, Low and High-Frequency Response, Group Delay, Saturation, Balanced and Unbalanced Transformers, Isolation Transformers, Bridging Transformers and Impedance Matching Transformers. A table of VSWR and Return Loss is also included.

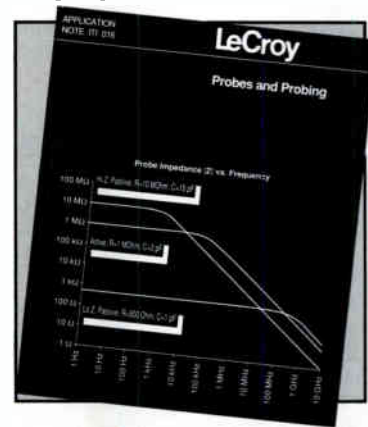
Circle 22 on Reader Response Card

#### Hand Tools Catalog

Willi Hahn Corporation has published a new catalog of Wiha hand tools. Products in the 24 page catalog include screw drivers, T-handles, Bit Selector, Magnetizer/Demagnetizer, dead-blow hammers, awls, screw-holding screwdrivers, a line of Torx tools and the Precision series of 4mm reversible blades.

Wiha also offers insulated tools

which meet necessary standards and are certified up to 100 Volt AC/1500 Volt DC. Some of the new products shown in the catalog are the 6mm reversible blade program with either the ratcheting Topra handle or Power handling



Probes and Precision Tools now available in single carded packaging.

Circle 23 on Reader Response Card

#### Probes and Probing

LeCroy has released a new application note, "Probes and Probing." The note describes problems most frequently encountered in probing electronic signals and discusses how to choose the right probe for various applications. Logic families (whose dynamic characteristics need to be matched with those of their probe) discussed include TTL (Standard, Low Power and High Speed), ECL (10kHz, 100 k, ECLinPS), CMOS (BiCMOS, FACT, HCMOS).

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## CALENDAR

### Upcoming Events

#### AUGUST

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

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

#### SEPTEMBER

**Custom Electronics Design and Installation Association (CEDIA):** Dallas, Texas. Contact: (800) CEDIA-30. September 8-11.

**Electronic Imaging International:** Boston, Massachusetts. Contact: (214) 239-3060. September 14-16.

**National Hearing Conservation Association (NHCA):** Philadelphia, Pennsylvania. Contact: (515) 243-1558. September 23.

**AEI Business Music Conference:** Seattle, Washington. Contact: (800) 345-5000. September 24-26.

**DSP World Expo:** San Francisco, California. Contact: (617) 964-3817. September 28-October 1.

#### OCTOBER

**Video Expo/Image World:** New York, New York. Contact: (800) 800-5474. October 3-7.

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

**National Council of Acoustical Consultants:** Estes Park, Colorado. Contact: (201) 564-5859. October 8-10.

**Media Summit '93:** New York, New York. Contact: (203) 352-8302. October 19-21.

**Rigging Seminars:** McLean, Virginia. Contact: (812) 995-8212. October 25-27.

**Visualization '93:** San Jose, California. Contact: (510) 422-1657. October 25-29.

**Viscomm '93:** New York, New York. Contact: (203) 852-0500. October 29-31.

**SMPTE:** Toronto, Canada. Contact: (914) 761-1100. October 30-November 2.

## PEOPLE

### Renkus-Heinz Hires Sauro; Stantron Appoints Wood

#### Manager at Renkus

Ron Sauro has been appointed Engineered Systems Manager for Renkus-Heinz. Sauro has operated his own company specializing in sound-system design and installation and the repair of sophisticated electronic equipment for the last 20 years. In his new position, Sauro's primary responsibilities will be related to the sale of the EASE, EASE JR and EARS acoustical design programs.

#### Stantron Engineer

Richard T. Wood is the new Chief Engineer of Stantron, a unit of Zero Corporation. Wood was previously employed by Hughes Aircraft Company where he was responsible for physical design engineering. Wood will oversee product designs at Stantron.

#### Luperella at Waterfront

Frank Luperella has been named Vice President of Waterfront Communications Corporation. Formerly Director of Finance and Administration for Waterfront and its affiliate company, Atlantic Satellite Communications, Inc., Luperella will continue in his financial and administrative capacity for Atlantic as he assumes responsibility for all of Waterfront's operational, administrative, and financial functions.

#### Switchcraft Appoints Lazaar

Diane Lazaar is the new East Coast Regional Sales Manager for Switchcraft. Lazaar formerly held sales, servicing and marketing positions at Bell & Howell in Chicago. She is now responsible for managing the activity of Switchcraft's seven US East Coast sales regions, plus Canada.

#### Miller is Director

Edward B. Miller has been named Director of Marketing of The Wiremold Company. Miller was previously Vice President of Engineering with G.S. Edwards Company in Farmington, Connecticut.

Prior to his marketing assignment, Miller held various engineering leadership positions for the Wiring Device Division and was the developer of GE's programmable lighting control business.

