SOUND & COMMUNICATIONS

Volume 37 Number 1 January 23, 1991

DISCO SOUND IN A TEXTILE WAREHOUSE

Close work and mutual respect among the architect, the sound contractors and the owners led to the most talked about club opening of the year. Steve Frattalone and Tom Tucker did the sound. But the lighting and the video are not to be ignored. **23**

ROOM COMBINING

Hig ...rth Carolina is the cer... furniture business. Wh... wing at the Home Fur... nter needed a new roo... g system, Select-roc... ion came in with a rea... get and a fast time win... **66**

IN THIS ISSUE

DISCO SYSTEMS

Pre-packaged or build your own. Signal processed or plain jane. Industry experts talk to each other and to sound contractors on what they see and what they do. From last year's NSCA Expo we present the first part of the seminar which brings these questions out in the open. **28**

Controlled, not processed

Spectral balance and controlled protection — a performance combination exclusive to DeltaMax™ electronically controlled speaker systems

Prior to the introduction of the Electro-Voice DeltaMax speaker line, dedicated processor-based systems have all exhibited a common problem — audible changes in sound quality when protection circuitry is activated.

With the development of DeltaMax, this compromise is a thing of the past. The heart of the DeltaMax speaker system is the dedicated DMC controller. The DMC features a dual-time-constant compression circuit with a variable compression ratio which provides protection from amplifier clipping and excessive temperature, while a soft-clip limiting circuit protects against over excursion. All of this is accomplished by broadband VCA compression/limiting without affecting the system's spectral balance or subjective dynamic range. Additionally, the DMC controller also offers crossover, equalization and signal-delay functions.

The DeltaMax line consists of two full-range compact trapezoidal systems, the DML-1122A and DML-1152A, a Manifold Technology® subwoofer, the DML-2181A, the DML-1152MC slant monitor and three dedicated DMC electronic controllers.

All DeltaMax speaker systems employ dual Neutrik (NL 4MP-R) Speakon™ connectors and are available in three-point flying versions utilizing Aeroquip hardware. No other competitive system can deliver the accuracy, reliability or output-per-pound performance of DeltaMax electronically controlled speaker systems.

With DeltaMax, having the best of both worlds is simply a matter of control.

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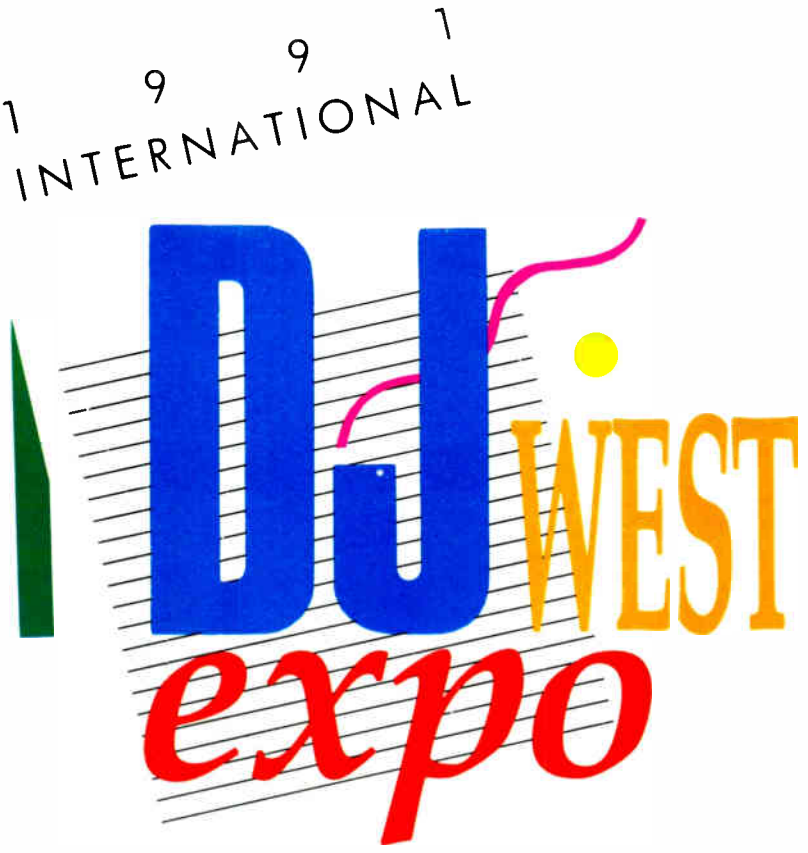

On April 23, 24 and 25 at the Sheraton Universal Hotel in North Hollywood, Cal., mobile and club DJs from around North America will descend on Southern California for DJ Times' 1991 International DJ Expo West. Important seminar panels will be held offering insight to all the hot topics of the industry, including mobile and club DJ tips, DJ gear, club trends and the latest from record companies. All the major players of the industry — record company execs, hot DJs, remixer/producers, equipment manufacturers and consultants — will sit on these panels, which are sure to be instructive to you, the professional DJ. As these panels offer forums for the most professional advice, attending the seminars should greatly enhance your career.

Additionally, there will be three days of exhibitions from the most important manufacturers and distributors of products vital to the club and mobile industries. Check out some of the newest products in the DJ market and get tips from the pros. Take advantage of special show discount opportunities and be the first to see the latest products demonstrated.

As the first International DJ Expo in Atlantic City, N.J., proved to be a smashing success, the West Coast show will surely build on that momentum. Over 1,400 attended the East Coast show which featured 37 exhibitors, 25 panel discussions and three nights of showcase entertainment with rising musical stars like C&C Music Factory and 2 in a Room.

Remember, in this competitive business, knowledge is key. And there will be a wealth of knowledge at your fingertips at the 1991 International DJ Expo.

Raves!

"The people who came were decision-making people. People were there to buy, not just browse. We made numerous contacts with dealers in the area and with end-users."
— Chris Giannoulas, OmniSistem

"I learned a lot."
— Lucien Spalla, Cantek Metatron Corp.

"It was an excellent show for us. We hit the right people-jocks and club owners."
— Pete Bidwell, Stanton Magnetics

"We got quite a good response from the DJs and club owners. It was a pleasure showing off the gear, and I think the show was cost-effective. We're still getting calls."
— Sandy Macdonald, Eastern Acoustic Works

"Informative seminars, good products represented. A great overall first effort."
— Frank Bilotta, Your Music

"Everybody's helping each other out there, that's the biggest part. Industry people are learning from the disc jockeys. And the disc jockeys are learning from the industry people."
— Jeff Greene, Partytime DJ's

"I loved it! I loved the people, the panels, everything."
— Mike Coppola, Boss 97, Vineland, N.J.

It's been nothing but a positive response to the whole show."
— Michael Hennessy, Samson Technologies

One of the Expo's more popular panels was "The DJ As Producer," featuring top DJ/producers such as Jellybean Benitez and Frankie Knuckles.

Singing trio Jomanda won many converts at the group's showcase performance.

Sessions & Seminars

Over 25 panels covering dance music, sound and lighting, and mobile and club topics!

Fresh New Panels on the Agenda:

- That's Entertainment: The Mobile DJ as Entertainer
- House Music: Groove is in the Heart
- West Coast Rap: Pump It Up
- Dance Music A & R
- CD Mixing: Spinning Into the Future
- Promoting Your Club: The Buzz Starts Here
- Marketing/Advertising for Mobile Jocks: Breaking New Ground
- The New Wave of Lighting
- Sound Crafting: Building a Boomin' Club System
- The Industrial Music Revolution

Plus Panels on:

- Master Mixers
- Crossover Radio
- Playing Wedding Receptions
- Dance Club Design Trends
- Record Pools
- Retail
- Video
- Remixing/Production

Highlights of the first International DJ Expo

Dose Material of 2 in a Room got the Superstar Theater crowd to "Wiggle It."

C&C Music Factory performed during the Expo's second showcase night. Here, rapper Freedom Williams dances during the group's smash, "Gonna Make You Sweat."

Star DJ's of Old Bridge, N.J., was one of the 37 exhibitors at the Expo. Here, two DJs demonstrate their skills.

Four DJs spin simultaneously at the High End Systems booth.

LOS ANGELES, CALIFORNIA

Tuesday — Thursday, April 23, 24 & 25 1991

Sheraton — Universal Hotel

Any questions about the workshops or other events — just call the DJ Times hotline (516) 767-2500 or FAX (516) 767-9335

Return this form below before April 5, 1991, and your badge and tickets will be waiting for you at the Pre-Registration desk at Sheraton-Universal Hotel.

Hotel registration discount form and discount travel arrangements will be sent to you within 10 days of receipt of your show registration.

I am a . . .

- Club DJ
- Mobile DJ
- Radio DJ
- Radio PD/MD
- Sound Contractor/Installer
- Lighting Installer/Designer
- Club Owner/Manager
- Architect/Designer
- Audio Equipment Dealer/Distributor
- Lighting Equipment Dealer/Distributor
- Record Tape, CD Retailer/Distributor
- Record Company
- Independent Promoter/Manager
- Agent
- Artist
- Media
- Manufacturers Rep
- Other

YES! Register me now for the 1991 DJ Expo West in Los Angeles (on April 23, 24, 25 1991)

☐ EXHIBITS ONLY (All 3 days)	Before Mar. 5....Free After Mar. 5.$25.00	XXX
☐ DAILY PASS (Includes workshops and exhibits)	Tuesday .....$85.00 Wednesday....$90.00 Thursday $60.00	
☐ FULL EXPO PASS (Show up to all workshops, exhibits, and special events)	(Register by Mar. 5).....$115.00 (Register by April 5) $155.00	
On-Site Registration ($215.00)	TOTAL	$

Check or money order enclosed. US funds only, please
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TITLE

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Daytime telephone (include country and city code if outside the USA)

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Make Check Payable to: 1991 International DJ Expo
25 Willowdale, Ave., Port Washington, NY 11050
(516) 767-2500 Fax: (516) 767-9335

Please photocopy for your files or if you need additional forms.

Act now and save big $$$

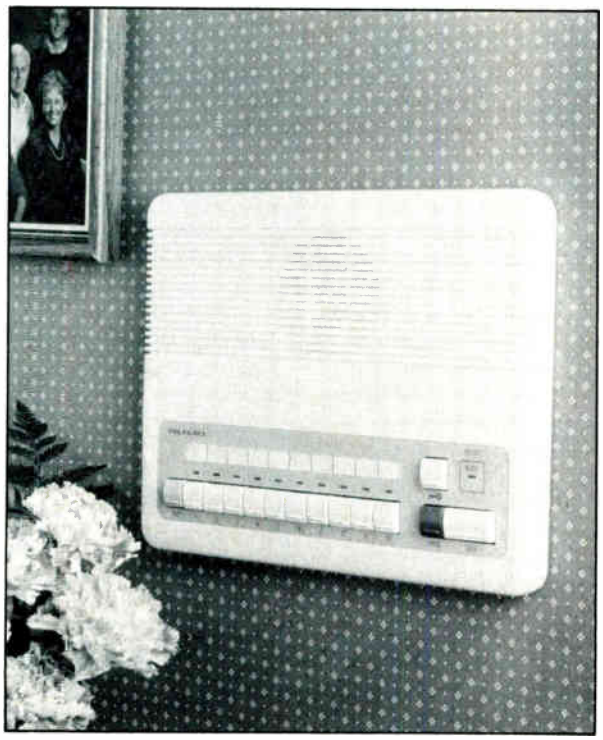
Also

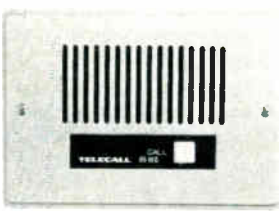
Receive FREE listing in
DJ Expo Program Guide

Deadline

March 5th . . . . For best admission price
April 5th . . . . Last day for FREE listing in program guide
April 5th . . . . And you can still get a discount on show price.

SPLIT PERSONALITY.





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To save both time and money, you can tie the master stations directly to an existing PA system without an adaptor.

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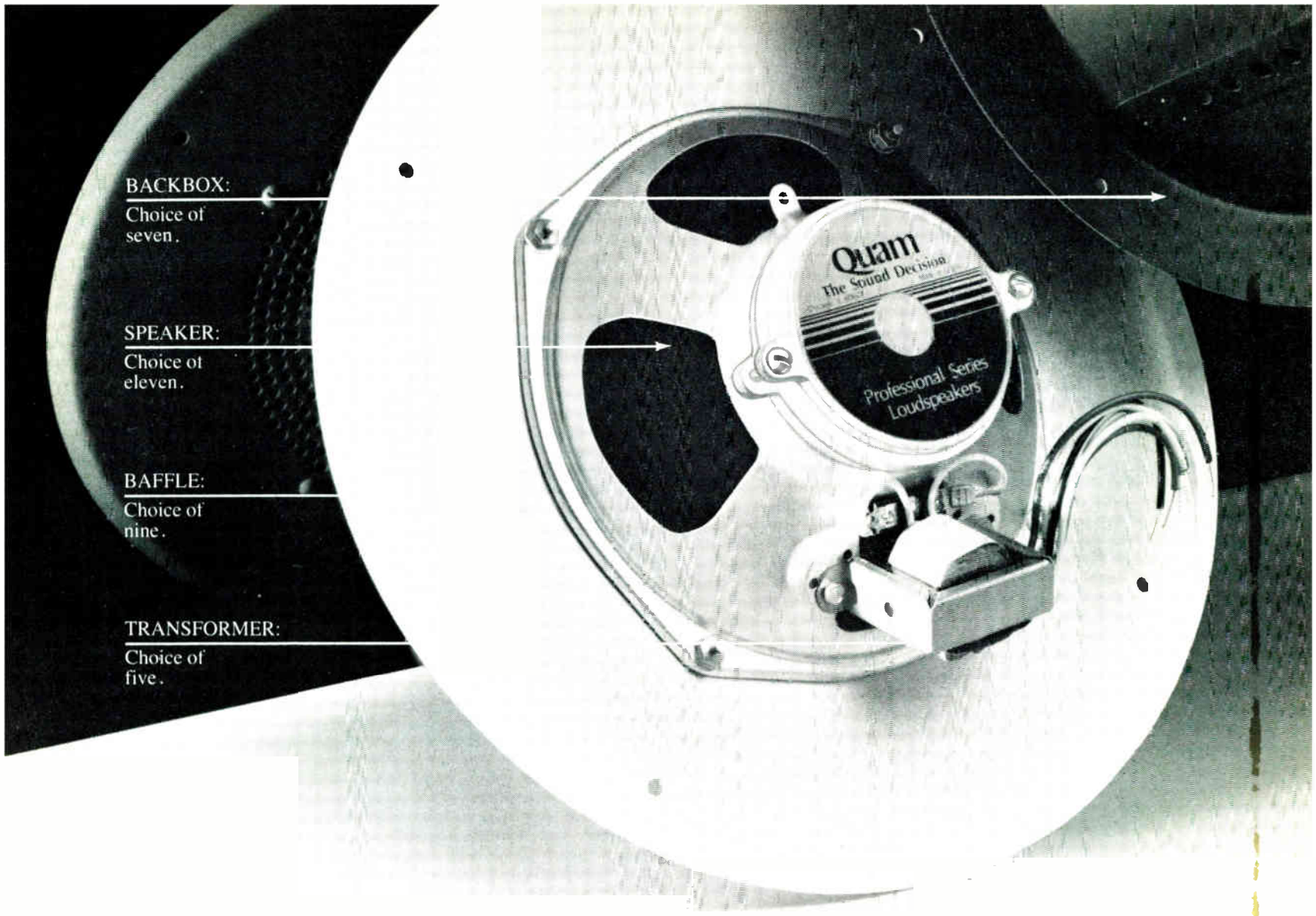

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When we say Quam offers a broad line of 8" assemblies, we don't mean a few speakers with a lot of baffles. We mean 11 different speakers, with nine baffles, to suit virtually any application. Add any of seven backboxes and five transformers (and more of each coming), and you have more than 3450 combinations to choose from.

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Our broad commercial sound accessories line is a change from the days when Quam concentrated exclusively on speakers. And we'll continue to change, adding innovative, high-quality products that help make you more profitable. What will never change is our tradition of quality and service.

Make Quam your Sound Decision. Call or write now for your free Commercial Sound Products catalog, and we'll add you to our mailing list for catalog updates and product announcements as they occur.

Quam: The Sound Decision

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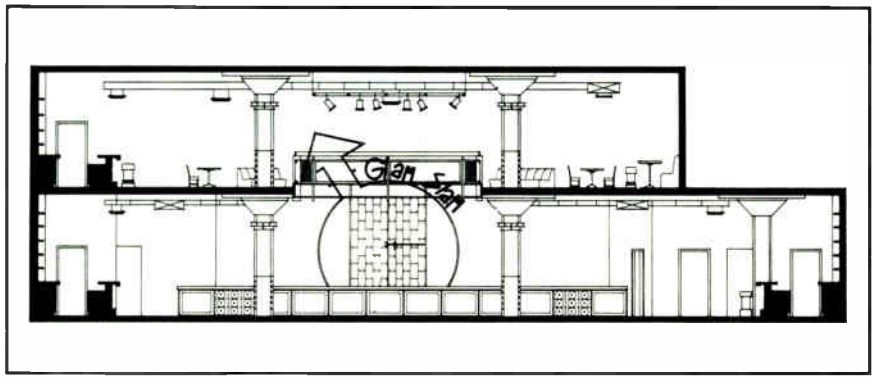
January 23, 1991



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FEATURES

DEPARTMENTS

WORD WPW SEARCH
WEST PENN WIRE

CUSTOMER SATISFACTION

WITH GENERIC CABLE, YOU DON'T HAVE A CLUE ABOUT QUALITY.

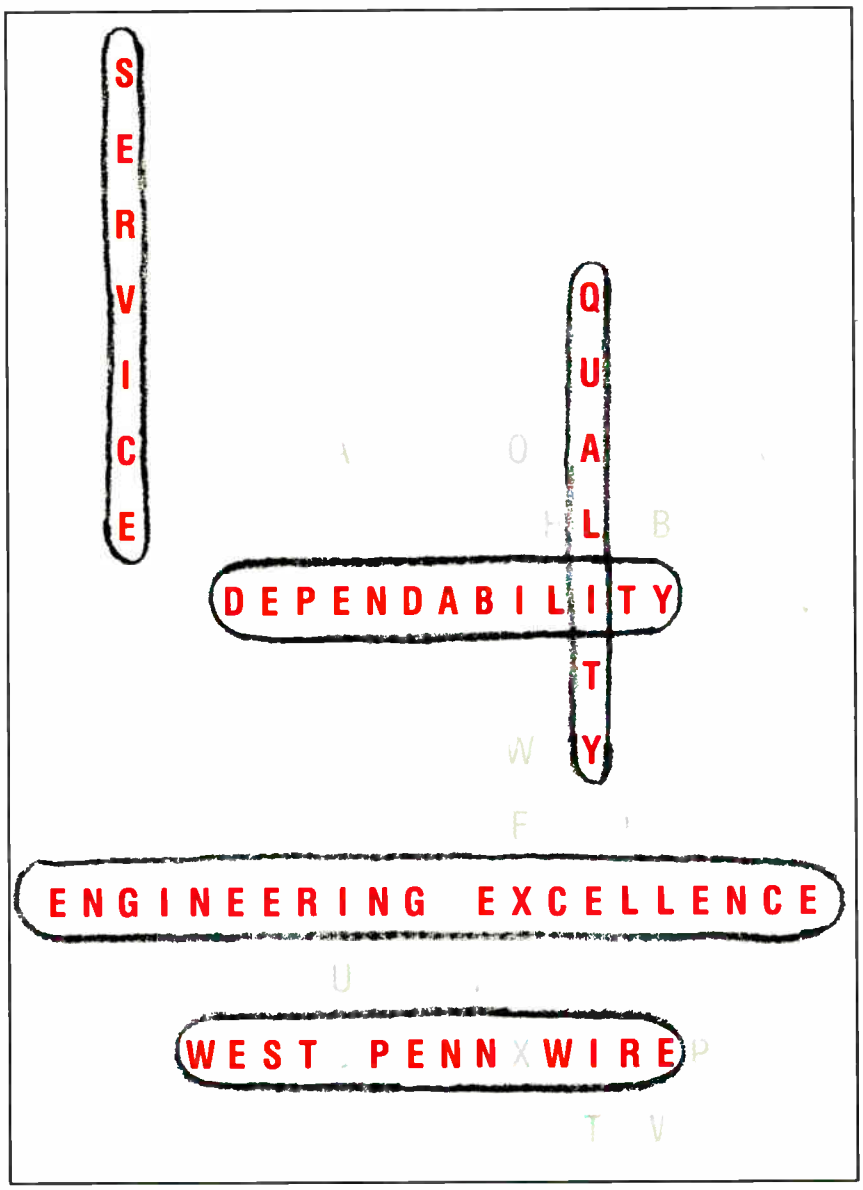
Choosing generic low-voltage electronic cable can be a puzzling experience. While generics may look like other electronic cables, you never really know for sure where they came from, what they're made of or how they're going to work once they're installed.

Thankfully, West Penn Wire has taken the mystery out of low-voltage cable. For over 18 years, West Penn Wire, a leading name-brand producer of quality electronic cable, has manufactured products you can count on for the long haul. Products like CL2, FPL, CM, plenum and non-plenum cables that meet and exceed the new NEC Codes. Products backed up with service that the generics just can't match.

So don't take a chance on an unknown cable in your low-voltage installations. It might leave you baffled when you really need a connection.

West Penn offers a complete selection of low voltage electronic cable. All backed by the dependable quality, service, competitive pricing and engineering assistance you've come to expect from West Penn Wire.

Contact the cable experts at West Penn Wire today. Call us on **800-245-4964** (in PA 800-222-8883) or write P.O. Box 762, 2833 West Chestnut Street, Washington, PA 15031. Fax 412-222-6420.



WPW WEST PENN WIRE
NOT EQUAL...BUT BETTER.

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THE WIRE GROUP
INTERCONNECT SYSTEMS PRODUCTS

NEWSLETTER

AES-SMPTE JOINT MEET

The Audio Engineering Society and the Society of Motion Picture and Television Engineers will host the 25th Annual Television Conference of SMPTE on February 1 and 2, 1991. To commemorate the 25th anniversary, the conference will be held in Detroit — site of the first SMPTE television conference. The theme of the conference is "Television Sound Today and Tomorrow." Twenty-six invited AES papers on audio, and 26 SMPTE papers on video technology will be presented.

SENNHEISER NEUMANN ACQUISITION

At press time, the implications of the purchase by Sennheiser Electronics of Neumann & Co. were still unclear. The acquisition becomes effective in Germany in January at which time Dr. Sennheiser is expected in the U.S. and will meet with the press. Neumann is currently distributed in the U.S. by Gotham Audio.

MULTIMEDIA AT INFOCOMM

The Infocomm show in Orlando February 14 through 16 will be the site of the Interactive Video & Multimedia Conference and Showcase. Kenton Pattie, executive vice president of The International Communications Industries Association, sponsors of Infocomm, said, "The industry is changing as computer users are discovering new ways to communicate." Infocomm will host, for the first time, the Cindy Awards, produced by the Center for the Study of Interactive Learning, recognizing excellence in film, video and interactive multimedia presentations.

APPOINTMENT FOR DYNACORD

Altec Lansing has appointed Mark Bird to the position of marketing manager for Dynacord products, following the acquisition last year of Dynacord by Mark IV and the placing of Dynacord under the Altec Lansing umbrella. Bird is responsible for the marketing of Dynacord sound reinforcement products, including loudspeakers, amplifiers, mixing consoles and sound processing products. Tim Smith continues to handle the Dynacord ELA products. Bird was previously with Kurzweil. Concurrently the company has announced the Dynacord PCA Series processor controlled power amplifiers featuring "Dynamic Signal Processing."

WEST COAST DISTRIBUTOR

Middle Atlantic Products has acquired full west coast distribution via Elcom, the west coast distribution company. Elcom will stock the full line of Middle Atlantic products to all segments of the market.

ICA-EXPO

ICA Expo '91 will be held June 4 through 6 in the Anaheim Convention Center. According to the ICA (International Communications Association), 130 companies have reserved more than 95,000 net square feet of exhibit space so far.

DSP COURSE IN JUNE

Purdue University is sponsoring a "short course" on Applied Digital Signal Processing June 10 through 14 at the University's School of Mechanical Engineering in West Lafayette, Indiana. The course costs $1,500 to include course notes, lunches and refreshments. The course will emphasize background theory and applications in the analysis of data. The lectures are supplemented with demonstrations and laboratory sessions where attendees will have hands-on experience using Bruel and Kjaer two channel analyzers and the engineering computer network at Purdue. Lecturers are from the School of Mechanical Engineering at Purdue, the Institute of Sound and Vibration Research in England and Bruel and Kjaer Instruments. Inquiries can be addressed to Patricia Davies or Phyllis Hurst at the Ray W. Herrick Laboratories at Purdue.

DEALER OF THE YEAR

Strategic Products and Services, Inc. of Omaha has been named AT&T Dealer of the Year, the highest award granted to independent dealers of AT&T telecommunications products for small business. SPS has 87 locations in 33 states. The company has had 40 to 50 percent growth per year in the past two years and expects to double in size by 1995.

NEWSLETTER

VIDEOCONFERENCING FOR GOVERNMENT

The state of Illinois has activated full motion full color interactive videoconferencing systems. The equipment was supplied by Videoconferencing System, Inc., a wholly owned subsidiary of Fi-Tek III. Illinois governor James R. Thompson said, "With the new facilities, state employees can hold face-to-face meetings and avoid the travel costs formerly involved." Two systems, customized versions of VSI's Spectra system have been installed in Chicago and in Springfield. Individual state agencies are assessed an hourly rental of $275.

US SOUND INSTALLATIONS

US Sound has completed two installations using its "Coherent Zone" engineering technologies and loudspeaker system components. The locations are the Omni in Atlanta and Madison Square Garden in New York. The Omni's large open-beam ceiling allowed for conventional rigging practices. The Madison Square Garden installation was completely custom-engineered to comply with the venue's requirement of a very low profile and a "fit" into the acoustical steel ceiling. Both sound systems use Carver PM-1200 amplifiers.

MARANTZ NAME SOLD

Dynascan Corporation has entered into an agreement with Philips Consumer Electronics of the Netherlands to sell the Marantz brand name for $8 million. Philips already owns rights to the Marantz name outside of North America. Dynascan, however, will continue to sell a line of professional tape recorders under the Marantz name. Headquartered in Chicago, Dynascan designs and markets consumer electronics products sold under the brand names of Cobra, Lloyd's and Marantz.

VIDEOTAPE AVAILABLE

Sound Concepts has announced the availability of a videotape that is intended to show the "best ways to set up and use sound reinforcement equipment." The 75-minute video has a suggested retail price of $39.95 and is titled "Live Sound! How to Run Your PA System." The presentation is hosted by David Scheirman. Sound Concepts is located at P.O. Box 831, Julian, California 92036.

NHK REPLACES REVERBERATORS

NHK, the Japan Broadcasting Corporation, has reportedly replaced all of its analog reverberators with Lexicon's 480L Digital Effects System. The system is used throughout NHK's television, radio and recording studios and at the NHK Concert Hall.

NOTRE DAME GETS VIDEO PROJECTORS

Sanyo's Industrial Video Division has announced the purchase of two PLC-100N LCD video projectors by Notre Dame Football. The units are to be used to display playbacks of Notre Dame games to players and coaches. The college plans to purchase two more units. According to Chuck Linster, video coordinator of Notre Dame's Athletic Department, "The ability to play back videos while we are on the road is critical. Until now that meant the use of heavy three tube projection units. By incorporating a built-in speaker, the PLC-100N doesn't require us to scramble for extra support equipment."

NEW INVOLVEMENTS

Two announcements have been made on the current endeavors of Arnie Nudell, founder of Infinity Systems, Inc. Nudell has been appointed Executive Vice President of Audio Products International, the design and marketing subsidiary of Global Sound Systems, which markets under the brand names of Mirage, Energy and Sound Dynamics. Additionally, Nudell has joined forces with Paul McGowan, founder of PS Audio, to market a new line of high end hi-fi loudspeakers to be sold under the name of Genesis. The line consists of three full-range models and two powered servo-controlled subwoofers.

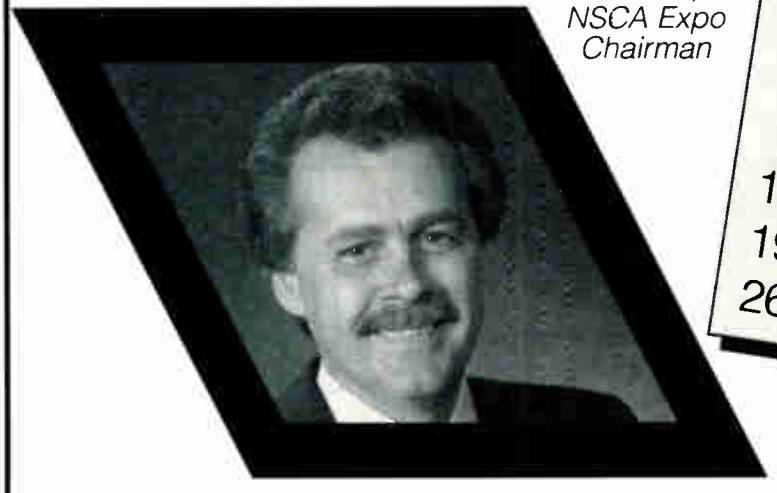
GENTNER LAZER

Gentner Electronics Corporation has released Lazer, a digital FM limiter/stereo generator to provide FM stations with digital audio processing technologies.

NSCA

CONTRACTOR'S CONFERENCE & EXPO '91

CINCINNATI CONVENTION CENTER
MAY 20-22



Jack Toerner, *NSCA Expo Chairman*

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NSCA

Phone for registration info today!

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*Contractor Caper Welcome Party - Everyone invited!

LETTER FROM THE EDITOR

New Faces and Places

There's good news and there's bad, although in this case the bad news is very good indeed. Nancy Davis is no longer Advertising Director of Sound & Communications magazine. She has been promoted to Director of Sales and Marketing for all of Testa Communications; and John Carr has joined our staff as Advertising Manager of this magazine.

Those of you who know Nancy Davis know how very good the news was when she took over that position a year and a half ago. And those of you who knew her before then — in various marketing positions at Testa Communications and at other publications — cheered Vinny Testa's offer and Nancy's agreement to take that position. Nancy's flair and business acumen has always placed her, to my mind, in an elite group of sales and marketing professionals. She has always impressed me with her tireless dedication in *servicing* her clients and her non-clients in the industry at large. Nancy is that rare salesperson who sees beyond the immediate sale to editorial and marketing possibilities connected with whatever an individual company is doing.

Unlike other magazines, those of Testa Communications keep editorial and advertising personnel and concerns separate. But that doesn't mean we don't talk to each other. And Nancy's editorial input has always been non-intrusive, intelligent and useful.

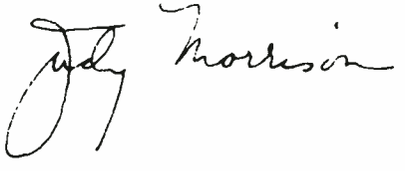
Her insight will now be available to all the properties and business relationships of Testa Communications. She is directing the marketing of five magazines, seven television shows, and at least two expositions a year. So while we'll miss her day-to-day involvement in Sound & Communications, we applaud her promotion as the right move within a company that is growing to the point where it needs the kind of direction she can provide as an aid to Vinny Testa's endeavors. And as Director of Marketing she will of course be providing overall direction to the sales and marketing of Sound & Communications.

With John Carr's arrival in our offices, we are staffed with the best sales staff in the business. John has an engineering and telecommunications background, serious interest in this industry, and a knowledge of the advertising business. He also, as does Nancy, has a belief in servicing the account, providing the best program for his advertisers.

All this is not strictly speaking an editor's concern in a company where the editors don't sell advertising and the sales staff doesn't assign or write articles. As I said before, this isn't necessarily an attitude followed by other magazines. However, my involvement in any publication is predicated on the abilities of the people around me. And I couldn't ask for a better marketing staff.

I mentioned before the expositions put on by Testa Communications. Yes, it's true. In October DJ Times, one of our magazines, sponsored DJ Expo on the east coast. It was a success and will be followed by one in Los Angeles in the spring. In this issue of Sound & Communications you can read about our first expo endeavor. And in this, our special nightclub issue, you can read about installations, equipment, and ideas specific to that aspect of the business.

Enjoy, and have a happy new year.



Judith Morrison
Editor in Chief

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"It's an exhibition which, if I didn't come, I would miss it. I did one year, one year out of 15 I didn't come, and I missed it terribly and I was about a year behind on the information. So we're here every year."

– Bob Jackson
Media Tech

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(Exhibit Dates: February 14-16)
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COPY PROTECTION REVISITED

By Mike Klasco

A letter appeared in our office recently castigating Mike Klasco on what the writer perceived to be Mike's published opinions on Copy Protection. We forwarded the letter to Mike, and publish here both the letter and his response. —Editor

The Letter:

I am dismayed by the article "Copy Protection" that appeared in the September 17 issue. Author Klasco all but admits that any negative aspects of a product will henceforth not be mentioned without the concurrence of the manufacturer. This policy completely discredits the integrity of any future product reviews in your publication. Your publication would be well advised to publicly renounce this policy.

Scott Campbell
Scott Campbell Engineering
Melbourne, Florida

Mike Klasco's response:

Dear Scott,

I think we have a failure to communicate! I'd better clarify a few aspects of the editorial. Most significantly, its main purpose was to state that my not commenting on copy protection in the reviews of software was the exception, not the general policy.

All the reviews that we publish are sent to the software developer for discussions of errors and omissions. It is not easy to learn and master a half dozen or so programs a year and then prepare the review. It is not unusual for the software developer to have some solution for a problem or criticism. Just as often, this solution is undocumented, and I comment on all of this in the review. I usually ask the software developer to generate the relevant graphics for the review. After two years of reviewing these programs, it is apparent

HE GROUPS ME WITH HIS DENTIST, A NECESSARY EVIL.

that these steps enhance the quality and accuracy of these reports. If the software developer (or test equipment manufacturer) can demonstrate and convince me of their position, then I revise that aspect of the review. More often than not, I am not convinced, and after my appropriately rude remarks in the review, I include a comment on the software developer's position on the matter.

Even the most casual reader of these reviews is aware that I spend as much time talking about what I do not like, as what I do like. I try to keep my negative comments constructive, although one program developer remarked that he groups me with his dentist, a necessary evil. I suppose this is better than being grouped in with the tax man. When a program is really off-base, I will can the review. There is just not enough space or time to spend on a funky program. Why lead on a reader just to tell him to forget it?

AFTER MY APPROPRIATELY RUDE REMARKS IN THE REVIEW, I INCLUDE A COMMENT.

An example of a program that was not reviewed was the French NexoCAAD. At the time the price was too high, some of the modeling techniques questionable (awkward creation of room models and a serious compromise in characterizing speaker radiation), and most important of all, they had not been able to find a U.S. agent. But when NexoCAAD is real, we will review it. Of course we could have asked the developers themselves to review the program. No doubt they would like their software very much! But we don't do that sort of thing.

NOW CONSIDER THE SOFTWARE DEVELOPMENT COSTS.

While I am not "in-cahoots" with the manufacturers and program developers whose programs I review, I need to more clearly state why copy protection might be considered legitimate. With AutoCAD, the customer base is enormous. Autodesk, the publisher of AutoCAD, has gross sales of this software product of about $100 million per year, roughly about the same order of magnitude as the gross sales of any of the big pro audio companies. Although there are less expensive "beginner" versions of AutoCAD, by the time most users have what they need, they have spent about $3,000 for the program.

Now consider the software development costs of AcoustaCADD, Modeler, CADP2, etc. Assuming each of these programs represents three to five engineers working for three to four years, add the cost of management support, secretarial support, a roof over their heads, and you have a starting investment of $500,000 to more likely $1 million or more. Once the program is released, the expenses will increase with the cost of manuals, training programs, support staff, new release development costs, and so on. If you go

Spending years on end cooped up in small, dark rooms with a bunch of engineers takes certain special qualities. Durability, for one. We've always been known for that. Of course, clear, uncolored sound quality doesn't hurt, either. Or hand-assembled components, with gap precision to plus or minus one-millionth of an inch.

These features got TAD speakers into studios like Record Plant, NOMIS and Masterfonics. And the same features are now getting us out of them.

See, we had this funny idea that if TAD could make music sound terrific in a small room, we could make music sound terrific in a huge arena. And every outing we've had with Maryland Sound has proved us right.

Not that we won't still work our woofers off in studios from L.A. to London all day. But, at night, we'd like to get out and jam more often.

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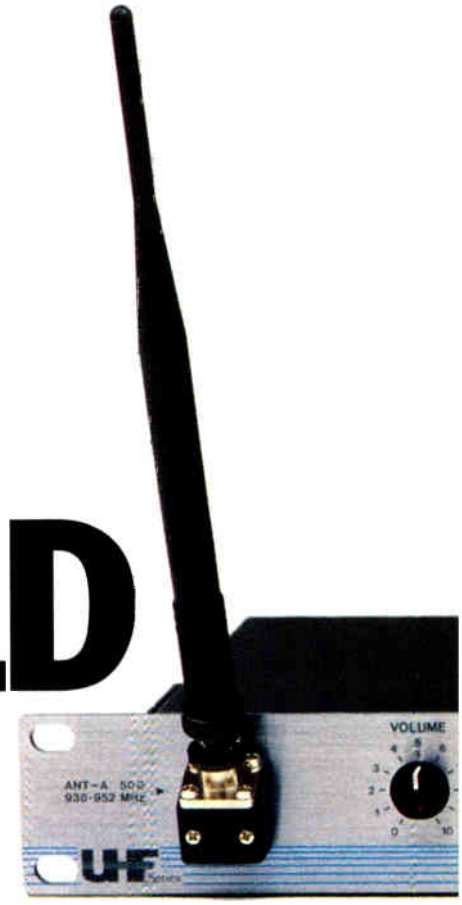
EIGHT THINGS YOU SHOULD KNOW ABOUT UHF WIRELESS.



UHF's time has come.

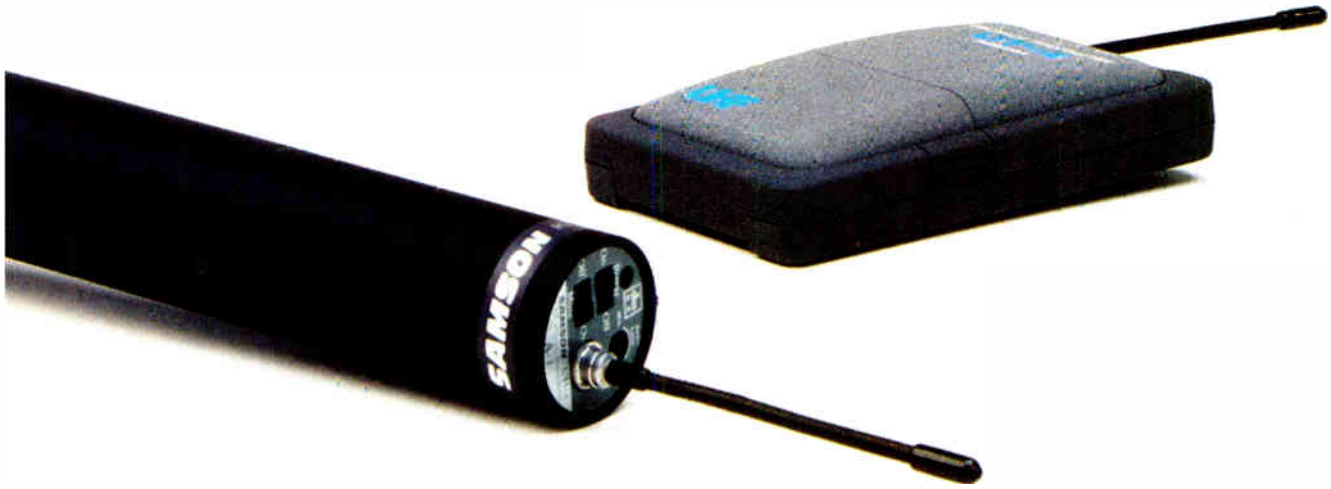
With the introduction of the Samson UHF* Series, we thought it might be helpful to provide you with new information about this technology.

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

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

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

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



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

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

7. UHF is more expensive. Until now. Because of robotics assembly techniques and the very latest in surface-mount technology, Samson was able to make UHF a realistically priced option for a whole new class of users.

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

In case you were reading too fast, we wanted to remind you that this ad is about UHF, not VHF wireless.

As long as you are reading our ad this closely, we thought we'd tell you who they are. Yukimasa Koike, Doug Bryant, Takao Horiuchi and Susumu Tamura.

†dbx is a registered trademark of Carillon Industries.

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through the numbers of how many programs might be sold, maybe 200 — 600 of any one program, at an average of $1,000 each, then the gross sales will be $200,000 to $600,000. Obviously the numbers do not add up, except as a way to enhance corporate image and as an engineering sales tool.

Non-corporate efforts, such as the PHD program, are the exception to commercial non-subsidized efforts, and Ambassador College and a number of individuals ended up donating their time, only to have users complain of lack of support and slow delivery of manuals!! Perhaps any non-commercial subsidized effort is doomed as the complexity and sophistication increases. For example, intelligibility measures in the latest programs have required big corporate bucks for funding proprietary research into STI predictive measures. Other research on speaker modeling interference effects, and development of high resolution directional pattern measurement systems are also beyond the scope of self-sustaining efforts.

COPY PROTECTION CERTAINLY OUGHT TO BE DISCLOSED TO POTENTIAL USERS.

What this all leads to is that I can understand the legitimacy and practical need for protection of intellectual property in the case of sound system engineering software. My heart does not bleed for record companies or movie studios, or even AutoCAD, but the numbers are not quite right for sound system software. At least a few software developers feel their projects are vulnerable to corporate scrutiny on this point. So we get back to the reason for the editorial in question; I will not comment on software protection in the review, as copy protection sometimes is used by software developers to satisfy management that their investment in this research will be reserved for the intended beneficiaries. Perhaps this problem is one of management perception, rather than reality, but this is not relevant.

The point of my editorial was that while I dislike copy protection, this does not need to be discussed in the review. But I feel it certainly ought to be disclosed to potential users, in the software literature, in the licensing agreement, and in the manual. So be sure to discuss this aspect and its ramifications before you license one of these programs. I promise nothing else will be sacred. ■

THE THREE Rs in ACOUSTICS

By Don and Carolyn Davis

Three acoustic parameters relevant to understanding how speech intelligibility is obtained in enclosed spaces are: Reverberation time in secs; Reverberant level in dB; Rate of decay in dB/sec.

It has been our experience that few sound men can define these three terms properly. Since you may have doubts about such a strong statement, we would like you to take a moment and write out your understanding of the meaning of the terms. (Our answers appear at the end of this article.)

REVERBERATION TIME

Most important: In order to measure reverberation time, you must first have a reverberant sound field. This nuisance is often overlooked or simply ignored, so most data quoting RT_{60} are, at best suspect, and at worst totally misleading. One has to despair for the future of acoustics when we watch the multitudes measuring RT_{60} on their latest "Wunderbar" 1/3-octave analyzer at less than critical distance, D_c, in rooms where what reverberant level there is hovers 3 dB above the ambient noise level. (See Figure 1.)

Sabine proposed at the turn of the last century, and we reaffirm it again at the turn of this century, that a mixing homogenous sound field is a fundamental requirement of an RT_{60} measurement. So! The happy measurer must be beyond D_c in a highly reflective enclosure so that the direction of arrival of the sound energy is equally likely from every direction.