#### Inter-Tel President

Steven P. Nichols has been named President of Inter-Tel Communications, Inc., the direct sales division of Inter-Tel, Inc., based in Chandler Arizona. Nichols will be responsible for managing and supervising 12 direct sales offices, and administering operations of 17 centers nationally.

#### Okun Named Eastern Sales Manager

Robot Research has announced the appointment of Kim Okun to Sales Manager — Eastern Region.

Okun has worked as a CCTV specialist and technical sales representative for Aritech and Arius, as northeast regional sales manager for Blue Grass Electronics and as a technical sales representative for National Guardian and Fire-Lite Alarms. She will be responsible for managing all Robot sales in states east of the Mississippi, as well as Texas, Louisiana, Oklahoma and Arkansas.



Okun

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INFORMATION**

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Cards in this  
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companies that  
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# WE CAN SHOW YOU ALL THE FEATURES THAT SET OUR NEW MPL 2242 APART EXCEPT ONE.

□ 22 inputs. 10 XLR balanced inputs featuring a low noise, padless pre-amp design. Six true-stereo inputs.

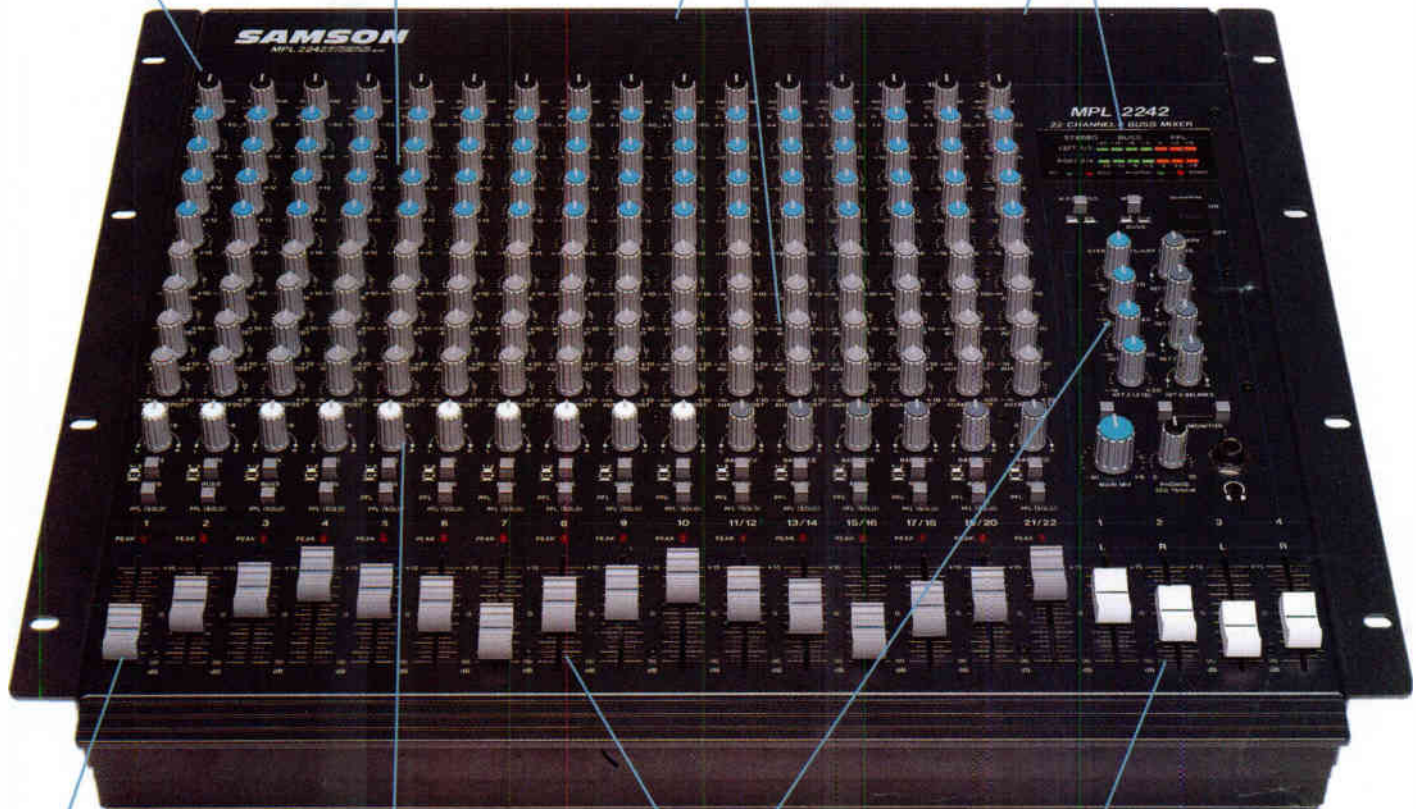
□ 4-Band EQ. High and low shelving filters: low band 80 Hz/high band 12 kHz. Two resonant mid-band filters: low mid 800 Hz/high mid 2.5 kHz.

□ Quad discrete transistor mic preamps.

□ 6 Aux sends: 1 pre; 5 post.

□ Rotating jackfield for conventional mixing or rackmounting.