Then, and only then, can we endeavor to measure the time it takes for the sound field we have excited in some manner to drop in level by 60 decibels (a reduction in acoustic power of 1,000,000 to 1.0). In actual practice, some portion of this change is measured and then extrapolated to obtain the full 60 dB.

IN ORDER TO MEASURE REVERBERATION TIME, YOU MUST FIRST HAVE A REVERBERANT SOUND FIELD.

How important is RT_{60} to speech intelligibility? Probably not as important as is the quality of the reverberant sound field — its level, diffuseness, and ergodicity. The RT_{60} number used in the most accurate method of speech intelligibility depends on the Early Decay Rate (EDR), not the decay rate of the statistical reverberant field decay. (See Figure 2.)

SOUND FIELDS — LABELS AND MEASUREMENTS

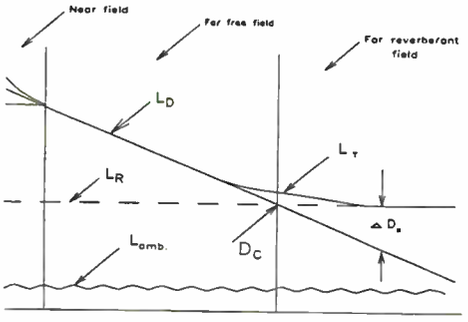

Figure 1: SOUND FIELDS-LABELS AND MEASUREMENTS: The direct sound level L_D. The Early Reflected sound level L_{RE}. The Reverberant sound field level L_R. The Ambient noise level L_{amb}. The Total sound field level L_T.

$$L_T = 10 \text{ Log } \left(10^{\left(\frac{L_D}{10}\right)} + 10^{\left(\frac{L_{RE}}{10}\right)} + 10^{\left(\frac{L_R}{10}\right)} + 10^{\left(\frac{L_N}{10}\right)} \right)^{L_{amb}}$$

THE REVERBERANT LEVEL

The classic equation for the level of the reverberant sound field is:

$$L_R = L_W + 10 \text{ Log } \left(\frac{4}{S\bar{a}}\right)$$

where L_R is the level of the reverberant sound field in dB. L_W is total acoustic power in watts expressed as a level in decibels, $S\bar{a}$ is the total number of sabins of absorption. In the U.S. one Sabin is one square foot of open window. In Europe and elsewhere, where S.I. dimensions are used, one Sabin is one square meter of open window. It is important not to overlook this obvious difference in generating computer design programs or in using them.

The L_{RT} is compared to the direct sound level, L_D, in speech intelligibility measurements. The ratio of direct-to-reverberant D/R is expressed in levels as $L_D - L_R$. For practical cases it is almost always a negative value because most listeners sit beyond D_C. Whenever a higher Q source allows the same L_D for a lower L_W, the L_R is lowered. (See Figure 3.)

Higher Q sources not only provide L_Ds at lower L_Ws but also force the energy that will eventually reach the reverberant sound field to take a longer-in-time (hence distance) path. This results in the typical dual slope decay rates observed on Energy Time Curve (ETC) measurements. (See Figure 4.)

In actual measurements L_R is almost always lower than calculated and never higher.

RATE OF DECAY

Rate of decay is measured in dB/sec and its relationship to RT_{60} is expressed as:

$$\frac{60 \text{ dB}}{RT_{60}}$$

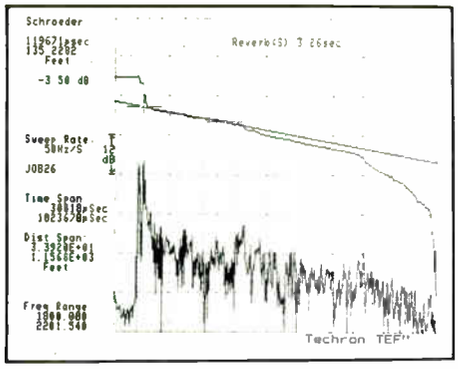

Figure 2A. An example of ignoring the early sound from a high Q source and computing RT_{60} from the steady state reverberant sound field.

Thus if it's a sec RT_{60} then the rate of decay is:

$$\frac{60 \text{ dB}}{3 \text{ sec}} = 20 \text{ dB/sec}$$

(See Figure 5.)

How fast a series of early reflections decay into the ambient noise floor after transient excitation is more important than the rate of decay for the steady state reverberant sound field. Now that we have such sophisticated tools to measure it with, we can come closer to seeing cause and effect in semi- and non- reverberant spaces.

In some cases, even a single specific reflection or a very limited series of reflections can cause severe interference with speech intelligibility. (See Figure 6.)

It is in this type of situation that canopies over pulpits have been observed to improve speech. It's not the reflections off the canopy back to the audience that is beneficial, but the fact that the canopy blocks energy from going to some distant surface to be returned as a focused interfering signal of high amplitude and unfavorable delay.

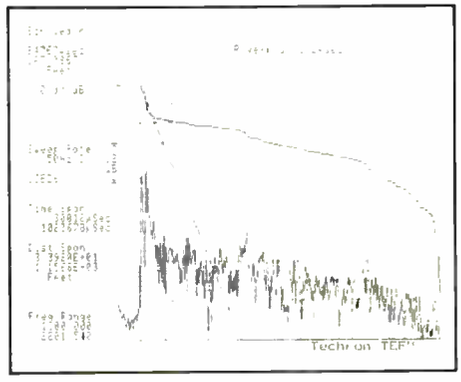

Figure 2B. A more "realistic" viewpoint so far as speech intelligibility is concerned. Here the first 10 dB of decay is extrapolated to obtain the RT_{60}. (In the previous plot, the second 10 dB of decay was used.) An RT_{60} = 0.24 secs is 250 dB/sec or 40 msec/10 dB. This rapidity of decay is of importance to speech intelligibility in such a room. Failure to decay this rapidly causes one word to be smeared into another.

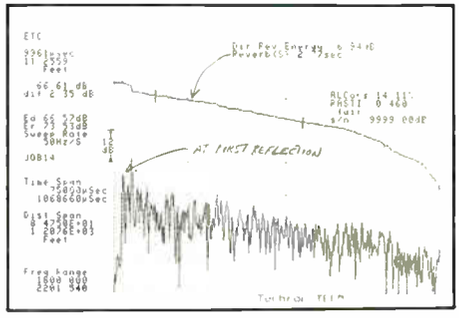

Figure 3A. A low Q device measured well beyond D_c with a TEF analyzer adjusted to remove a major portion of the travel path.

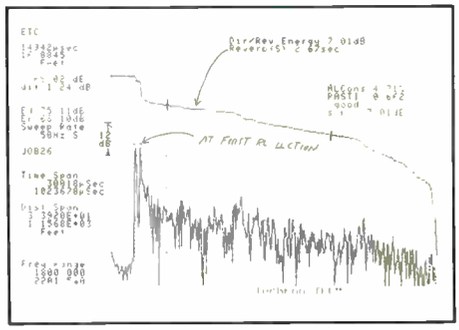

Figure 3B. A high Q device, measured under the identical conditions. Note how much higher L_D is and how much lower L_R is even though this device and the device in Figure 3A were both producing the same L_P at the measurement point.

The wizardry being exhibited by today's advanced TEF users lies in their sensitivity to early reflections and source mis-synchronizations, their ability to measure rapidly and precisely the effect, and the tool knowledge to apply an economical solution.

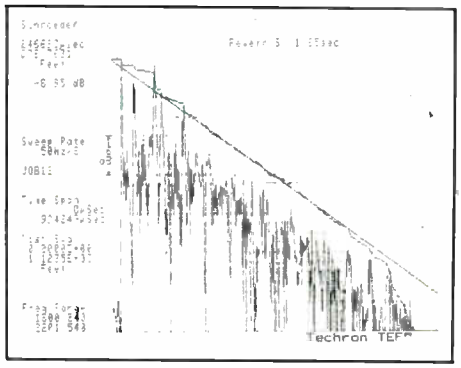

Figure 4. An example of several early changes in rate of decay as evidenced by the measured data that rises above the average regression line.

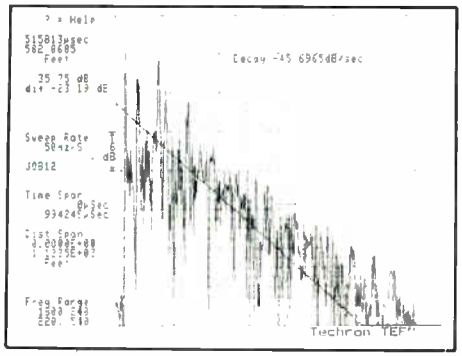

Figure 5. A reverberant field computed as a rate of decay: −45 dB/sec translates into an RT_{60} = 1.33 secs.

CONCLUSION

If at the beginning of the article you defined *Reverberation time in seconds* as: The time in seconds that it takes a steady state reverberant sound field level (measurer is beyond critical distance), upon cessation of the acoustic source, to drop in level by 60 decibels,

$$RT_{60} = \frac{55.26V}{S\bar{a}\ c}$$

and you defined *reverberant level in dB* as:

The steady state level of the sound field beyond critical distance from the steady state acoustic source. Beyond D_c being defined as appreciably free of inverse square law effects.

$$L_R = L_W + 10\ \text{Log}\ (\frac{4}{S\bar{a}})$$

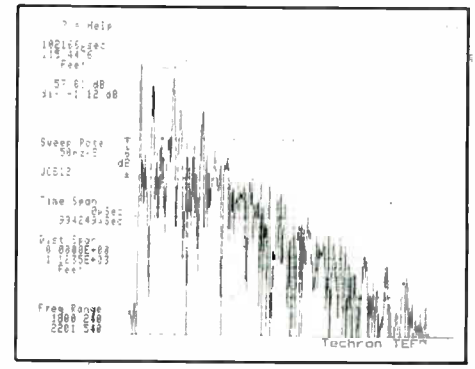

Figure 6 An example of a long delayed reflection at too high a level. This reflection arrives 102 msecs after the direct sound and is only 1.12 dB below the direct sound. Note that even in this extremely "live" room only four reflections are causing the difficulties.

and finally if you defined rate of decay as:

$$\text{rate of decay} = \frac{60\ \text{dB}}{RT_{60}}$$

and understood that it could also be applied in rooms as the rate of decay of early reflections at given specific locations in rooms that do not have a measurable reverberant sound field, you are indeed blessed with a workable knowledge of the 3 Rs of acoustics. ■

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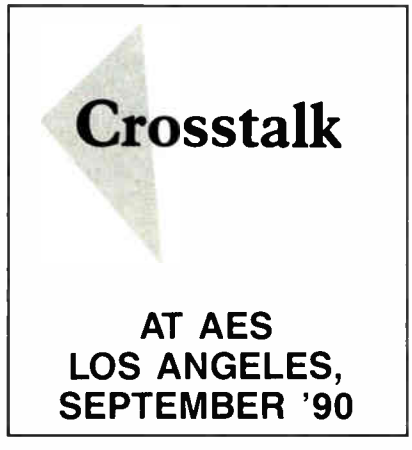

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Glam Slam in Minneapolis

Textile Warehouse Parties Down

BY MALCOLM HOWARD

When contractors Steve Frattalone and Tom Tucker took on the task of painting their own acoustical signature on the new Minneapolis club Glam Slam — modeled after a nightclub owned by Prince and Morris Day in the latest Prince movie "Graffiti Bridge" — they started where any self-respecting graffiti artist would: The walls.

The Minneapolis-based sound contractors, who merged last year to form Tucker Frattalone Corporation, began to leave their mark early in the design phase by working closely with K.K.E. Architects to make sure the walls, ceilings and other open surfaces would work toward transforming a highly-reverberant textiles plant into a thundering, but acoustically clean, dance club.

The DJ booth is almost as wide and sits directly across the stage.

A NATIONAL SOUND

Prince has already put his hometown on the map with Paisley Park, a record label and studio; "Purple Rain," his first motion picture depicting the Minneapolis music scene, and with his own musical styles. Now club owners Gilbert Davison and Ruth Whitney hope to follow suit with a 20,000-square-foot party space that accommodates 1,200 people.

As far as sound, Tucker and Frattalone feel they've come up with a system worthy of national attention. "I'd say you won't find a system like this anywhere in the Midwest, even Chicago," said Tucker. "You'd probably have to go to L.A. or New York."

Set in Minneapolis's historic warehouse district — where several scenes. "Graffiti Bridge" were shot — the renovated Wyman/Partridge Building at 110 N. 5th Street is still faithful to its turn-of-the-century industrial roots as well as its fictional counterpart in the latest Prince flick.

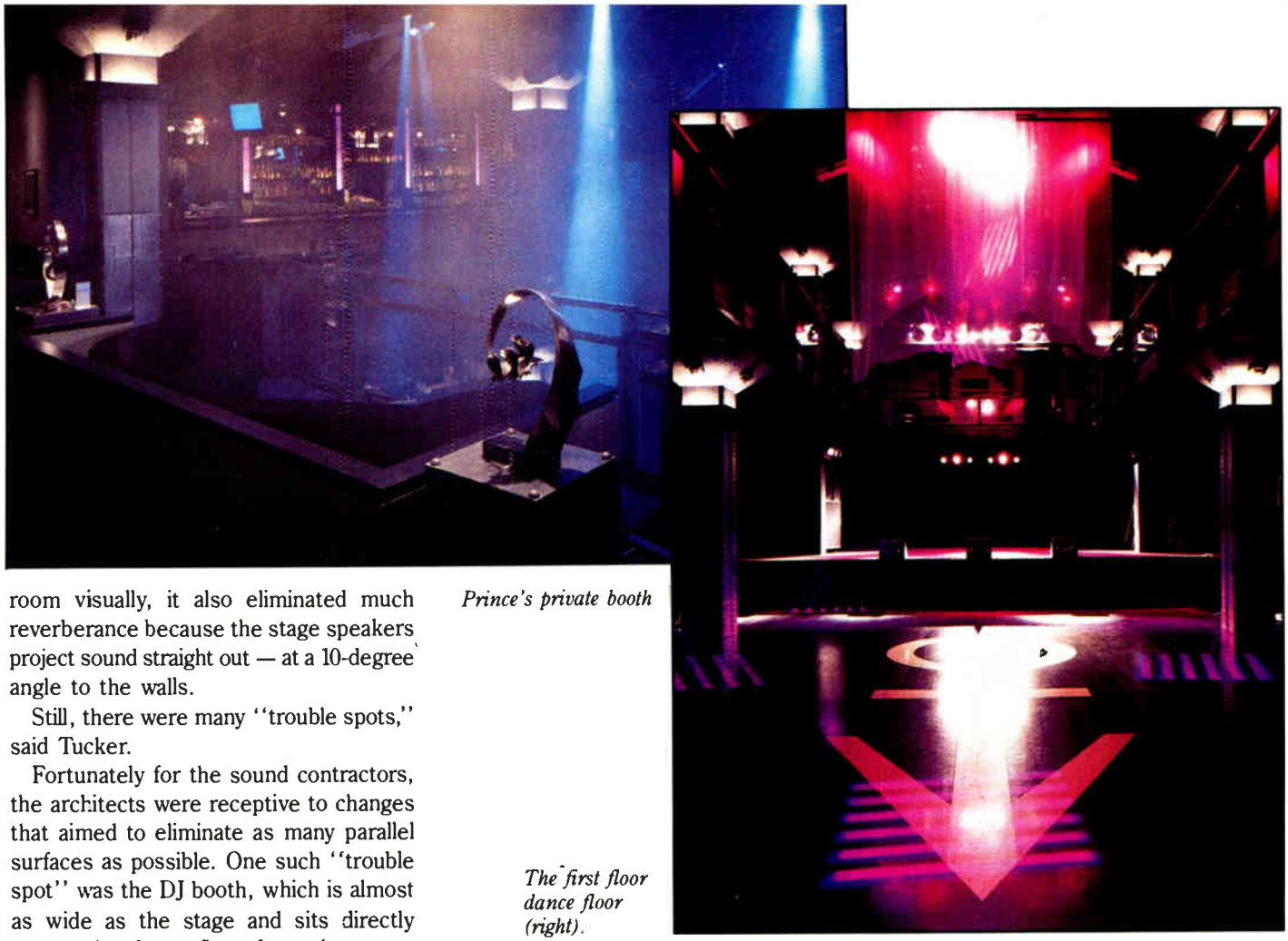
Aside from creating an atmosphere that highlights the crisp and bassy cyber-funk music of the '90s, Tucker Frattalone also installed stage and house systems for live and pre-recorded sound, a closed-circuit network for live and pre-recorded video, a DJ booth, as well as lighting and special effects. To make the whole package user friendly, Tucker Frattalone ran all sound and effects through mixers and controllers in through the DJ booth and designed custom-built circuitry to make the conversion between live and pre-recorded music (or video) as easy as flicking a switch.

INDUSTRIAL TRAPPINGS

But that was the easy part. Turning a textiles mill into modern dance space was a challenge that stayed with the contractors from early design to the final touches.

"You could slap your hands and watch the echo bounce around the room and go back out again; it was incredible," said Steve Frattalone, whose resume includes more than 250 nightclubs, more than 30 hotels, and more than 100 various installations.

The solution incorporated both aesthetic and acoustic concerns: K.K.E had already designed the walls of the first floor to set at a 10-degree angle from the existing walls of the old plant in order to create a certain "motion" to the club. (A floor plan of the first floor shows the newer and roughly rectangular-shaped room built at an angle inside the perimeter of the outside walls). While that step enhanced the



Prince's private booth

The first floor dance floor (right).

room visually, it also eliminated much reverberance because the stage speakers project sound straight out — at a 10-degree angle to the walls.

Still, there were many "trouble spots," said Tucker.

Fortunately for the sound contractors, the architects were receptive to changes that aimed to eliminate as many parallel surfaces as possible. One such "trouble spot" was the DJ booth, which is almost as wide as the stage and sits directly across the dance floor from the stage. Original plans had the front of the elevated booth parallel with the stage, a plan that would have sent sound waves slapping back at dancers and the performers.

"The design of the DJ booth continued to go through changes right up until it was built," said Tucker. The final plan shows the shape of the booth as a rough parallelogram, with the stage-side wall protruding at an angle roughly 10 feet at one point. While that move reflects sound waves away from the stage, the back and sides are all askew to nearby walls.

The contractors then took to the ceilings. Kafco, a black acoustical material, was sprayed on the ceiling to deaden reflections and hide some of the conduit. The dark material fit in perfectly with the industrial mood the architects and interior designers created, said Gordon Olschlager, the architect with K.K.E. who worked on Glam Slam.

Other decorative touches such as statues, fashion displays, and industrial 'objets d'art' that protrude into the room also help cut down echo by dispersing sound waves, Frattalone said.

INVITATION ONLY ACOUSTICS

While some acoustical problems could be handled with floor plan modifications, other challenges were too large to be dealt with without the help of electronics.

Looking up from the main, 13,000-square-foot dance floor, a dancer might just see wild flashing lights and the faces of privileged partyers looking down from a balcony on the private second floor. A sound contractor standing in the same spot just a few months earlier was looking at some pretty serious acoustical challenges.

The problem was that sound piped up to the comfy invitation-only mezzanine area that surrounds the upstairs balcony would be out of sync — in the ballpark of 60 to 70 milliseconds according to an Ivie acoustical analyzer — with the sound coming from downstairs speakers.

"There was a bit of a slap against the back wall [of the upstairs room]," noted Frattalone.

The good news was that the plush couches for the special guests upstairs absorb stray sound waves as effectively as they do pooped patrons. "They create a nice dead space," said Frattalone. But because bouncers guarding the upstairs, members-only party area can't police sound waves as easily as they can people, the contractors would have to come up with a way to stall the upwardly mobile sound waves.

The problem was corrected by adding roughly 60 milliseconds of delay to the upstairs speaker system using an Audio Digital delay ADD-3, which takes signal from one input and splits it three ways, with separate time correction settings on each channel, Frattalone said. "It worked quite nicely," he said.

GOT THE LOOK

But there were still other built-in challenges that come with a large, high-ceilinged industrial space. Both the architects and the sound contractors faced the same challenge of providing sight and sound lines that would be unimpeded by the large, square pillars that run in a row down either side of the dance hall.

"That was a big thing: How to work around the pillars in terms of coverage." noted Tucker, "But we worked it out because of cross firing [from speakers across the hall] into tables on the opposing side that are behind the pillars."

Still another turn-of-the-century flourish created an acoustic obstacle. "The pillars also have a capital around the top, which expands about six to eight feet in diameter at the ceiling; so we were unable to attach speaker clusters there," said Tucker. "That changed what we would have liked

Speakers are free-floating as a result of the turn-of-the-century pillars.

to do. It would have made coverage easier — in terms of sound coming off the stage — to have the speakers at the top of the pillars. Instead of trying to aim around the pillars, the sound source would be right at the pillars.''

As a result, the speakers are free-floating: While the stage's Delta Max 1152s are aimed straight out from the stage, the dance floor's 1152s are pointed in across the center of the room.

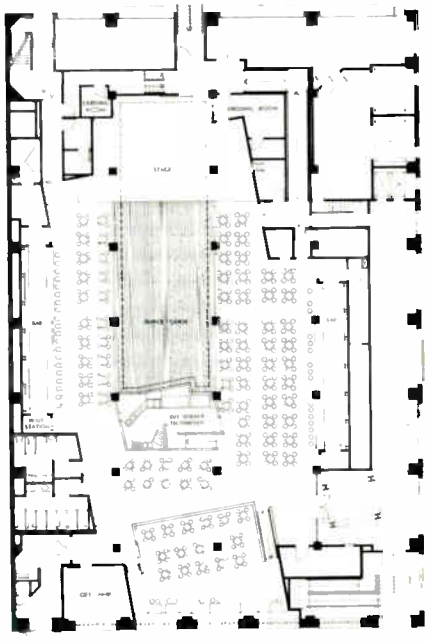
There were a few other things the installers couldn't change: ''The rear wall on the main floor is all windows, and that's an obstacle we'll have to live with,'' said Tucker. ''So depending on where you stand, you might get the reflection off that. . . . But those tend to be the quiet areas. We had to create some areas where people could go and talk during live music. Now by the back windows there's a quiet lounge area where people can talk.''

PARTICULAR PRINCE SOUND

Once the basic acoustical/architectural problems were worked out, the next stage was fitting in the appropriate sound system. Unlike scenarios where computers are used to help the contractor chose the right equipment for the space, Tucker Frattalone used a CAD program to help them find the best location for speakers and other equipment that had, for the most part, already been chosen.

Although Prince was not directly involved in equipment specs, the signature of his live show was left all over the equipment list.

''We tailored this sound system around what Prince has been touring with; using the same Crest amps, Klark-Teknik equalizers, E-V Delta Max speakers and what not,'' said Tucker. Tucker Frattalone also proposed an alternative plan, with JBL enclosures, but club owners went with a system much like the one used by Prince's touring company, db Sound. ''Prince himself was not involved, but his sound man, Matt Larson, was acting on behalf of the owner as a consultant,'' added Tucker.



Floor plan for the first floor.

The heart of the live sound system is the DDA-4 Q-Series 40-channel console, and five Crest 8001 and two Crest 7001 power amps, which power the speakers with a total audio system output of 15,330 watts. The contractors chose six E-V Delta Max 1152 mid-high main enclosures, four MTL-4 bass main enclosures, and four E-V Delta Max 1122 full-range house enclosures to provide coverage. In addition there were six E-V DMC processors controlling the various Delta Max enclosures, Frattalone said.

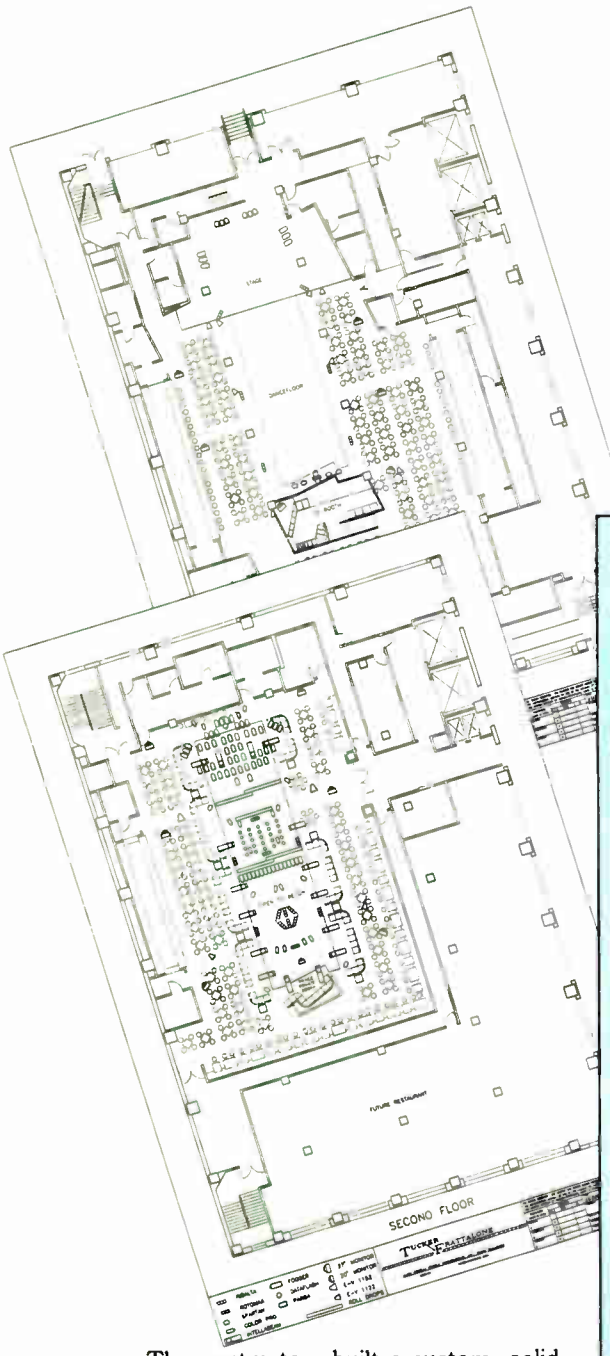
The live sound effects arsenal includes two Klark-Teknik DN360B stereo equalizers, a Yamaha GQ1031B equalizer, two Audio Digital ADD-3 delays, a Yamaha Rev-5 digital reverb, two SPX-90 IIs, and one Valley People TR804/PR processing system.

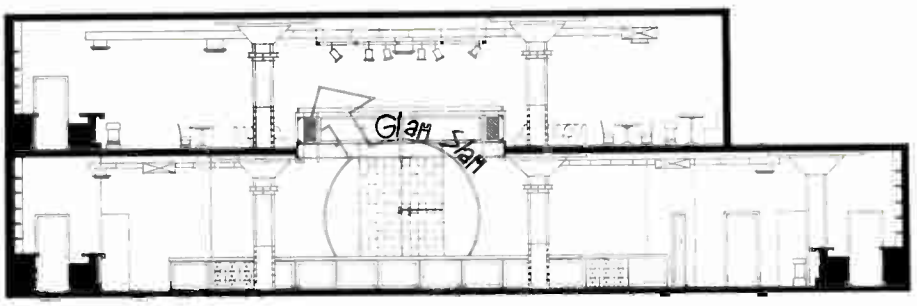
For the stage side fill system, Tucker Frattalone employed four Delta Max DMC processors, three Crest amps, four Delta Max 1152 mid/hi enclosures, two MTL-2 bass enclosures, and two Klark-Teknik stereo equalizers.

The stage monitor mix is channeled through a Yamaha 2408 24-channel board, but uses Crown Microtech 1200 amps. The contractors chose eight 12-inch, two-way floor monitors with JBL components, and four 15-inch, two-way floor monitors with JBL parts.

TUCKER FRATTALONE WAS HERE

But because live music is not the only demand on Glam Slam's audio network, Tucker Frattalone was able to leave the firm's autograph where live music and video interplays with pre-recorded sight and sound.





Cutaway of the two-floor ex-textile warehouse (above). First floor and second floor plans.

The contractors built a custom, solid-state relay so that speaker coverage and EQ settings would automatically change between the club's two modes: live music, which is distributed evenly through the whole club, and pre-recorded dance music, which focuses mainly on the dance floor.

To change from live to pre-recorded settings, the DJ flicks a switch. Two additional speaker configurations (two mid/hi Delta Max enclosures and two bass MT-4 systems) aimed in at the dance floor kick in while the volume of other house speakers is turned down a notch.

When that switch is engaged, the DJ is operating through an EQ setting as individual to Frattalone as the sign of a Graffiti artist. Frattalone would not dicuss all his EQ "tricks," but said that in dance music he likes to boost narrow bands in

Glam Slam Overview

In 1987, Ruth Whitney decided to open the Fine Line Music Cafe in the district and retained KKE Architects to help her adapt a turn of the century warehouse space to the needs of a contemporary music club. When Ruth teamed up with Gilbert Davison to build Glam Slam, they decided to work with Gordon Olschlager of KKE, because of his success with the Fine Line and familiarity with the district. Ruth and Gilbert expressed from the outset their desire for the club to bear a resemblance to the night club in Prince's upcoming film Graffiti Bridge. (Scenes from the actual movie were shot in the alley behind the Wyman Partridge building.) Thus the gritty industrial images of the warehouse district alleys formed the basis for the club's design vocabulary.

The Wyman Partridge Factory and Warehouse was built in 1921 and designed by the prominent Minneapolis firm of Kees & Colburn. The 12 story building has a unique concrete structural system that was patented by its engineers. The exterior facade is a refined architectural statement utilizing granite and ornate green glazed terra cotta with large industrial sash windows.

The interior of the club exploits the Wyman Partridge's unique structural system of concrete columns with pyramidal capitals. The materials used for interior details were designed as simple industrial parts wth exposed nuts and bolts and were installed in their raw state, (unpainted steel, concrete block and fire door wire glass) to express the industrial past of the club's setting. The use of faux marble finishes, unique backlit columns, and mirrors counterpoint the raw industrial elements to create a sophisticated urban environment in which to experience the cutting edge in rock music.

The night club was planned to accommodate national bands in an intimate setting. The DJ and sound technician booth was placed at the center of the club and made a focal point of the design. The stage and sound booth were oversized to accommodate road show equipment. The original concrete slab was cut away at the center to allow for views of the dance floor and stage from the second floor private club. The balcony rail is designed as a bridge truss to support the concrete floor slab at the cut away and visually expresses its structural role. L'B Contract Industries modified a standard contract bar stool and chair to have a buffed steel finish to match the exposed structural steel elements. The architects also salvaged marble toilet partions from the factory floor for reuse in the mens and womens toilets. The rear exit and stage backdrop were obtained from the Historic State Theatre on Hennepin Avenue which is currently undergoing renovation by the Minneapolis Community Development Agency.

The lighting design by Michael DiBlasi of Schuler & Shook, Inc. illuminates the column capitals which bear plaster castings of Prince, Ruth and Gilbert. The sound system was designed and installed by Tucker Frattalone, Inc., the newly merged association of Steven M. Frattalone and Associates and Sound Acoustics. Tucker Frattalone worked closely with Matt Larson of Paisley Park Studios who has been responsible for the sound set up for Prince's local performances as well as his recent international tour.

the low-mids and upper-bass ranges.

"Some of the dance music they're playing these days has electronic drums that will tear your face off — if the EQ is set right," said Frattalone. "On a very full sound system like this, you're walking into an atmosphere of sound. But then you need something that's going to add the punch. Instead of the low, 40 Hz rumble that a lot of people turn up, I'm doing a few things with the low mids . . . So, no one leaves with a headache."

For further clues to the Frattalone mark, refer to the effect rack engaged for pre-recorded music: Sound is mixed through a Rane MP-24 mixer and processed by a BBE822 processor, and a Klark-Teknik DN360B stereo equalizer.

The DJ booth is the command headquarters for almost all the support gear installed by Tucker Frattalone. Four people run the booth: the DJ, the live camera man (when there's a live show), the effects and house-lighting tech, the stage-lighting tech, and the live mix engineer.

Like the sound system, the video network is designed for dual purposes: To allow patrons positioned behind a pillar to get a close-up look at performers and to give patrons something to look at while the DJ spins pre-recorded music. To make life easy, Tucker Frattalone conjured another custom solid-state relay in their in-house shop so that all the camera person has to do is flick a switch to make the transition from live taping to video playback.

Most viewing will be on the 14 NEC 27-inch monitors, distributed roughly equally between first and second floors. The video play starts with JVC HR-F5500U S-VHS video decks, a JVC WV3260 color camera, and three Panasonic WJ 300B video distribution amplifiers. The video system also has some effects of its own, including a Micro Script character generator.

"I think in the future, they're planning to do something with big-screen monitors or a video wall, but for now, video was the main thing they scaled down on in the initial budget," said Tucker.

The lighting system, however, was not scaled down.

Glam Slam Equipment List

Prerecorded Audio Playback System:
- 2 Technics SL1200MK-II turntables
- 2 Stanton D680-EL cartridges
- 1 Technics SLP1300 CD player
- 1 Tascam CD401 CD player
- 1 Tascam 122MK-II cassette deck
- 1 AKG D330BT microphone
- 1 Rane MP-24 mixer
- 1 Barcus Berry BBE822 processor
- 1 Klark-Teknik DN360B stereo equalizer
- 1 Custom prerecorded/live output interfacing relay system
- 2 EV Delta Max 1152 Mid/hi enclosures
- 2 EV MRL-2 bass enclosures

Note: Speakers are used selectively to reinforce the main (live) audio system when used in the prerecorded format.

Live Audio System:
- 1 DDA-4 Q series 40 channel console
- 1 Tascam 122MK-II cassette deck
- 2 Klark-Teknik DN360B stereo equalizers
- 2 Yamaha GQ1031B equalizers
- 2 Audio Digital ADD-3 delays
- 1 Yamaha REV-5 digital reverberator
- 2 Yamaha SPX90-II effects processors
- 1 Valley People TR804/PR processing system
- 2 EV Delta Max DMC1181 processors
- 2 EV Delta Max DMC1152 processors
- 2 EV Delta Max DMC1122 processors
- 2 Crest 7001 amplifiers
- 5 Crest 8001 amplifiers
- 4 EV Delta Max 1122 full range "house" enclosures
- 6 EV Delta Max 1152 mid/high "main" enclosures
- 4 EV MTL-4 bass "main" enclosures
- 1 (Lot) "live" support accessories

Note: Audio system is generating 15,330 watts of output.

Stage Side Fill System:
- 1 Klark-Teknik DN360B stereo equalizer
- 2 EV Delta Max DMC1181 processors
- 2 EV Delta Max DMC1152 processors
- 1 Crest 7001 amplifier
- 2 Crest 8001 amplifiers
- 4 EV Delta Max 1152 MID/HI enclosures
- 2 EV MTL-2 bass enclosures
- 1 (Lot) side fill support accessories

Stage Monitor System:
- 1 Yamaha 2408M 24 channel console
- 4 Ashly XR-100 crossovers
- 2 Klark-Teknik DN360B stereo equalizers
- 4 Crown Microtech 1200 amplifiers
- 8 12" 2-way floor monitors w/JBL components
- 4 15" 2-way floor monitors w/JBL components
- 1 (Lot) monitor support accessories

Video System:
- 2 JVC HR-F5500U S-VHS video decks
- 1 Panasonic BTS-702N dual 7" color monitor
- 2 Panasonic WJ200RB video switchers
- 3 Panasonic WJ300B video distribution amplifiers
- 1 Custom prerecorded/live audio input record select
- 1 Micro Script character generator
- 1 JVC WV3260 color camera
- 1 Bogen 3011 camera tripod
- 1 JVC TM-134 13" color monitor
- 1 NEC HM-2050 20" color monitor
- 14 NEC HM-2750 27" color monitors
- 15 Lucasey ACM-2030 monitor brackets
- 1 (Lot) video support accessores

Stage Lighting:
- 1 Zero 88 Eclipse lighting console
- 6 Leprecon LD2400 dimmer packs
- 6 PAR-56 1K spot fixtures
- 66 Par-64 1K spot fixtures
- 1 (Lot) stage lighting support accessories

Special Effects Lighting:
- 2 Lightwave Research F-100 smoke generators
- 1 Custom F-100 remote control panel
- 4 Laser chorus vipers
- 1 Laser chorus viper controller
- 25 Lightwave Research data flash w/reflectors
- 1 Lightwave Research data flash controller
- 16 Lightwave Research color pro Series-II
- 1 Lightwave Research color pro controller
- 1 Pulsar touch Panel-II (for memory access)
- 16 Lightwave Research intellabeams
- 1 Lightwave Research intellabeam controller
- 1 Pulsar Touch Panel-II (for memory access)
- 3 Custom 12 channel relay controlled patch panels
- 3 Pulsar Touch Panel-II relay controllers
- 1 Custom 144 channel dead front patch panel
- 1 Custom 72 channel live front patch panel
- 1 Relay panel rack
- 6 Coemar Spartan 750/AL fixtures
- 8 Coemar Rotomax-2 fixtures
- 12 Coemar Ribalta-3 fixtures
- 1 Custom "PRN" lighting hexagon enclosure
- 5 "PRN" custom roll drops
- 1 Custom "PRN" roll drop relay assembly
- 1 Custom "PRN" roll drop relay switch panel
- 1 Custom tone burst/sound to light interface control
- 1 (Lot) special effects support accessories

Note: Custom "PRN" lighting effects are from the Prince "Sign o' the Times" tour.

On the ceiling above the balcony's edge, 16 Lightwave Research Intellabeams are perched. A total of 25 Lightwave Research Data Flash effects with reflectors are arranged in a cluster mid-way across the dance floor and 16 Lightwave Reserch Color Pro Series II effects hang in strategic locations across the ceiling above the dance floor. ■

Music Disco Systems

Roll Your Own or Buy a System

At the NSCA Expo in Las Vegas, Mike Klasco chaired a seminar on Music Disco Systems. Participants were Ivan Schwartz of Electro-Voice, Steve Romeo of JBL, Ken DeLoria of Apogee Sound and Paul Hugo of Gauss. An edited transcript of the first part of the seminar follows.

Klasco: This panel is going to be pretty much concerned with the manufacturers' perspective on new trends — roll your own boxes versus ready made boxes; signal processing speakers and other new tricks. Our first panelist is Ivan Schwartz from Electro-Voice.

Schwartz: I'd like to preface this by saying that Electro-Voice is in a unique position in that we obviously manufacture speaker components, and we manufacture systems. We're in an unusual situation in that we supply the components for self-made boxes and we also make money by selling completed systems. So, I'm going to go into a little bit of where we see one used and where the other is used.

Primarily the do-it-yourself boxes give an individual individuality. Without naming names, in some areas you have the Joe Doe box and you have the Jack Brown box and you've got these very specific boxes that everyone knows, and so you say this is a so-and-so disco, that is a so-and-so disco. Now that started years ago, all the way back to the late 70s primarily, and there were some very common designs that I refer to as mid-70s studio monitor designs. Most of them are two 15-inch woofers directly going to a fairly large format horn and then some type of high frequency device, bullet tweeters or something similar. That hasn't in some areas evolved very much; however, people have gotten more advanced in system design. Electro-Voice as a manufacturer offers components that are certainly greatly superior to those available 10 years ago, and we feel are some of the finest made.

But we see a number of problems that I think people should be aware of when they're building their own systems. Obviously, there's just the cost of developing this system. How much money can you spend making a box that sounds good? I think that's what's most important, perhaps. Remember that in this type of environment you are creating a sound. I'm not so sure anyone would raise his or her hand and say the goal of a dance music sound system is to be an accurate reproduction system and is to create a certain environment. So, perhaps you don't need an anechoic chamber, and perhaps you don't need a TEF machine to develop these type of speaker systems. But on the other hand with something like a Manifold Technology system that we have, which was developed primarily for the concert touring industry, and the MT2 system which is a smaller version of our large MT4, you're able to buy a completed system that is the result of many years of research basically by a leader in transducer engineering. We design through the actual devices that go into these systems and design the systems with a certain goal in mind.

"Perhaps you don't need an anechoic chamber to develop these type of speakers."

In terms of rigging hardware, we have structurally certified hardware that offers a number of different conveniences, but it also offers the end user the ability to put the responsibility of flying the system on the manufacturer. And so we've seen a lot of both Deltamax systems and Manifold systems going into discos very recently. They go up quickly and you don't have to worry about them. You don't have to design elaborate mounting methods for the speaker systems. We also see a number of people using their own boxes with our, for example, Manifold Technology, low frequency devices which provide a great deal of low frequency energy in a very small box which is convenient where you're limited in the size of low frequency cabinet you can put in. As far as overall system design, we see a number of people using the electronically controlled speaker systems. I think the main convenience there is repeatability. We see a number of people putting in a club and then they want to build a club elsewhere and they just know they can take this XYZ package and put it in, put it in here, put it in there. The electronic control part, what I call the sensing part of it — the ability for the controller to monitor what the speaker's doing and protect the system from destruction — I feel is very, very useful in what's loosely called a disco environment. In touring sound, you have much more repeatability from show to show to show. You have mostly trained engineers operating those systems, and in a dance club that can't always be guaranteed, so systems have a lot of advantages.

To sum it up, the package systems, the electronics, the speaker systems offer a great deal of advantage to installers.

The Music Disco Systems panel at last year's NSCA included (from left to right) Ken DeLoria of Apogee Sound, Ivan Schwartz of E-V, Steve Romeo of JBL. Paul Hugo of Gauss and Sound & Communications Technical Editor Mike Klasco.

They're quick, they're repeatable, quite often — and we use this technique a lot — the owners of the club can go to another club and hear a system or at least get an idea of what they're going to be getting. It's a little hard to do that sometimes if it's a new box you've just developed or it's not even out, if it's a concept you've developed.

I think we are not at the stage where these systems, these packaged systems are offering the flexibility for people — the ability to go in and even do uniquely shaped clubs, hexagonal dance floors and such. It's something that just early in the design phase. You should look and see what's available. Really think it out and ask yourself, is it worth the time to build your own box, to develop it, etc., to worry about the fine hardware and rigging or is it better for you to seek out some of the systems available, the high performance systems that should fit your needs.

Klasco: Thank you Ivan. Does anybody have a question relevant to Ivan's talk? . . . The question is, "What dynamic range is optimum for a disco system?"

Schwartz: I would say that's kind of a hard thing to answer because half the systems we put in, half the electronically controlled systems which offer what we feel is the most dynamic range you can work as close to the destruction point of the driver as possible without worrying. And then when we see people going in and there is multi-frequency compression limiting and then they tighten up the bass and the impact's tremendous, but to me it's like an on/off switch. Either it's really loud or it's really soft. Personally, I like a system that has more faithful reproduction and that requires a tremendous amount of power and a tremendous amount of driver capability to deliver that uniformly throughout the dance floor.

Klasco: Our next speaker is Ken DeLoria from Apogee Sound.

DeLoria: Thank you. I'd like to continue on in the same trend and talk a little more about reliability and the advantages

of processor based speakers. My company manufacturers exclusively processor based speaker systems. And we feel that among the various applications that processor based speakers are valuable in, probably nowhere are they as valuable as in disco installations. Primarily in the low end low frequency reproduction. The most abusive conditions that we've seen from returns and from discussion with dealers and contractors is in disco installations. It's not the large tours that are traveling around stadiums and arenas that are blowing up low frequency drivers. It tends to be the smaller club installations where the sound level is continually increased over a five-hour or possibly even longer period in an average night at the disco. And as time wears on and peoples' hearing starts to close down a little bit from the high spls that are common in discos, the DJs have a tendency to continually push the system harder and harder, and towards the end of the night it's not rare at all to see quite a few amplifiers clipping and possibly even in clipping more than they are out of clipping.