□ 5 dB more overall gain than any mixer in its class.



□ High quality, center-detent Panasonic® faders.

□ 128 dB overall signal-to-noise ratio, A weighted.

□ Panasonic sealed potentiometers.

□ 10 Hz to 30 kHz frequency response.

□ 4 true-stereo returns.

□ Ceramic hybrid channel design that further reduces noise and optimizes stability.

□ The only 4 buss design in its class (using 4 dedicated sub group faders) with discrete Group and Main summing outputs.

## SOUND.

### **SAMSON AUDIO**

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

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Sam Ash	63	282
Samson Audio	75	212
Samson Technology	3	213
Sharp LCD	25	214
Shure Brothers	29	215
Sonic Systems/Soundsphere	22	249
Sonic Systems/Soundsphere	53	250
Soundtracs	67	211
SVS	40	271
t.c. electronic (east/west)	77	233
Tascam	17	223
Tektone Sound & Signal	56	280
University Sound	C2	202
Vestax	49	252
White Instruments	58	272
Winsted	68	276

**FREE INFORMATION**  
Use the Reader Service Card  
opposite page 18. Just circle the RS#  
of products that interest you.  
Detach, and Mail!

"While every care is taken to ensure that these listings are accurate and complete, Sound & Communications does not accept responsibility for omissions or errors."

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 Phone: 516-767-2500 FAX: 516-767-9335

# PRODUCT CHECK:

## THEME PARKS

Products used most frequently in Theme Park installations . . .

### ... NOW IN PROGRESS

#### PRODUCTS

	FIRST PLACE	SECOND PLACE	THIRD PLACE
PA Amplifiers	CROWN	TOA	ALTEC LANSING
PA Loudspeakers	ATLAS/SOUNDOLIER	TOA	SOUND-CRAFT
Mixers	TOA	YAMAHA	ALTEC LANSING
Signal Processors	YAMAHA	KLARK-TEKNIK	RANE
Switching/Routing Systems	I.E.D.	AUTO PATCH	BSM SYSTEMS
Microphones	ELECTRO-VOICE	SHURE	AKG
● Background Music Systems ●	AEI MUSIC NETWORK ●	3M ●	EMS/MUSIC
Repeaters	BOGEN	I.E.D.	MACKENZIE LABORATORIES
Fiberoptic Links	REVERE INDUSTRIES	FIBER OPTIONS	GEPCO INTERNATIONAL
Lights (Dimmer Systems)	NESS	NSI	TEI ELECTRONICS
Security Systems	AIPHONE	THORN AUTOMATED SYSTEMS	REVERE INDUSTRIES

\* Indicates tie

### ... IN LAST SIX MONTHS

#### PRODUCTS

	FIRST PLACE	SECOND PLACE	THIRD PLACE
PA Amplifiers	CROWN	ALTEC LANSING	TOA
PA Loudspeakers	ATLAS/SOUNDOLIER	TOA	ALTEC LANSING
Mixers	TOA	YAMAHA	ALTEC LANSING
Signal Processors	KLARK-TEKNIK	YAMAHA	RANE
Switching/Routing Systems	I.E.D.	AUTO PATCH	ATLAS/SOUNDOLIER
Microphones	ELECTRO-VOICE	SHURE	AKG
● Background Music Systems ●	AEI MUSIC NETWORK ●	3M ●	EMS/MUSIC
Repeaters	BOGEN	MACKENZIE LABORATORIES	I.E.D.
Fiberoptic Links	REVERE INDUSTRIES	FIBER OPTIONS	GEPCO INTERNATIONAL
Lights (Dimmer Systems)	NESS	NSI	TEI ELECTRONICS
Security Systems	AIPHONE	THORN AUTOMATED SYSTEMS	REVERE INDUSTRIES

\* 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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**IF YOU THINK** paying a higher price guarantees reliability...  
**IT DOESN'T.**

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tolerances, and highest spec components in the  
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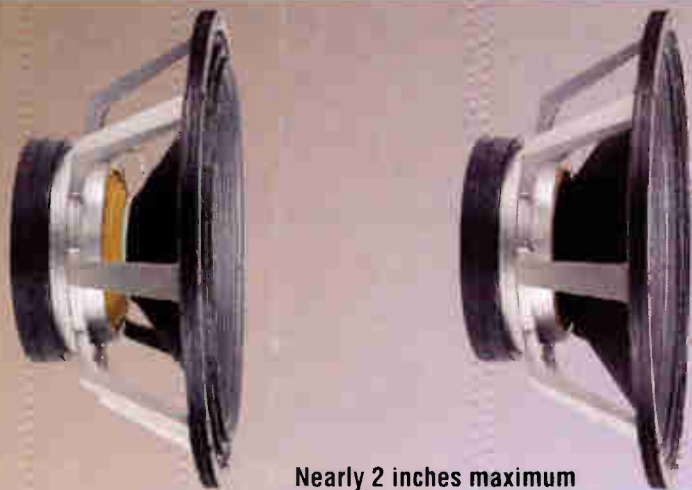


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