We feel that the protection that's inherent in a well designed processor based speaker system is very, very valuable for a contractor who is installing the system and wants it to stay functional and reliable. Although it may seem more costly at first, the purchase price might be higher than the projected price of buying plywood, cutting it up and making your own enclosure, buying drivers, fitting them in the enclosure, etc. The value of the protection and the engineering, we think, very much outweighs the roll-your-own or build-it-yourself type of approach. We spend considerable amount of money and time destruction testing drivers to find out where the mean failure point will occur and set up the limiters in our processors in such a manner as to engage and protect before that point does occur. In the long run that's both economically sensible and functionally sensible. When a disco loses its low end reproduction system, there's not a lot of impact left there, particularly if the rest of the system is comprised of smaller diameter cone drivers and tweeter

Mike Klasco, Sound & Communications.

horns, which is a trend that we are seeing quite a bit. Two large subwoofers on the floor or built into the walls and then very small enclosures with a low frequency roll off of perhaps 60 or 70 Hz mounted in the dance floor, on the ceiling, pointing straight down at the audience so that you get maximum exposure in that area with the minimal amount of spillover to the other areas where you may want quieter sections of the room for conversation, etc.

Ken DeLoria, Apogee Sound.

On the same subject, another aspect that makes it in our view advantageous to purchase an engineered system versus trying to engineer one from the ground up for each installation is the critical nature of tunings at low frequencies. We found through our engineering and R & D efforts that things become much more critical when you're tuning cabinets in the 20, 30, 40 cycle range, compared to tuning above 50 Hz or midrange crossover points. Precision that's required to maintain a tuning that can reproduce at a high level yet protects the speakers from bottoming becomes quite more delicate than at the slightly higher frequency where a variety of tunings will often work quite functionally. The subtleties between 55 Hz tuning or 65 Hz cabinet tuning are noticeable with instrumentation, but far less noticeable with simple listening techniques. We feel that the trend toward processor based speakers does give additional reliability and repeatability from installation to installation. Processor speakers are a formula package you can purchase; off the shelf hardware is usually available for most manufacturers for installation and hanging, and with a minimal amount of effort you can produce some very high quality results.

Klasco: Thank you Ken. Does anybody have any questions? . . . The question is "What is the optimum tuning frequency for a subwoofer system?"

DeLoria: I don't think there is an optimum tuning frequency per se. That's a function of the particular characteristics of drivers, the target dimensions of the enclosure and the intended acoustic response characteristics. In general most traditional disco systems don't really go down very low into the 20, 30 or even 40 Hz range; — and this is strictly an opinion. The traditional approach is to produce a very high amount of energy from about 50 to 60 Hz on up; the chest pumping sound that you get, the feeling you get from it isn't the very low frequencies but more the 80, 90, 100 Hz. And I think that part of that is a function of available equipment in the past, bass enclosures with folded horns whose low frequency cutoff is not

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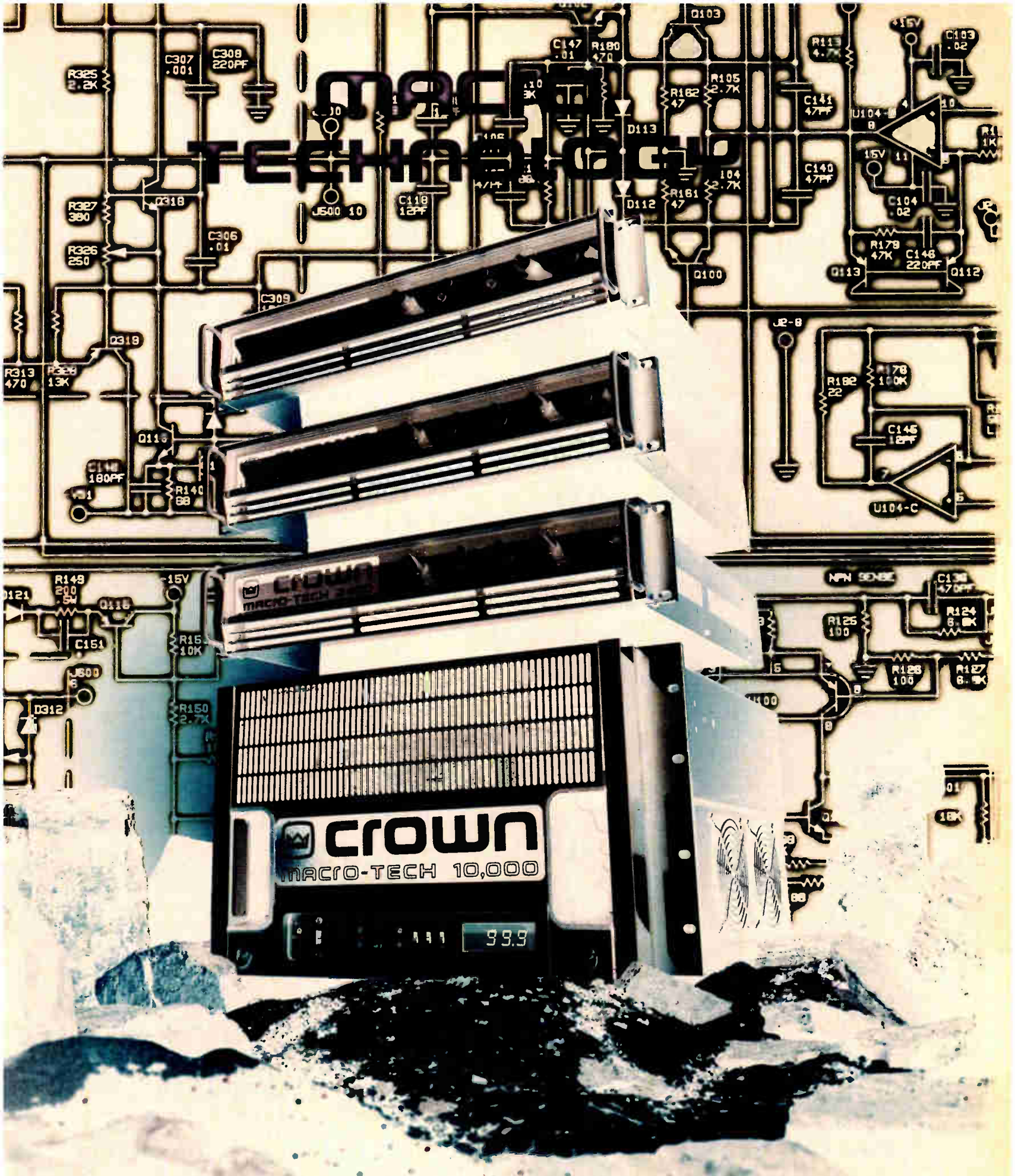

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as low as a vented bass enclosure's. Vented bass seems to be the trend for most subwoofers nowadays.

Klasco: Question: "Is there any preset equalization in the processor system?"

DeLoria: That varies from manufacturer to manufacturer of people who manufacture processor based systems. In our systems, there is equalization that's part of the overall enclosure tuning. Part of our protection scheme is to adjust that equalization to limit the excursion of the drivers in such a manner as to control the destruction point without radically affecting the sonic response. The techniques that are used vary quite a bit from one manufacturer to another of processor based systems.

Klasco: Thank you Ken. Our next speaker is Steve Romeo from JBL.

Romeo: Disco systems are defined by high spl output and usually a heavy handed DJ on an equalizer. Quite frequently we find a marked imbalance towards the low frequency end of the system. You're going to have continuous high power output and transients and you're also going to have nasty environmental conditions in a lot of the discos.

I noticed that one question came up about the optimum low frequency output. Many discos are small room environments. There are certainly many more small clubs than there are nightclubs, and it's impossible to measure low frequency response in a small room. If you're going to measure a low frequency device below 60 Hz properly, you go outside and you bury it in the ground. You take your measurement and then when you're in the small room perhaps you could take a pressure measurement. When you try to measure a low frequency device in a small disco setting, quite frequently you're going to have very misleading readings on your RTA.

But back to the main topic. All of these components — the environmental (heat, smoke), overloaded bass input to the loudspeakers combine to produce several phenomena that defeat the very purposes that you're trying to achieve when you do a disco. You can't have power compression.

Steve Romeo, JBL.

How many people here know what power compression is? About 20 percent. Power compression is a phenomenon of reduced acoustical output that results from thermal rise in the voice coil and motor structure. It's like a toaster. When the heat goes up, the impedance goes up and the current flow through the device goes down. This is why so many systems that are not made up to the higher standards sound wonderful for about the first five minutes and then they don't quite sound so good. Something's missing. They sound dead. They flatten out. What happened is in the devices that receive high power input the voice coils are heating up, the motor ductions are heating up, impedance is rising, current and voltage going through the devices are going down, and you're essentially limiting the electrical output of your amplifier into the speakers. An interesting thing here, an inside look at the speaker business: When most speaker manufacturers that produce products of high power applications ship their speakers you should be aware that if you're building your own boxes, when you attempt to take a raw transducer and load it into a low frequency box and then measure the response, you've automatically done something wrong by the very act of taking it out and putting it in the box and trying to measure it immediately. Most transducers for low frequency applications of high quality are shipped with a higher free resonance than what is in the specification sheet. Over a course of say 12 to 40 hours, the device loosens up, it breaks in just like you break in a car, and resonant frequency, which is higher in spec than when you brought the device, shifts into where it should be according to the spec sheet. This is quite deliberate and I hope I can save you some pain if you've ever wondered why the measurement didn't work right at preinstallation.

Paul Hugo, Gauss.

Okay, power compression means that the speaker reduces the acoustical output. It can vary by as much 3 to 4 dBs depending on the size of your voice coils and the heat dissipating characteristics of it.

JBL wanted to attack the power compression problem by designing drivers that would not power compress or at least would achieve the theoretical minimum of power compression through good heat dissipation. And the way we did it is through a technique called vented gap cooling. Vented gap cooling combines with changes in the voice coil structure and new carbon fibers — composite paper cones, a new suspension, and a new basket. About the only thing that's the same in these speakers as our former product is the paint. It had the benefit of giving us

higher powered capability; increased excursion capability. This is important. The further a speaker can move before a mechanical limitation starts in, the higher power output you can have with less distortion all other things being equal — which they never are. The vented gap cooling woofer differs from a conventional woofer in the hollow air chamber in the center and in the vent. These chambers have been carefully curved in such a way that when there's a linear displacement of air it goes in a circle, heats up and goes out the other vent. If you hold your hand behind JBL vented gap speakers and oscillate it 20 Hz to 30 Hz, you can feel the huge amount of heat that is pumping out of the speakers. What does this mean in practical terms? It means that when you install a disco, you're not going to have a disappointed customer after 3 or 4 hours when the sound seems a little dead. I'd like to go back on a little history. JBL is one of the few manufacturers that is not just a box stuffer. We make everything from the ground up. As a result we've got total control over the operating characteristics of the device. At JBL our job has been to make the disco systems installer's job easier by providing higher power, more reliable, more extended bandwidth devices backed by an awful lot of research and development.

Klasco: Thank you Steve. Does anybody have any questions? . . . The question is, "How does the distortion compare with the old style versus the new style vented gap system?"

Romeo: Okay. I should emphasize one thing, any cabinet you have with the JBL 2225 driver can directly substitute the 2226 with no change in parameters. What you gain is the power handling capability of two 600 watt speakers. And you gain distortion reduction. The reason the distortion drops is there's greater thermal stability, the cone is different and the suspension is different. So, at certain frequencies the reduction and distortion is about 30 percent; at other frequencies it's about 5 percent.

Klasco: The question is, "Will JBL be coming out with a processor based speaker system?"

Romeo: JBL is an intensive research based company. We have bought all of the competition and analyzed the processors. There are some companies that make super high quality product for which we have a lot of respect. There are other companies that use processors as a crutch for its components. The problem is as a contractor, how are you going to know the difference? Well you're going to find out after you've installed the thing and you get complaints within a day or one year's time. "Doesn't sound right, sounds funny, something's not right. Maybe the tape heads are dirty." That type of thing. We think there is a place for processing and we are investigating signal processed systems. Do we have a set schedule for bringing out the processor? Are you going to introduce a processor in the next six months? No I don't think so. But we are doing our homework. It's not impossible that we might introduce a processed system. But we're still in the investigation stage. We prefer to make the electro-acoustic component the very best it possibly can be and to give you the freedom to control the input signal.

"We make everything from the ground up. As a result we've got total control over the device."

Klasco: We're going to have time for a few more questions after our last speaker, Paul Hugo from Gauss.

Hugo: Gauss is a speaker manufacturer that does not make processed systems. We do not make packaged systems. We do not make packages for speakers. We make only raw frame loudspeakers. To speak of the trends as far as they apply to disco systems, certainly the processor based and prepackaged sound systems are seeing quite a bit of use these days. Gauss has always enjoyed and continues to enjoy quite a bit of the market share as far as sales into the disco market. This is primarily due to the fact that the sound pressure levels and reliability required for night-after-night type usage on a dance floor fit right into Gauss's ballpark. We make only one level or one quality or application type of level which is a professional type of loudspeaker. We don't really make anything that falls into what would be commonly considered as MI. We're best known of course for our low frequency transducers, 18s and 15s and to a somewhat lesser extent our 12s. Of course all of the comments that I'm making are referring to building your own system.

We make a 15 inch as well as two 12 inch coaxial models. A coaxial is a pairing of two different transducers in one frame. In the case of Gauss, our 15 inch and 12 inch cone transducers are paired with a 1 inch exit compression driver. These components are quite often being used as part of a multi-way system. As opposed to some of what's been said earlier, three-way sound systems seem to be gaining popularity as the minimum acceptable in most nightclubs — certainly the higher end nightclub applications. Four and five way are something we're finding quite common. In those applications (3, 4, or 5-way systems), the 12-inch coaxial is the most commonly used. Partly because it's almost always supplemented by a very low frequency transducer such as an 18 or even a 15. Quite often if they're using our 12 inch coax product that has the phenolic diaphragm, therefore not quite as extended a high frequency response, they will use a bullet tweeter such as our 1502 or God forbid one of our competitors, who also makes a very good product. This works out very nicely. Because it follows right in with another trend in nightclubs which is increased fidelity.

I think most of us recognize that the pro audio of today is not what pro audio was, let's say 10 — 15 years ago. Pro audio previously had a connotation of high power, high reliability. While that's still the case, and Gauss has always been right in that niche, there is also quite a pressing concern about high fidelity. It's a merging if you will of the hi fi and the pro markets.

And the coaxial for all its benefits such as time alignment and, as some of these fellows have spoken about, engineered systems if you will, coming from the factory R & D standpoint. All of these are available in the critical range, let's say from 80 Hz to 15 kHz or even higher. That is one strong trend we're seeing.

I would like to step back and present a case for which I may be the only flagbearer here. Which is building your own systems. Gauss has available and if I'm not mistaken, I think two or three of the people here have computer programs to help in the tuning and correct usage of raw frame drivers. Of course, the gentlemen from Apogee doesn't because he doesn't sell raw frame drivers. So you can't fault him for that. The Gauss program will give you various curves for a given type of loudspeaker. And our particular program allows you to feed anybody's Thiele-Small parameters into that program. You take the application and choose the appropriate curve and it will dictate the size of box, the size of port and the length of the duct.

This is coming from my standpoint as a nightclub designer, years before I was with Gauss. I think that along with fidelity and reliability and the other factors, the gentleman from Electro-Voice made a good point, which is there's a certain amount of installation identifiability if I as sound contractor ABC turns out a cabinet that has a look to it or a trend and look to it. It's identified as coming from me, and when clubowner B comes into the room and sees clubowner A's system and likes it, he's more than likely going to identify that system with me. So that's a positive thing.

The other thing is quite often that aesthetics in the room are important. And allowing for some flexibility in packaged systems, it cannot be as flexible as the shapes and sizes and variations that you can come up with as box building in and of yourself for raw frame components.

I work with a number of interior designers who are primary to the project developer, and the sound contract or the sound bid went out as a sub-bid to electrical. So you may come in at a secondary level and you have to work with people in other trades, such as interior designers who are looking for maximization of sight lines and such and you can do that per facility in a way you cannot do with prepackaged systems. I think that's about everything I need to cover. ■

New Opportunity.
R CLAIM . . .

5. What associations do you belong to?
   - ☐ NSCA
   - ☐ PARA
   - ☐ CEDIA
   - ☐ Other _____

6. Do you have a showroom facility? Yes ☐ No ☐

7. How many lines are you franchised to sell?
   - None ☐
   - 1 — 10 ☐
   - 10 — 20 ☐
   - 20 — 50 ☐
   - Over 50 ☐

8. Do you want to increase the number of lines you carry? Yes ☐ No ☐

9. Number of employees you have
   - None ☐
   - 1 — 10 ☐
   - 10 — 20 ☐
   - 20 — 50 ☐
   - 50 — 75 ☐
   - Over 75 ☐

10. Do you have drafting and design capabilities? Yes ☐ No ☐

11. If you answered "sound contractor" in question number 1, would you be willing to do the residential installation, on a system sold by a non-competitive retail establishment, of the following type?
    - ☐ Multi-room a/v system
    - ☐ Home automation system
    - ☐ Residential security system
    - ☐ Individual room a/v system

12. If you answered "retailer" in question number 1. . .

    A. Do you have your own installation facility? Yes ☐ No ☐

    B. Would you be willing to subcontract the installation out to a commercial installer? Yes ☐ No ☐

    C. Do you currently subcontract the installation? Yes ☐ No ☐

13. If you answered "custom installer and designer" in question number 1. . .

    A. Do you ever sell equipment without installation services? Yes ☐ No ☐

    B. Do you work with retail outlets? Yes ☐ No ☐

    C. Are you willing to do the installation work on equipment sold by other outlets? Yes ☐ No ☐

    D. Are you willing to subcontract out some of your installation work? Yes ☐ No ☐

    E. Do you sell and/or install security systems? Yes ☐ No ☐

14. The current annual volume of your company is
    - Under $1 million ☐
    - $1 mil — 3 mil ☐
    - $3 mil — 5 mil ☐
    - $5 mil — 8 mil ☐
    - $8 mil — 10 mil ☐
    - Over $10 million ☐

15. What area of the country are you located in?
    - Northeast ☐
    - Southeast ☐
    - Midwest ☐
    - Far West ☐
    - Southwest ☐
    - Northwest ☐
    - Canada ☐
    - Outside U.S. and Canada ☐

16. What is the biggest selling line you carry? _____

17. What is the most profitable line you carry? _____

18. What would you consider the biggest problems in selling product and services to the residential market (Rate from 1 for biggest problem to 7 for smallest problem)
    - ☐ Interfacing with customer
    - ☐ Wiring
    - ☐ Getting the equipment
    - ☐ Getting qualified installation personnel
    - ☐ Selling the product
    - ☐ Making a profit on equipment
    - ☐ Making a profit on labor

19. Are your employees bonded? Yes ☐ No ☐

20. Do you carry liability insurance for installation personnel? Yes ☐ No ☐

21. Are you part of a buying group? Yes ☐ No ☐

PICTURES AS SEEN IN SOUND & COMMUNICATIONS MAGAZINE
MAY 1990

In the past few years we have seen and heard a lot about the growing interest in the custom ''Home Entertainment'' installations market. As a matter of fact, we at Testa Communications were the first to launch a magazine that became the blueprint for other publications to follow. It was appropriately entitled HOME ENTERTAINMENT Magazine. Today there are several magazines in the market that have imitated the style, design and layout of Home Entertainment Magazine. Yet the nagging questions remain: Who wants it? Who sells it? And most importantly . . . Who installs it?

The founding editor of Home Entertainment Magazine is Judy Morrison, who is now the editor of the leading trade magazine for the professional sound & communications installation market . . . SOUND & COMMUNICATIONS Magazine. Ms. Morrison is also the editorial director of CES-TV News and NSCA-TV News (the convention News Program for the National Sound & Communications Association).

It would be easy for us to sell some advertising, write a few articles, and publish a magazine or a supplement to one of our existing publications.

Instead we decided to first try to identify who the players really are . . . and what they would like to see.

We already know there's a market there. We knew it first! We want to be able to identify exactly how ''hi end'' consumer electronics manufacturers can help grow the market. Sensible market research can identify the needs of the manufacturer, the universe of potential installers and the integration of related markets.

When we announce our editorial commitment to the efforts of organizations like PARA or CEDIA, and the marketing objectives of member manufacturers . . . you can be sure it will be supported by the knowledge, information and experience we have brought, and continue to bring, to the professional and consumer electronics markets.

WE URGE YOU TO FILL OUT THE ACCOMPANYING QUESTIONNAIRE. THE RESULTS WILL BE MADE AVAILABLE TO ALL INTERESTED PARTIES.

TESTA COMMUNICATIONS

Sound & Communications • DJ Times • Post
Sound & Communications Blue Book
Producers Quarterly
The Music & Sound Retailer • The Retailer Red Book
The Music & Sound Buyer's Guide
CES-TV News • NAB-TV News • NAMM-TV News
NSCA-TV News • CROSSTALK/AES-TV News

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25 Willowdale Avenue
Port Washington, NY 11050

PHOTO AS SEEN IN OCTOBER 1990 SOUND & COMMUNICATIONS

A New Market. A STAKE YOU

MANUFACTURERS

PLEASE ANSWER THIS SIDE OF QUESTIONNAIRE

1. Do you currently sell to the residential market? Yes ☐ No ☐

2. Do you currently sell to the commercial market? Yes ☐ No ☐

3. If you answered yes in questions 1 and 2, do you have separate divisions for residential and commercial? Yes ☐ No ☐

4. Do you distribute any of your products through retail establishments? Yes ☐ No ☐

5. Do you require a showroom of your outlets? Yes ☐ No ☐

6. Do you require installation capabilities? Yes ☐ No ☐

7. If you answered no in question 6, would you like to require installation capabilities? Yes ☐ No ☐

8. How many retail outlets do you distribute through?
   ☐ Under 100 ☐ 100-300 ☐ 300-600 ☐ 600-1,000 ☐ Over 1,000

9. Does your company have separate divisions with separate distribution patterns? Yes ☐ No ☐

10. Do you distribute through . . .
    ☐ Reps
    ☐ Distributors
    ☐ End users

11. What is the annual sales volume of your company?
    ☐ Under $1 mil
    ☐ $1 mil to 5 mil
    ☐ $5 mil to 10 mil
    ☐ $10 mil to 15 mil
    ☐ Over $15 mil

12. Do you belong to . . . ☐ CEDIA ☐ NSCA ☐ PARA ☐ EIA

13. Do you sponsor an educational program for installers? Yes ☐ No ☐

14. Approximately what percentage of your retail outlets have their own installation capabilities?
    Under 10% ☐ 10% — 25% ☐ 25% — 50% ☐ 50% — 75% ☐ 75% — 99% ☐ 100% ☐

15. To your knowledge, what percentage of the installation work on your products is subcontracted out by the primary seller?
    Under 10% ☐ 10% — 25% ☐ 25% — 50% ☐ 50% — 75% ☐ 75% — 99% ☐ 100% ☐

16. Do your have plans for demarcation of your product as either residential or commercial? Yes ☐ No ☐

17. In your opinion, what is the level of product knowledge and installation capability among your retail outlets?
    Poor ☐ Fair ☐ Good ☐ Excellent ☐

18. In your opinion, what is the level of product knowledge and installation capability among your non-retail outlets?
    Poor ☐ Fair ☐ Good ☐ Excellent ☐

SOUND CONTRACTORS, RETAILERS, CUSTOM INSTALLERS

PLEASE FILL OUT THIS SIDE

1. Would you define yourself as a:
   ☐ sound contractor
   ☐ audio/video retailer
   ☐ custom installer and designer
   ☐ other _____

2. If you answered "sound contractor" in question 1 . . .
   A. Do you currently do residential installations? Yes ☐ No ☐
   B. Have you in the past? Yes ☐ No ☐
   C. Do you want to in the future? Yes ☐ No ☐

3. How much do you currently know about . . .
   A. Multi-room audio/video systems ☐ A little ☐ A lot ☐ In the middle
   B. Home automation systems ☐ A little ☐ A lot ☐ In the middle
   C. Residential security systems ☐ A little ☐ A lot ☐ In the middle
   D. Acoustic simulation ☐ A little ☐ A lot ☐ In the middle

4. How much do you want to know about . . .
   A. Multi-room audio/video systems ☐ A little ☐ A lot ☐ In the middle
   B. Home automation systems ☐ A little ☐ A lot ☐ In the middle
   C. Residential security systems ☐ A little ☐ A lot ☐ In the middle
   D. Acoustic simulation products ☐ A little ☐ A lot ☐ In the middle

The Custom Non-Commercial Installation Market

WHO NEEDS IT?

WHO DOES IT?

WHO CARES ABOUT IT?

ELECTRONICS MANUFACTURERS

INSTALLERS

RETAILERS

CONTRACTORS

CONSULTANTS

Discotheques — They'll Be Coming Back

A Personal Account, Reminiscence, and Prediction

BY ALEX ROSNER

Disco sound systems still provide work for sound contractors and soundmen wannabees but not as much as they used to.

They went away because of greed, racism and temporary distraction by computers and video. The music, which used to move our hearts, and a little lower, lost its harmony and the necessary forward motion which represents the desire to dance. The beat alone can only make us jump up and down, so sooner or later we sense some lack and either sit down in protest, watching video, or jump up and down in protest, rapping.

It won't be long now before moving music will emerge stronger than ever from any one of the many cauldrons of suffering in the world. The last wave of music for dancing was based in rhythm and blues. The one coming could be from anywhere and, like love, we'll know it when we hear it. The time is almost here. Those of us who want to work in this field had better get ready or we'll get caught flat-footed.

How to get ready? First, understand the basic principles of disco sound systems. That is, what they're supposed to do and not do. Second, broadly plan out sound systems which can accomplish this. Third, lay ground work to establish sources of supply for the equipment and people you'll need to get the job done on short notice. Finally, look into how to conduct business with discos.

Why do I think discos are coming back? In the first place, man is a social being who enjoys the company of others. Dancing is one of the most natural activities and we've always done it. Unless sex is completely eliminated from our lives, social dancing will continue to take place. But we can only dance when the music grabs us. And music which grabs us has got to have harmony. Harmony is lacking in dance music nowadays so most of us are sitting out this dance. Latin dance clubs are still hopping because their dance music continues to retain most of its harmony. This is so despite their modern balladeers who are putting an ego-driven spin on the music, chasing some of the harmony away. One can see the effect of the music on the dance floor.

At first, everyone will be doing installations themselves.

Secondly, trained musicians with large repertoires are in low supply, and with some help from their trade unions have priced themselves out of the business of playing live for dancing.

Thirdly, with musicians using more electronic instruments, and with sound reproduction systems capable of higher performance than ever before, the line between live and recorded, from an intimacy or realism standpoint, is blurred. Dubbed television shows, including live and pre-recorded commentaries mixed with live and pre-recorded coverage of events like the Olympics, as well as dubbed live stage shows, have all helped to confuse the perception of what is happening now. Thus have we accomplished the time shift from the studio to the disco, where as a practical matter, recorded music is now preferable for dancing.

The next wave will probably be different from before in several ways. At first, everyone from DJs to the promoters will be doing installations themselves, armed with experience from the last wave and being unable to resist because of their enthusiasm. What they won't be ready for is the increase in sophistication of the modern audience and their demand for quality sound. Movies, video, compact discs and unrequited love has raised the sound consciousness of the present generation. They won't want 130 dB of sound pressure level anymore. 115 will do nicely, provided it's really clean all the way across the spectrum, from the very bottom to the threshold of audibility at the top. Maybe a little more bass than before, but pain is out! Masochism will have moved away from these places, whose function will be to make people feel good about themselves

Alex Rosner Heads up Rosner Custom Sound in Long Island City, New York.

and others. A sort of haven from the beating they get in hard economic times. The rooms will be smaller and simpler with fine sound systems playing records, tapes and compact discs, to which all kinds of people will be dancing until their bodies fatigue.

The recording artist will make his art in the recording studio. He will hone it and tune it. He will mix it and remix it and prepare it for the DJ to just play it in combination with music of other artists, as the DJ finds appropriate to suit the people who wish to dance. The DJ, operating in real time, where the stakes are higher, will be charged to keep the patrons happy. Our job will be to make sure that the sound system is up to the task and keeps working, no matter what.

Let's see just how high the stakes are. Have you ever been present when the sound system failed at the peak of the action in a club? I can tell you that it's more than just an unpleasant experience. It's more like coitus interruptus! If they don't riot, the patrons leave in a huff and may never come back because it's a traumatic experience.

I was present in a club when the entire lighting system failed. The party went on as if nothing happened.

I will never forget one such occasion in 1965, which provided my first lesson in reliability requirements for this type of venue, revealing what kind of stakes were involved. The club owner, an engineer from California, found a perfect basement location on East 58th street in Manhattan and built the sound system himself. It consisted of two Thorens TD124 turntables with Ortofon moving coil phono cartridges, an Altec 1567A mixer/preamplifier, a McIntosh MC275 power amplifier and four Altec 604E coaxial loudspeakers in Altec bass reflex enclosures. These were suspended from the balcony railing, aimed down at the dance floor below. Exotic looking go-go girls danced in cages at the balcony level, next to the control room, inspiring the DJ as well as the patrons all around.

The owner was proud of his efforts and when he found out I was an audio engineer he asked what I thought of his sound system. I told him that it sounded fine and instinctively asked what would he do if the single amplifier failed. He said it was the Rolls Royce of amplifiers, making that a very remote possibility. When I responded that even a Rolls Royce can get a flat tire, he got annoyed and nearly threw me out, though I managed to give him my business card.

Have you ever been present when the sound system failed at the peak of the action in a club?

A month later at 1 AM he called in a panic. The sound system had just failed, he was too upset to find out what the problem was, didn't have any spare parts and would I come right away to fix it. At 1:20 AM, carrying my tube caddy and tool case, I walked into an almost empty room and proceeded to determine that the 3.2 amp internal fuse of the power amplifier was blown because one of the KT88 output tubes failed.

It was hard to concentrate with the go-go girls on one side and a frantic club owner on the other, but by 1:45 there was

music again. So the entire system down time was less than one hour. Since the club was empty, I couldn't understand why the owner was so upset. Trying to console him, I told him that I thought he was lucky it was such a slow night. If it was busier, he could have lost money.

At first, everyone from DJs to the promoters will be doing installations themselves.

He jumped in my face and told me that when he called me the place was packed with people. He said that what he lost that night was enough money to buy another complete sound system. I was stunned. Without this experience, I wouldn't have thought that people would actually leave that quickly and that the financial loss would be so great because of the loss of sound for an hour. But that's the way it was, so at that moment I resolved to build systems that wouldn't fail completely — by splitting the load among several amplifiers and by other methods.

The analogy which came to mind at the time was that this was like a chariot racing through the desert in wartime. You couldn't stop or you'd get killed. These were the stakes. So you had to build it with extra wheels on the same shaft; with extra horses in front. If a horse tripped there was no time to unhitch him and replace with a spare from behind. He had to be cut loose and the others would just have to carry on. In the morning you could return and remove the body, but not tonight!

What about the lighting system? How important is it? I was present in a club when the entire lighting system failed. It was a dimmer pack power supply failure. The owner, with the help of two bouncers, ran an extension cord from the upstairs bar

Even a Rolls Royce can get a flat tire.

and installed a temporary 200 watt worklight in the corner of the room, while the DJ announced that there would be light in a few minutes. The party went on as if nothing happened. So much for lighting. I was also present in a club when on opening night a patron died of a heart attack, right on the dance floor. After some con-

fusion during which too many people gathered around him, order was restored and everything went on as if nothing has happened. So much for death.

Where there are high stakes, a responsible sound contractor can charge well for his services.

It seems that the only thing which really matters in a club is that the music keeps playing and it can only do that if the sound system keeps working. Even the DJ can be quickly replaced by a tape machine, but not the soundman, who is a key person in the operation, though most of us have not exactly stood up for this fact. It's not that we need medals. But a little self-assertion on our part would go a long way towards reducing the confusion in the mind of the club owner as to the order of his enterprise. The club is the place where an artist plays an instrument for the enjoyment and participation of the patrons. The sound system is the instrument. We are the instrument builders. The DJ is the artist who plays the instrument. Records, tapes and discs are the software ingredients he uses.

More specific design aspects of appropriate disco sound systems will be covered in a subsequent article.

In establishing sources of supply for equipment, the emphasis must be on dependable availability of the stuff, without excuses. This means either a direct connection to the factory or an established relationship with a distributor, plus accurate knowledge of what is available. There's no need to dream up a system you can't deliver in time for the opening. Some items such as cable, turntables, mixers and crossovers can be stocked. But be careful with amplifiers and loudspeakers because of the wide range of requirements.

In terms of your employees, keep in mind that the disco business is not a nine-to-five affair. Both sales and service are done at odd hours because the club staff is not always available when it's convenient for you. Then there's the physical environment, which may turn some individuals off.

There are live rats, dead mice, cockroaches, the smell of stale liquor, smoke, drugs, too hot, too cold, dirt and related hazards in some places which are poorly cared for.

Finally there's the business part, which is very simple but not easy to put into practice. The key is to get the major part of the price of the system up front, with the balance either on completion or shortly thereafter. I've tried all the other variations and ended up working one year for free during my first 10 years in business. It's not that disco club owners are necessarily any less trustworthy than others, but they come in with a very strong short term profit motive and they consistently underestimate the actual start-up costs. So when the system is ready they have no more money and have already put themselves into debt to others. If the club succeeds, they'll make lots of money in no time. But for every one that succeeds right away, many fail. The reasons may not even have to do with their capability or the soundness of their business plan. A disagreement between partners, a sudden zoning change, resistance from neighbors, and other unexpected problems can force initial failure. Unless you are willing to be a non-voting partner in their club, plan to get the bulk of the money before you finish, or you might never get it. This aspect has rightfully discouraged many of us from the club business.

Movies, video, compact discs and unrequited love has raised the sound consciousness of the present generation.

Nevertheless, discos provide a wonderful opportunity for creative sound system designs. Each one is different. There are always new ways to install the same equipment and there is lots of new equipment. There is opportunity to work with creative architects, designers and craftsmen of many trades from whom much can be learned. There is joy in hearing a fine sound reproduction system designed especially for a particular room. It's a natural extension of building a stereo system for yourself.

The high stakes add an excitement not unlike car racing, where the cost of participation is about the same. The difference is that in car racing the owner wouldn't think of entering the race with a cheap race car.

What he lost that night was enough money to buy another complete sound system.

Where there are high stakes, a responsible sound contractor can charge well for his services because to maintain a reliable response capability costs money. If there's more than one account to service, one person alone can't do it. So communications enters the picture. You must be able to be reached immediately, 24 hours a day. Here, again, it's not as easy as it seems to provide for that without fail. There are family and social considerations, mechanical breakdowns and ordinary forgetfulness working against a total 100 percent reliable response. Half of our club accounts came to us after their dissatisfaction with the way they received service on their systems from others. Sometimes, the client's expectations are unrealistic and need to be adjusted. But mostly it's the high stakes which create the need for 100 percent effective service.

The business is not a nine-to-five affair.

So if you have a feel for building sound reproduction systems and enjoy the excitement of being on the edge — discos, or whatever their new name will be, will provide you with plenty of work. Get ready! They'll be here real soon, now.... ■

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Subs in Clubs

The Subwoofer in All Its Incarnations

BY DAN SWEENEY

"You can make it low or you can make it loud. What do you want to make it? You want it low? Are you sure?"

So goes the sales pitch of Gary Jones, Technical Services Manager for Altec Lansing, and his questions touch upon the crux of a problem facing every purchaser of sound reinforcement subwoofers — namely that deep bass extension, power handling, and efficiency are all interrelated. These in turn are interrelated with cabinet size, transient response, and to some extent with distortion and directivity. Furthermore, improvements along one performance parameter are nearly always to be had at the expense of losses in at least one other. It follows that there are no universal subwoofers and that all subs are highly application specific.

This being the case, it pays to understand the precise performance requirements involved in any application before you start writing any checks or specs. The application discussed here is the club or discotheque installation.

A FEW GENERALITIES

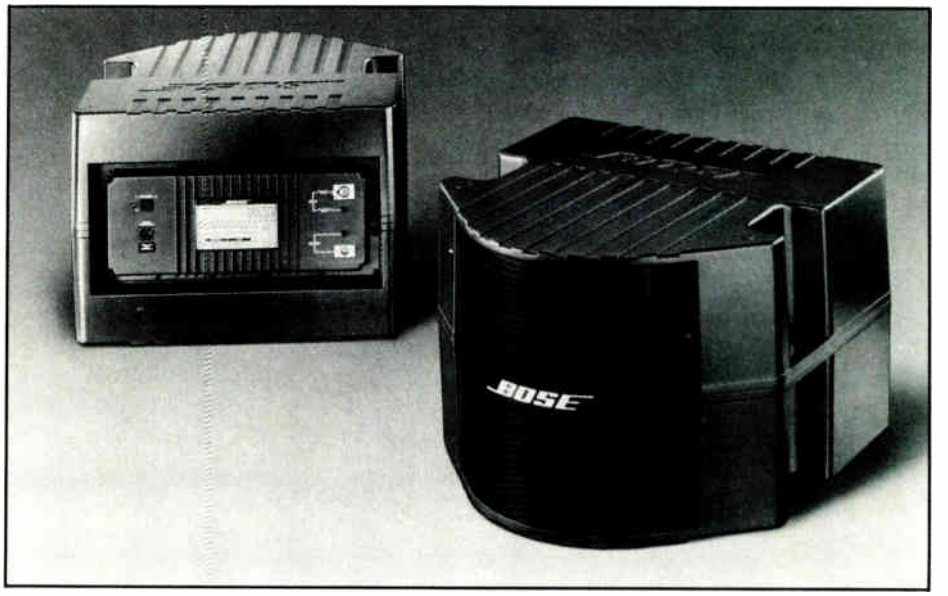
The pro subwoofer manufacturers address at least five distinct market segments — in many cases with products specialized for just one such segment. These segments involve, respectively, special effects applications in amusement parks, skating rinks, industrial exhibits, and the like; movie theaters; concert stage sound reinforcement; electric organ applications; and clubs and discos.

Special effects and movie subs are pretty closely related and are apt to be monsters. They're earthquake and rocket blast simulators, and Gary Jones' dictum notwithstanding, they'll go loud and deep (they usually have considerable output down to 25Hz). They're invariably huge and heavy, and generally intended for stationary installations. They're also generally very expensive. With some exceptions, special effects and movie theater subs are poor matches for the club environment — kind of like using a howitzer for skeet shooting.

Concert stage subs tend to share the extremely high output requirements of the special effects type, but generally needn't go as low. The bass guitar pretty much defines their required frequency range.

Organ subs are worth passing mention at best. They need to go deeper than any other type, but they needn't necessarily play especially loud. Extended range, limited output consumer high fidelity subwoofers can work in some organ applications.

And finally we come to subs in clubs, the market segment in question. These are specifically designed for the reproduction of dance music, and as such they needn't



The Bose Acoustimass Professional powered speaker system.

Klipsch club subwoofers.

go extremely low. But they must be capable of high output, and unlike the other types they cannot be very large.

Let's look at the performance requirements a little more closely.

For as far back as music has been written for social dance, such music has nearly always included a prominent bass line — generally plucked bass of one sort or another. Modern amplification allows an emphasis of this bass line that wasn't possible in the past, but the musical significance of the bass line hasn't really changed. It's absolutely essential for just about all dance music from polkas to lambada. Thus the most obvious function of a sub in a club is to articulate the essential bass line — which will rarely dip much below 40 Hz in almost any kind of dance music.

Subs will tend to enhance the impact of the music even when the main speakers are kept to moderate levels.

When used with electronic crossovers subs will do much to clean up the output of almost any full range speaker. With properly integrated subs, vocals and instrumental melody lines will sound cleaner and more articulate — in other words, highs and midrange as well as bass will sound better. That's because deep bass tends to stress a full range system by driving the woofer hard, which in turn produces a lot of harmonic and intermodulation distortion. A subwoofer, by taking over the deep bass allows the full range speaker to do less work and produce less distortion.

Finally, subs will tend to enhance the perceived impact of the music even when the main speakers are kept to moderate output levels. In other words, subs will lend fullness and weight to the reproduction without the liability of dangerously high broadband sound pressure levels, so that the audience may be excited by the music without being deafened.

So what's needed in a good club sub? That's a matter of some debate in the

industry, but most people agree that extreme low frequency output is neither required nor even desirable. Club subs on the whole have corner frequencies in the 40 Hz range, with a few extending down to 30 Hz or so. True, Intersonics, Bose and JBL make a few subs with disco applications which reach lower, but these are isolated exceptions.

And there's good reason for the relatively high cutoff. Of those instruments used in club environments, only synthesizers have significant energy below 30 Hz, so it isn't very often that a 20 Hz sub has much to contribute. And since air displacement must quadruple for each additional octave of low frequency extension, it doesn't take much figuring to see that a 20 Hz system is going to be huge compared to a 40 Hz system — and we all know the drawbacks imposed by excessive bulk. Every square foot devoted to a subwoofer's footprint is potentially one less foot of space on the dance floor.

On the other hand, extreme dynamic range is important, as is power handling capability. A sub that can't produce peak outputs of 120 dB B weighted is anemic by club standards, and since club owners tend to run subwoofers continuously right at the specified safe operating limits, those limits must be generous and conservatively stated.

Finally, efficiency is important as it is with all professional speakers.

A few subwoofer manufacturers, principally Klipsch and Associates, Peavey, and E.A.W. advocate controlled directivity for club subwoofers. Obviously with direct radiator loudspeakers the wavelengths at frequencies below 100 Hz are so much longer than the cabinet dimensions that the output of the speaker is essentially omnipolar, but a true bass horn such as the Klipsch MCM bass box or the Peavey FH-1 has some directivity down to the limits of horn cutoff. Such directionality may in fact be desirable in some club environments insofar as it permits the generation of high spls on the dance floor while at the same time permitting conversation at the tables.

An example of servo-motor drive technology is Intersonics' ServoDrive Contra Bass subwoofer, which uses two 15-inch cones.

DESIGN VARIANTS

To recapitulate, the most important attributes of a club subwoofer will be com-

pact physical dimensions, high output, high power handling, and high efficiency. In the past, nearly all subwoofers available for club use employed ducted port enclosures where box size is strictly related to efficiency and bass extension, and where any attempt to reduce box size appreciably would only result in severe misalignment and sloppy one note bass. With this basic design it was very hard for a manufacturer to achieve a significant competitive advantage in any areas except power handling and distortion. The thrust of innovative design in subwoofers during the last few years has been to reduce cabinet volume without sacrificing efficiency while maintaining high power handling — and that necessarily involves the use of some design variants that haven't seen much application in the past.

EQUALIZED SYSTEMS

The simplest way to get deep bass out of a small box is to seal the box and equalize it. Unfortunately this approach is generally unsuitable for pro applications because of the extreme reduction in efficiency it entails (12 dB for one additional octave), though the tactic appears in at least one pro product, the Intersonics 2-15 (the latter also employs a highly unusual voice coil-less driver). A better approach, one used in the Professional Audio Systems models RS-2 and EB-2 is to use an equalized vented alignment, also known as a sixth order alignment. Here the unequalized system is designed to have a slight, gradual bass rolloff rather than the 24 dB per octave rolloff characteristic of maximally flat vented systems. The drooping bottom is then brought up with a moderate amount of boost, and the final system response is made maximally flat at cutoff with a 24 dB drop thereafter. Sixth order alignments permit one third to one half greater bass extension than unassisted maximally flat vented alignments of equivalent box size, and they do so with at most a 6 dB sensitivity penalty at the extreme low end. Sixth order represents an elegant stratagem for maximizing base performance in a small box.

Pro bandpass subs use a more complex configuration called a dual cavity or a triple tuned cavity.

THE BANDPASS

An even more elegant approach, one used by a growing number of manufacturers, is the bandpass subwoofer, an old design that has seen rapidly increasing utilization during the last few years.

Bandpass designs date back to the nineteen thirties, but because of the complex filter theory derivations and mathematical modeling necessary to calculate box and port dimensions, bandpass speakers were considered too challenging to attempt commercially prior to about 15 years ago. Now they are becoming almost commonplace.

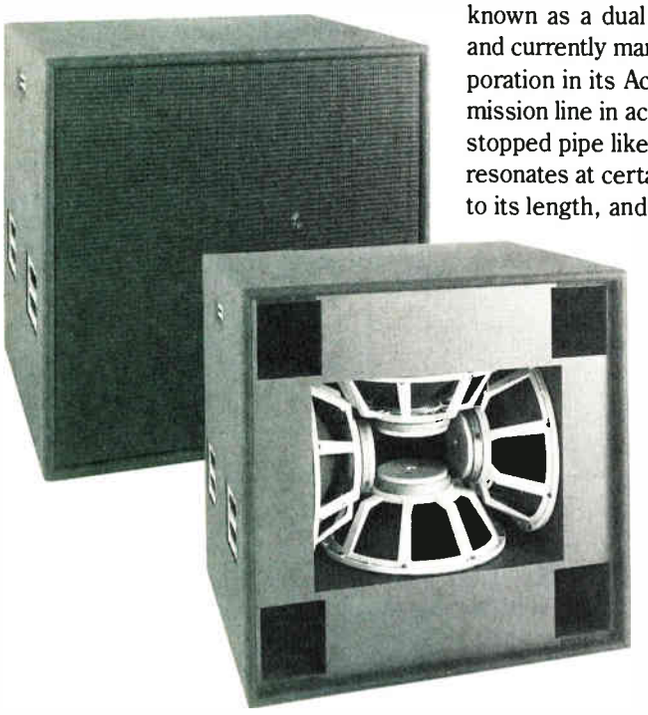
A bandpass enclosure places the driver or drivers on an internal partition where they modulate one or more vented cavities. Like a horn, a bandpass is an indirect radiator, but the resonant cavity or cavities are properly Helmholtz resonators and behave exactly like the internal air volumes in an ordinary ducted port bass reflex design. The differences are that there at least two cavities in a bandpass, and that the driver produces no direct output whatsoever.

The simplest form of bandpass speaker has one sealed enclosure behind the driver and a ducted port enclosure in front of it. As with a conventional direct radiator vented system, a range of alignments is possible with this configuration. This design is used in several consumer speakers but has less gain bandwidth than the dual vented variety, and for that reason, has not found favor in professional applications.

Pro bandpass subs use a more complex configuration called a dual tuned cavity — or in the case of JBL's bandpasses — a triple tuned cavity. Each cavity resonates at a different frequency, and the outputs of the ports reinforce one another so that the two or three separate resonant peaks sum in a broad nearly flat hump that re-

sembles a softly clipped sine wave in appearance. Attenuation in the out of band regions is typically 12 dB per octave.

Bandpass speakers are governed by the same tradeoffs as more conventional single cavity designs, but one tradeoff — efficiency versus bandwidth — is inherent in the basic design. Most bandpass speakers have at most two octaves of fairly level response. Essentially what you've done in all cases is to trade off frequency response at the high end, where you don't need it anyway, for efficiency in the low bass where it's most desirable. How much efficiency can you gain by this tactic? A couple of dB over a maximally flat vented system of the same total interior volume.



The Electro-Voice MTL-4 low frequency system is an example of manifold subwoofers; a design for which E-V has a patent.

Moreover, because it loads the driver with an air mass over its entire designated operating range and damps cone movement through this frequency range, the bandpass speaker will tend to produce little distortion, and what distortion is produced will tend to be filtered out by the resonant cavities. On the downside, the bandpass will place several acoustical second order crossovers close together for a several hundred degrees of phase shift through the region of the bandpass. Still the design has much to recommend it in installations where space is limited. Subs which utilized the design include the Bose Professional Acoustimass, the JBL Control SB-1 and 4782, the TOA Musical Concert Stage series, and the Renkus-Heinz-152.

THE DUAL TUNED TRANSMISSION LINE

Related to the bandpass is a design known as a dual tuned transmission line and currently marketed only by Bose Corporation in its Acoustic Cannon. A transmission line in acoustical terms is a tuned stopped pipe like an organ pipe. The pipe resonates at certain frequencies according to its length, and reinforces driver output at that frequency. Like a vented cavity, a transmission line damps the driver at resonance and unloads it below resonance. A single transmission line has one rather sharp primary resonance and a series of lesser resonances spaced an octave apart, and by using two lines tuned to different frequencies and equalizing the output an extended bandpass of two or more octaves is possible with moderate efficiency. The Cannon, which has useful response down to 25 Hz, has applications in movie theaters as well as clubs, and unlike most designs with such extended low frequency response is remarkably portable. Total system weight is under a hundred pounds, and the system takes the form of a long (12 feet) straight PVC pipe which can be leaned against a wall, hidden behind curtains, etc.

MANIFOLDS

This type is principally the province of Electro-Voice, which has a patent on the design, though manifolds are also manufactured by E.A.W. and Adamson. The Manifold as such is less an enclosure design than a baffle design. The rear wave from the drivers (which paradoxically comes off the front of the drivers) modulates a ducted port cavity of fairly conventional design, but the direct (more or less) output of the drivers is sent through a shallow open cavity. The backs of the two to four drivers nearly meet in the middle of a small rectangular cavity on the front of the cabinet and sum in phase for a pronounced mutual coupling effect. Gain in efficiency is roughly 2 dB over a conventional maximally flat vented enclosure of the same dimensions.

The design has a couple of other benefits in addition to heightened efficiency. Phase cancellations in driver output cause a natural acoustic rolloff at a fairly low frequency allowing slower slope electrical filters, and the channeling of air in the frontal cavity helps to cool voice coils and increase power handling.

ELECTRONICALLY MANIPULATED THIELE-SMALL PARAMETERS

Box size in a vented system is a function of a number of driver parameters including compliance, cone mass, cone Q and damping. All of these parameters can be manipulated electronically by the use of appropriate signal processors. Such manipulation is not the same as equalization, because it involves complex phase manipulations to achieve a well defined filter function. The most sophisticated application of the technology is in the Audio Pro subwoofers from Sweden, but these have never seen much use in pro applications due to limited output. The only serious professional subwoofers employing electronic manipulation of Thiele-Small parameters are the Professional Audio Systems subwoofers, which also use low frequency equalization. These systems use a line level interface which produces

(continued on page 63)

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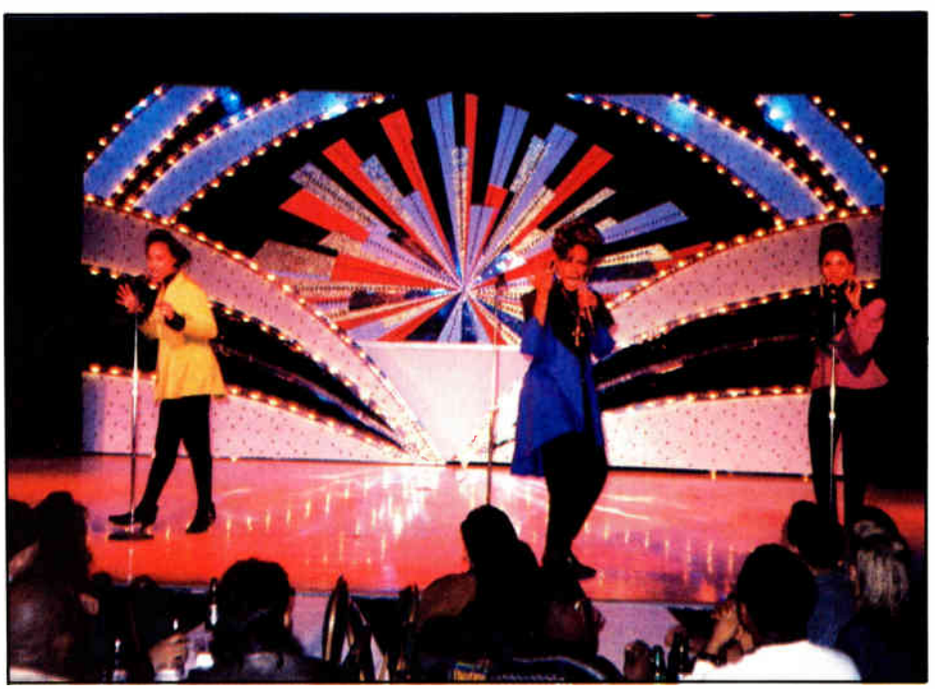
IT WAS HAPPENING! FIRST INTERNATIONAL DJ EXPO DRAWS RAVES

By Jim Tremayne

There was more than a little nervous anticipation in the air at Merv Griffin's Resorts Casino Hotel the morning of Tuesday, October 23. DJ Times was in town — with 36 exhibitors in tow — hosting its first International DJ Expo and harboring a lot of hope. Few knew what exactly to expect.



Big Beat recording artist Jomanda at the Superstar Theater during the final showcase night of the expo.

But when the DJ Expo staff sauntered into the lobby to begin pre-registration for the three-day event, it was greeted with a queue of walk-in registrants that seemingly stretched to Cherry Hill. Faced with this, the staff had one collective thought:

It's happening!

And so it was in this, the East Coast's haven of glitz and decay. Over 1,400 attended the event which included 21 hours of exhibit-hall time, 25 seminar discussion panels and three showcase nights featuring 13 recording artists. The end result was a pronounced validation of the DJ and club market and the DJ profession.

"It was an excellent show for us," said Pete Bidwell, president of Stanton Magnetics. "We hit the right people — jocks and club owners. We have no complaints at all."

Exhibitors included club installers, DJ companies, manufacturers of DJ equipment and lighting and audio products.

DJs who walked the exhibit floor got a chance to check out the latest lines of DJ equipment from companies like Numark, Gemini and Vestax. Demonstrating their audio wares were: JBL Pro, QSC Audio, Bose, BBE Sound, Community Sound and Light, Eastern Acoustic Works, Electro-Voice, Crown, Gem Sound, Cerwin-Vega, Harbro, Peavey Electronics, Panasonic/Ramsa, Pioneer and Technics. Showing off lighting were: High End Systems, OmniSistem, Tracoman, Cantek-Metatron, Farralane and Ness Imports.

Specialty manufacturers included: Stanton Magnetics, Pioneer Laser Entertainment, Knight Industries, Towards 2000, Island Cases, Penn Fabrication and Samson Technologies. Also exhibiting were: Sound Stage Systems, LA Publishing, John Roberts DJ Training Center, The Pros and Star DJ's.

Initially, there were sound level difficulties but, with a modicum of cooperation from exhibitors, those problems lessened as the Expo wore on. "It was loud," said Greg McVeigh of QSC Audio. "But overall, it was a very well-produced show. I was really impressed. For this being the first time, all the bases were covered and there was good traffic."

"We got quite a good response from the

Jim Tremayne is the Assistant Editor of DJ Times Magazine, a Testa Communications publication.

A demonstration at High End System's booth included a performance by Star DJ's.

Over 1,400 attended the three-day DJ Expo at Atlantic City whose exhibitors included manufacturers, installers and DJ companies.

DJs and club owners," said Eastern Acoustic Works sales engineer Sandy Macdonald. "It was a pleasure showing off the gear, and I think the show was cost-effective. We're still getting calls."

The panel discussions offered a wealth of information and were mostly well-attended, especially "The DJ as Producer," which featured such luminaries as John "Jellybean" Benitez and Frankie Knuckles, and the mobile panels like "Playing Wedding Receptions" and "Serious Biz: Business Tips for the Mobile Jock." Sheldon Starke, a Cleveland sports and entertainment attorney who moderated the latter panel, interspersed the panel with numerous breaks, encouraging the mobiles in attendance to network and share experiences. Starke's aggressive, yet endearing style prompted fellow panelist and Star DJ's president John Murphy to lightheartedly compare the moderator to television personality Larry King.

Two seminars were of special interest to SOUND & COMMUNICATIONS readers. "Pumping Up the Bass: Sound Design in Nightclubs" was moderated by SOUND & COMMUNICATIONS contributor Alex Rosner of Rosner Custom Sound and featured such notables as Crown rep Sam Helms and consultant (and contributor) Chris Berger. "Sound and Light for Club Shows" was moderated by Jay Paul of Trump Plaza and included CORE System's Griff Palmer and Chestnut Cabaret's Bill Hayward.

Other panels included: "Master Mixers," "Shopping for DJ Equipment," "The ABCs of Mobile Training," "The Global Picture of Dance" and "Club Safety."

"For the most part, the (light and sound) panels didn't have commercials for the manufacturers and that was good," said Crown's Gerry Barclay. "I think (the staff) did a good job of informing them beforehand."

The late-night artist showcases gave exhibitors, attendees and staff a chance to relax and let their hair down a bit. The first two showcase nights were held at Viva's in Trump Castle and featured dance and rap artists D'Borah, Club Idol, Ceybil, C & C Music Factory, Father MC, Next School and Joeski Love. Thursday night's finale at Resorts' Superstar Theater offered some hip-grinding action from 2 in a Room, Adeva, Jomanda, Aftershock and Joey Kid.

High End System's Chip Bullock was a man in demand, as he was working his booth and offering his expertise on discussion panels. His professional background as light jock at New York's famous Studio 54 club illuminated the discussion on the panels such as "Lighting Fixtures: Getting the Right Fix" and "The Light Jock: An Artist in His Own Right."

Perhaps the most favorable DJ Expo comments came from OmniSistem's Chris Giannoulas who said: "I think (the staff was) extremely well-organized, friendly, attentive to the exhibitors and helpful. (They) gave the feeling that (they) cared. It was better than we expected. The people who came were decision-making people. For being the first show, (it) impressed many people, and I've been to a few shows. This had a different character. People were there to buy, not just browse. We made numerous contacts with dealers in the area and with end users, who we referred to our dealers."

So Atlantic City's a wrap . . . until next time. ■

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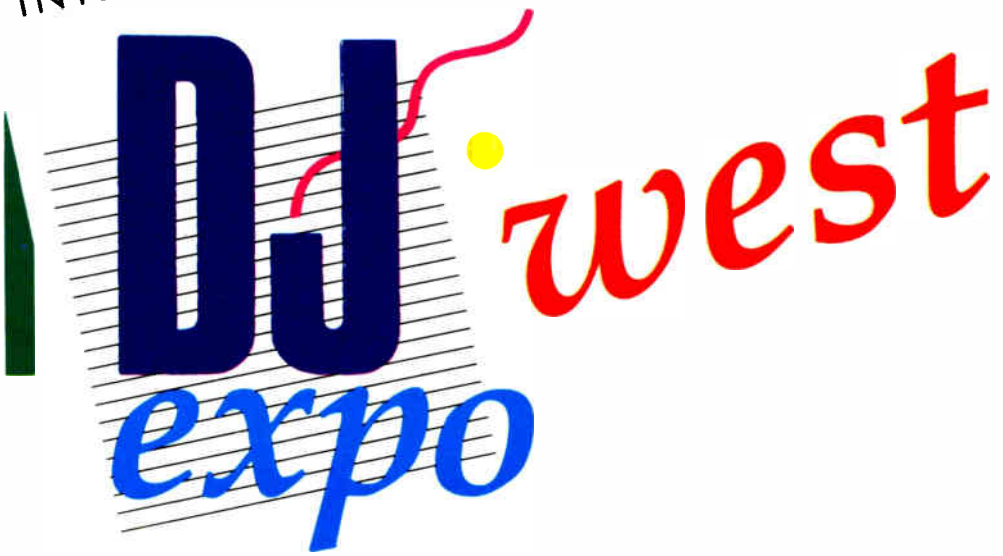

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Forward Innovations PAG-1

Multi-Purpose Test-Set

BY MIKE KLASCO

Recently, I came across a very handy device, the Forward Innovations PAG-1. Basically, it is a handheld signal generator intended to be used with a multimeter and a sound level meter for purposes of troubleshooting in the field. A few of its uses are as an aid to sound system equalization, speaker line impedance measurement, and checking for rattles and buzzes. The PAG-1 is unique as it costs only $140, is very compact, and has low distortion.

A well-equipped sound contractor typically will have a spectrum analyzer, distortion analyzer, scope, and other test equipment. Yet it is not always practical to have a set of this sort of instrumentation for every field technician. And while your "A" team may be well equipped, the "junior" techs that do the less sophisticated servicing may not be ready for the heavy artillery. Still, at least a digital multimeter, sound level meter, signal generator, and maybe a scope ought to be part of your troubleshooting package (plus the usual pile of adaptors, cables, impedance transformers, etc.). Cheap function generators are popular, but these suffer from very high distortion — usually 5 percent or more. This is a problem as this will mask whether the system is sick or if you are just hearing the muck from the generator. Is the speaker coil rubbing, or is that buzz from the generator?

Inexpensive, but cleaner, sine wave signal generators (less than $150) are available from B&K Precision, and a few others. The Forward Innovations is a clever sine wave signal generator with the added bonus of very low harmonic distortion, less than .03 percent. This is well below other inexpensive handheld units that I have seen.

The PAG-1 has a number of other handy features. The sine wave generator control is marked both in frequency and in one-third octave bands to aid the equalization of a sound system. Using a sound level meter on slow response and sweeping the knob back and forth the full range of the control will give you a reference level. Sweeping within the blue markings will give you the one-third-octave response. The scale is a little more than a decade from 18 to 225. A range switch toggles between X1, X10, and X100. Therefore, you can cover 18 Hz to 225 Hz, 180 Hz to 2250 Hz, and 1800 Hz to 22,500 Hz. The overlap is provided so that no critical (crossover) points fall too close to the edge of the range. Another use of sweeping sine waves is to excite resonances. Room and speaker resonances can be located and (sometimes) fixed.

It is a handheld signal generator intended to be used with a multimeter and a sound level meter.

For accurate volume/gain settings you can use your multimeter with the PAG-1, and if you want accurate frequency data, consider using a multimeter with a frequency counter, such as the Fluke 8060A.

Even if you already have a one-third-octave analyzer/noise generator, the PAG-1 still can come in handy. Recently, I was on a job when the power supply on my one-third-octave analyzer got screwy. The unit did not want to operate, not on its internal battery nor when it was plugged in. This would have required another visit, but then I remembered the PAG-1 and my old General Radio sound level meter that I left in the car. After apologizing to these devices, I finished the job.

To check resistance, inductance, and capacitance, the PAG-1 is used in parallel with a multimeter with no load connected.

The reading is taken. Then connect the load (or component) and retake the reading. The manual suggests that readings be taken at 200 Hz and 2 kHz. The manual gives a lot of good advice and includes a number of handy charts.

The Forward Innovations is a clever sine wave signal generator with the added bonus of very low harmonic distortion.

Aside from the power switch on the volume control, the unit is automatically turned off when the test lead is removed from the quarter-inch phone jack output. The battery can be checked in use by using a voltmeter between the sleeve of the output jack to the volume control shaft (easily accessible by inserting a pin probe under the knob). The output of the PAG-1 is dc coupled so it can be used as a signal injector.

The PAG-1 is a 9V handheld battery powered portable audio generator.

The PAG-1 is a handy field instrument that greatly increases the usefulness of a multimeter and sound level meter. The distortion level is respectable and the price is modest. Every field technician should have one.

Specifics: The PAG-1 is 1.25 inches high, 5.75 inches long, and 3.6 inches wide and weighs eight ounces. Maximum output is 1 volt. Maximum voltage the device can be connected to is 50 volts dc and 30 volts ac. A single 9 volt battery provides 24 hours of continuous operation. Total harmonic distortion is less than .03 percent. Price is $140. Forward Innovations, P.O. Box 9429, Santa Rosa, CA 95405. Phone 800-866-6264. ■

SUBS IN CLUBS

(continued from page 54)

a negative output impedance in the power amplifier driving the speaker and effectively cancels the voice coil resistance, thus vastly increasing system damping and permitting lower tunings than are possible in an unassisted system with the same box size. Yamaha uses a similar system in its YST consumer speakers, and is said to be developing a professional subwoofer designed on the same principle.

SERVO-MOTOR DRIVE

Perhaps the most unusual professional subwoofers made today are the products of Intersonics, a research oriented Illinois based company which does a great deal of contract work in acoustics and transducers as well as producing loudspeakers. Unlike the other manufacturers mentioned in this article, Intersonics makes only subwoofers.

The basic thrust of servo-motor engineering is broadly similar to that for the bandpass, manifold, and synthesized parameter technologies described above, namely a reduction in box size without sacrificing efficiency over useful bandwidth, but the means for approaching that goal are entirely different. Intersonics' speakers use a driver technology that is radically different from that employed in any other loudspeaker.

The driver from outward appearances is ordinary enough, having a cone, surround, and dust cap, but internally it is quite extraordinary. Instead of employing a magnet and voice coil to provide motive force, the cone is shaft driven by means of a rotary dc servo electric motor which transfers rotary force to the shaft via a drive belt. The mechanism actually resembles the pushrod driving the wheels on an old time steam locomotive. The motor itself is a low inertia, high acceleration device similar to the motors used in disc drive transports.

Why the complexity? The effect of the motor is to confer extremely high electromagnetic damping on cone motion, permitting the use of a smaller box size than would be the case for a conventionally designed cone of similar displacement. In that respect the benefits are similar to what might be achieved by synthesizing Thiele-Small parameters electronically. But servo-motor technology brings the added benefits of higher linearity since there's no problem with voice coils leaving the gap. In addition, heat build up is reduced due to greater conductive surface area, and consequently power compression is much reduced. The latter phenomenon, which effectively reduces power delivery to the speaker at high driver levels, arises when voice coil resistance increases due to heat. Intersonics claims that significant power compression can occur in the space of a few low frequency wave cycles, and can lead to poor reproduction of bass impulses due to attenuation of the trailing edge.

The servo-motor itself is expensive, more than most entire loudspeaker drivers, but since one servo-motor can be used to drive two cones, the cost premium need not be all that great. Intersonics currently makes three models suitable for club applications, the horn loaded SDL-4 using two 15-inch drivers, the Contrabass which uses two 15-inch cones and two 18-inch passive radiators, and the Model 2-15 which is a very small sealed box system with two fifteens.

SUMMARY

I have concentrated on newer designs that permit downsizing without significant penalties in efficiency and power handling. Significant reductions in distortion are also characteristic of some of these designs, most notably band passes. But, in any subwoofer system, regardless of enclosure design, the quality of the drivers will be decisive in the performance and durability of the system as a whole. ■

CALENDAR

Upcoming Events

FEBRUARY

RF Technology Expo: Santa Clara, CA: Contact: (303) 220-0600. February 5-7.

Systems, USA: Anaheim, CA: Contact: (408) 987-4200. February 7-9.

InfoComm International: Orlando, FL: Contact (703) 273-7200. February 14-16.

NEPCON/West '91: Anaheim, CA (708) 299-9311. February 25-28.

MARCH

NAMM (National Association of Music Merchants): Frankfurt, Germany: Contact: (619) 438-8001. March 2-6.

ENTELEC (Energy Telecommunications & Electrical Association): Houston, TX: Contact: (301) 468-3210. March 4-6.

Video Expo: San Francisco, CA: Contact: (914) 328-9157. March 4-6.

CAMMP (Computer Aided Graphics, Multi-Media and Presentations): San Francisco, CA: (914) 328-9157. March 4-6.

Nepcon Europe: Birmingham, UK: Contact: (203) 352-8476. March 19-21.

Interface '91 Plus: Atlanta, GA: Contact: (617) 449-6600. March 26-28.

SOUTHCON: Atlanta, GA. Contact: (213) 772-2965. March 26-28.

Int'l Mobile Communications Expo: Anaheim, CA: (303) 220-0600. March 26-28.

APRIL

Midlantic Electronics Show: King of Prussia, PA: Contact: (215) 828-2271. April 2-3.

ERA Annual Conference: Lisbon, Portugal: Contact: (312) 649-1333. April 4-11.

Facilities Security and Protection Expo and Conference: Chicago, IL: Contact: (708) 299-9311. April 9-11.

NAB (National Association of Broadcasters: Las Vegas, NV: (202) 429-5300. April 15-18.

Int'l DJ Expo West: Los Angeles, CA: Contact: (516) 767-2500. April 23-25.

EDS: Las Vegas, NV: Contact: (312) 648-2300. April 30-May 2.

Installation Profiles

Custom Communications Installs Audio, A-V, Video for Rochester Community College

BY THOMAS M. VEGA

In late 1988, Rochester Community College in Rochester, Minnesota, began the initial planning stages for an extensive addition at their facility. This project included additional classroom, faculty, and lounge facilities.

The design team for this project consisted of Svedberg Architects for architectural design and Lundquist, Wilmar, Schultz and Martin who handled mechanical and electrical aspects.

The Engineered Systems Division of Custom Communications, Inc., in Rochester, Minnesota, was called upon for the audio, video, and audio-visual systems.

The scope of this project included a lecture hall, lounge classroom (with ability to be divided into separate classrooms), and joint rear projection/equipment room.

The lecture hall consisted of tiered seating and was designed for formal presentations. Incorporated into this room were speech reinforcement, high fidelity stereo program sound, custom remote control, and rear projection system with a ceiling mounted video/data projector and single 35mm slide projector for speaker support.

To accomplish speech reinforcement a TOA A906A amplifier, Electro-Voice 2230 equalizer, Rauland-Borg USO-216 ceiling speakers, and Shure SM99 and Electro-Voice RE-85 microphones were used.

The high fidelity stereo program sound system used a TOA P-75D amplifier, Electro-Voice 2210 equalizer, Tascam M1B 6-channel mixer, and 2 Canton Karat 40 speakers. Also incorporated into this system was a Ramco XL20 monitor amplifier and Teac LX57 monitor speaker located at the equipment rack to assure clarity of system.

The scope of this project included a lecture hall, lounge classroom, and joint rear projection/equipment room.

A custom designed AMX remote control system was designed to tie systems operations into an easily controlled and accessible location. Functions of this system are as follows: activate lighting; open/close drapery; high fidelity stereo volume control; speech reinforcement volume control; video projector; 35mm (Eastman Kodak) operation; and video player (JVC BR3500) operation. The remote system also incorporated stepped C.E.D. volume control display panel indicating relative levels.

In the rear projection system, a Barco 600S overhead projector with 750 lumen light output was used. In addition, a JVC BR3500OU 4-head VHS was incorporated. To accomplish slide projection a Kodak Ektagraphic III with buhl rear projection lens, 290-050 internal mirrors, 456-362 steady rest RP lenses were used. This was mounted on a Chief MSU-200 micro set stand.

Additional equipment located in the lecture hall included a Luxor LX-100 wood lectern, and 3M 2130 wide angle overhead projector.

Rauland-Borg USO-216 ceiling speakers were used throughout the large classroom for both monaural speech reinforcement and program sound. Bi-folding divider doors have been installed, as this room is occasionally divided which in turn required the system to be operational as a 2-zone system.

Other components consisted of a TOA A906 amplifier, TOA M900A mixer, Electro-Voice 2230 graphic equalizer, and Shure SM99 microphones.

Again, an AMX remote control system, Barco 600S, JVC 3500OU 4-head VHS, Kodak Ektagraphic III slide projector were used to fulfill the demands of this project.

All equipment was rack mounted in Soundolier cabinets in the rear projection rooms, located between the lecture hall and large classroom.

Custom Communications, Inc. technicians Dave Colbenson and Marv Oesau had extensive interaction with Dale Peterson, head of Audio-Visual Services at Rochester Community College. Because of Mr. Peterson's expertise and familiarity with audio-visual systems, these rooms have, since completion, been used for a very diversified number of applications, such as closed circuit sales seminars, daily classroom usage, and also numerous events with IBM and Mayo Clinic, both located in Rochester.

Pennsylvania Courthouse

BY BRUCE WEBER

Gelnett and Associates of Northumberland, Pennsylvania designed and installed The Scranton Federal Court Sound System using an Altec Custom Sound System.

The system uses an Altec 1678C automatic mixer to control each microphone individually yet hands-free of an operator. Also used is the Industrial Research DI-4019 automatic leveler to maintain a constant and comfortable level throughout the court room.

Room equalization is achieved with an Altec 1753A one-third octave equalizer. This then feeds into an Altec 1268, which is a 120 watt amplifier. This amplifier in turn provided the power needed for the 12 Altec 409-4T ceiling speakers with appropriate backboxes and supports. These speakers are divided into five zones which are independently controlled by rack mounted volume controls.

An added extra is the custom relay control panel that is driven off the logic output of the 1678C mixer. This system dropped the level of the speakers in the area of the microphone being used by 6 to 9 dB. This proves to be effective in eliminating any chance of feedback, and makes the person speaking unaware of any amplification.

Between the equalizer and the amplifier, a custom "Mute All" switching circuit is installed which allows the Judge to, during a side bar, turn off all microphones and activate a Soundolier MG-1500 Masking Noise Generator. The generator produces random pink noise into the system to help mask conversations at the bench, allowing for privacy between judge and attorneys. Along with the "Mute All" switch, a "Judge's Priority" switch is installed to allow the Judge to turn off all other microphones while leaving the Judge's microphone fully functional.

Gelnett installed the system using an Altec Custom Sound System.

The Scranton Federal Court sound system was designed by Gelnett and Associates.

The entire system is turned on and off by a rack mounted power strip with one switch controlling all power outlets.

After several uses the system has been found to be operating flawlessly, therefore not needing any adjustments and allowing security covers to be placed over all equipment.

The courtroom staff, judges and many attorneys that have used the system have commented on the quality of the sound, the flexibility to do multiple functions at one time, and that it works flawlessly every time. The court clerk also now has a good quality cassette tape produced for documenting the trial. ■

Simplicity Counts

Signal Processing at High Point's Top of the Mart

BY DANIEL F. RAPER

A room-combining sound system: simple, reliable and economical. That's what we were asked to provide for Top of the Mart, a conference, dining and entertainment complex at the top of the 11-story Wrenn/Green Wing of the 2.8-million-square-foot International Home Furnishings Center, High Point, North Carolina.

Top of the Mart manager Mike Raeford wanted a system simple enough even for the food service staff to operate. One of their duties would be to set the room-combining sound switches and level controls as they set up the rooms for the various functions. The client insisted on rack simplicity: no more patchcords or lever switch-banks. We also had to meet a deadline: the opening of the Spring furniture market, to which 50,000 people would come.

We met the deadline and fulfilled the client's expectations.

Folding walls divide the 9,040-square-foot Top of the Mart ballroom into four sub-rooms. Microphone sound for one event can take up the entire ballroom. Or separate sound for two different, simultaneous events can take up any two of the contiguous sub-rooms. For three simultaneous events, the system can combine a pair of contiguous sub-rooms while two other meetings take place in the other two rooms. Or four simultaneous events can take place in the four rooms, each with its own separate sound. The system handles all the combinations automatically.

With only an hour or two between the setups of these rooms for dining, demonstrations, panel discussions, cocktail parties, dancing, or whatever, a food-service employee uses the combiner-panel switches to join the sound of contiguous rooms and to adjust their level controls. When the employee combines the Crown Room and Crown Annex, for example, and the master of ceremonies is to be near mic-jack 2, the Crown Annex speaker volume is lowered to avoid feedback. For panel discussions or special events, a portable six-input mixer is plugged into any of the wall jacks.

The client asked us to put all major controls on one super-simple panel.

A PRODUCTIVE UPDATE

Top of the Mart's former system, about 15 years old, was an arrangement of mixers and amplifiers that had become a service problem. There were only three channels: two for mics, one for background music. A switch-bank matched the speaker groups to either of the mic channels; inputs were configured by patchcords. The system was inconvenient to use and hard to maintain.

Our solutions have been:

- To provide independent sound for the ballroom's four sub-rooms — the High Point Room, Crown Room, Crown Annex and Shepherd's Terrace — along with a room-combining system.
- To provide independent microphone sound for a small meeting room, the 990-square-foot President's Room.
- To provide independent microphone sound for the 741-square-foot space that is divided equally into the Piedmont, Triad and Pines Rooms.
- To provide independent sound for a private dining room, the 2,112-square-foot Southern Furniture Club.
- To provide background music for each room.
- To provide independent volume control for the mic output and background music in each room.
- To provide emergency paging to all rooms from a mic in the manager's office.
- To provide standby power amplifiers.
- To provide two multi-position diagnostic switches for fast system checks. One is accessible only to a Selectrocom technician, but the other is accessible to any Top of the Mart employee who has to check the speaker-channel outputs.

The client asked us to put all major controls on one super-simple panel. This precluded the use of several fixed-design room-combining systems, which provided only local controls in each room. We considered building up a relay system and immediately discarded the idea because of the contacts' questionable long-term reliability.

The answer was a system that would use solid-state switching and routing. Our company designed, built and installed it for under $15,000.

Daniel F. Raper is president of Selectrocom Corporation in Greensboro, North Carolina.

PICKING THE COMPONENTS

We used the existing speakers: 40 of them, ceiling-mounted, standard eight-inch background-music grade, each with a top-hat enclosure and a standard round grille. (Their dispersion is good because of the ceiling height: 12 feet to 15 feet over 78 percent of the area of the nine function rooms our system serves.) As another cost-saver, we deleted an equalization package from our proposal. But operating in a flat mode, the system performs well — because of the presence of acoustical tile, drapery and carpet, and because of the quality of the signal-processing components.

They are Industrial Research Products System 41 modules: seven of them, mounted in a System 41 DJ-4101 mainframe. The mainframe has a 13-card capacity; ample room for transversal equalizer and notch filter cards if the client wants them in the future. The amplifiers are IRP DH-4020.

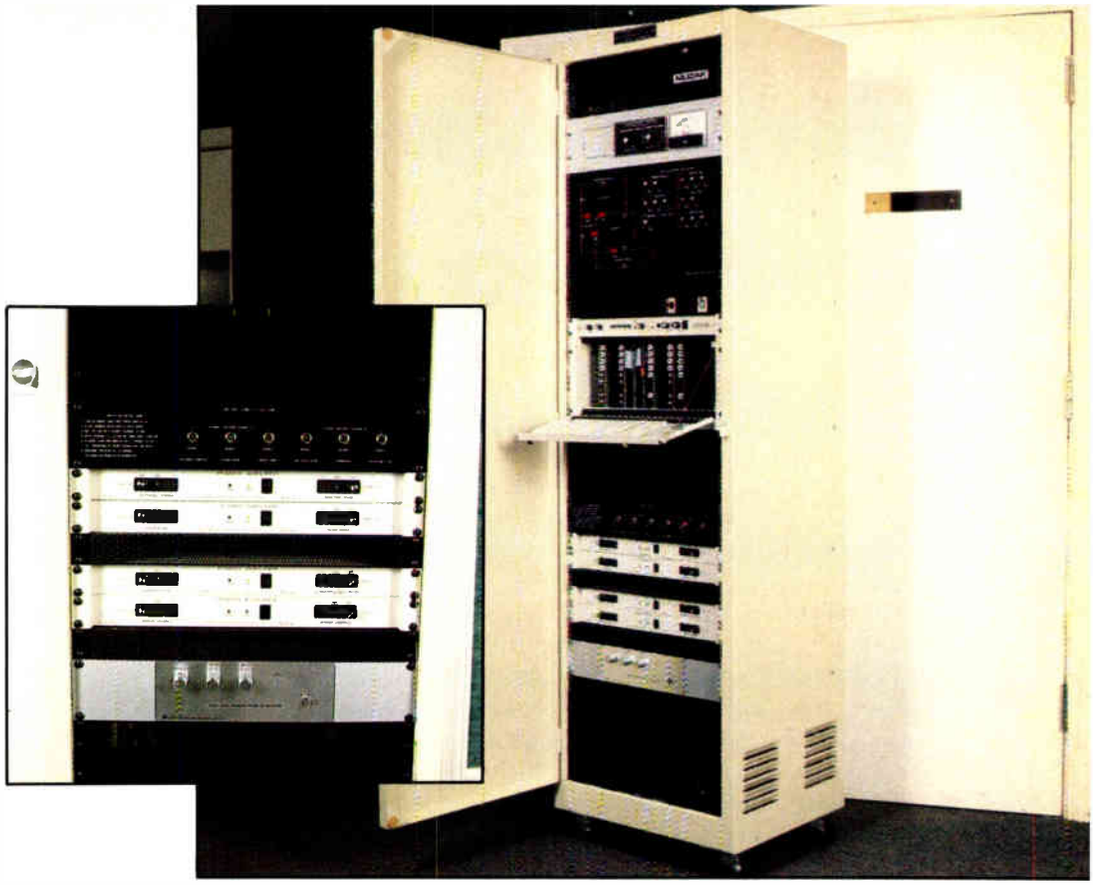
SYSTEM CIRCUITRY

The music signals are taken from the three-channel Muzak isolation transformer at 600 ohms and are fed to our graphic combiner. Its six music-level pots are bridging, unbalanced and built out to feed the six music inputs of our DJ-4102 microphone mixers.

The eight mic-level controls are *remote* level controls (so they could be panel mounted) for the mic inputs to the three DJ-4102 mixers. The five background music level controls are high level mix external to the DJ-4102. Each of these mixers has two outputs and split mixing buses, which become intermediate-level feeds to the DJ-4122 matrix mixer. The matrix mixer provides four active, balanced inputs and four active, balanced outputs. Solid-state switches, controlled by DIP switches, select any or all inputs to any output.

The DJ-4122 matrix mixer and the DJ-4128 remote matrix controller are, together, the "brains" of our room-combining sound system. (We programmed the controller with plug-on shunts; the setup was easy.)

The four combining switches on the



System rack with door open. (Right) Close-up of power amp, substitution panel and TOA amp.

graphic combiner panel feed the controller inputs. It's impossible to obtain the wrong combination if the operator remembers one rule: contiguous rooms are combined by the switches between them on the panel. The system combines contiguous rooms only. (Each switch lights up when it's on.)

The outputs of the DJ-4122 matrix mixer normally feed three of the four IRP DH-4020 power amplifiers. They have no fans or relays and their 1.75-inch height saves rack space. We split their outputs, feeding specific speakers.

The fourth DH-4020 amplifier is a spare, which the operator actuates by means of the controls on our amplifier-substitution panel. This simple device replaces any two of the six main channels instantly, with no loss of normal mixing capability.

Operating instructions are on the front of the panel and six 3-pole double-throw power-handling grade switches are inside.

The 9,040-square-foot Top of the Mart ballroom.

The International Home Furnishings Center in High Point, North Carolina.

One of the poles directs the output of a DJ-4113 lineselect mixer. When the operator flips the switch for the Crown Room, for example, the inputs which normally feed amplifier B are routed through the lineselect mixer to spare amplifier B. It's that simple.

With only an hour or two between the setups of these rooms a food-service employee uses the combiner-panel switches.

For emergency paging, the manager's office has a wall-mounted dispatch mic with a push-to-talk switch. This activates a relay pack, which mutes the mixers through input 6 of the three DJ-4102 mixers.

It also feeds 24V dc to the modified-priority attenuators (Soundolier AT-10-PA) in the two smaller rooms — the President's Room and the Piedmont-Triad-

Pines Room — each of which has a small amplifier of its own. We have added an SPDT switch to each attenuator, enabling it to accept either a house feed or a local-amplifier output, and still feed an emergency page with no reduction of level. Each attenuator provides a local means of trimming the room volume. For emergency paging, each AT-10-PA has a relay that will override the local volume-control settings.

LOW-COST SELF-DIAGNOSTICS

The client wanted some simple, on-site diagnostic capability. So we gave him two diagnostic accesses, one for his people and one for ours. Neither of these is expensive.

For the client's people, we have a speaker-monitor panel with inputs from all amplifiers including the 3-watt monitor amplifier in the System 41 mainframe; a 12-position switch makes the selection. If an amplifier isn't amplifying, they call us.

For our own use, we designed a second diagnostic panel — with a 12-position switch — installed in a spare slot in the System 41 mainframe; and this one taps into the test points. Not only do we hear the signal; we also get a relative-level indication from the built-in monitor on the System 41 mainframe.

INSTALLATION

We replaced some speaker wiring and microphone circuits, installed the mic jacks and wall-mounted the two attenuators, shop-assembled and tested the entire rack, and made the installation within the four-day window we were given.

The rack is in an equipment closet. To allow it to be rolled out for maintenance, we installed a 24-inch × 24-inch × 4-inch junction box waist-high, terminated all cables on screw terminals, and installed 12-foot rack feeds. The only problems occurred during the first day: some interaction on one of the music circuits (due to a missing ground) and a small amount of interference from a radio station two blocks away. Bypass capacitors across the power-amplifier inputs eliminated the RFI. Since then, our service calls have been next to nil.

This is the system's first year. It has performed flawlessly for the two major 1990 furniture markets and numerous other events. It has a three-year warranty, as is standard on the IRP equipment, and neither we nor the users have been disappointed. ■

New Speakers; Mixers; Sequencers

Timelapse Sequencer

Robot Research Inc. has announced the release of 'upgrades' to its TS16 timelapse sequencer. The TS16 allows the output of up to 16 cameras to be recorded onto a single VCR.

Robot claims improvements in picture quality, sequence programming flexibility, decoding circuitry and the introduction of a VCR playback freeze function.

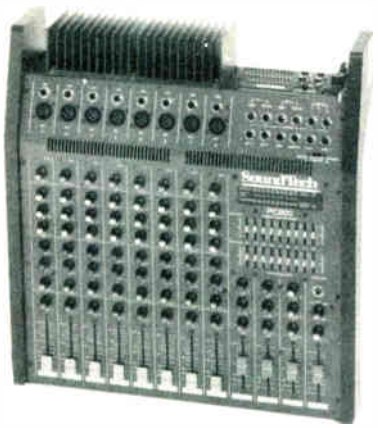
Circle 1 on Reader Response Card

Powered Consoles

SoundTech has introduced two powered mixing consoles. The PC800 and PC1200 contain eight and 12 channels with power ratings of 150 and 200 watts per channel, respectively.

Each mixer can be used in stereo or mono configuration. In stereo, the built-in power amp amplifies the left and right main outputs. In the mono mode, the amp sends power to the monitor speakers as well as the main systems.

Circle 2 on Reader Response Card

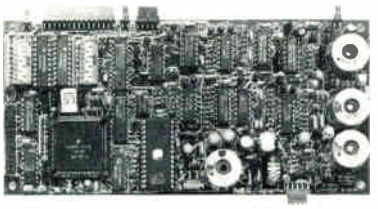


Synchronized Clock

Kinemetrics/TrueTime has announced the release of the model VB-PCB WWVB Synchronized Clock. This plug-in unit claims to provide "accurate, traceable, unattended and reliable" time within 10 milliseconds of the worldwide standard of UTC.

The unit is designed as a timing source for emergency dispatch consoles, voice/data switching systems, computer systems and facility control systems.

Circle 3 on Reader Response Card



Multiplexer

American Dynamics has announced an "upgraded version" of its DuoQuad Multiplexer. The AD1475A version of the DuoQuad provides real time quad displays of eight inputs for CCTV security/surveillance applications. It contains on-screen setup programming and various user-programmed quad displays.

Circle 4 on Reader Response Card

Loudspeaker Systems

JBL Professional has added the Control Micro loudspeaker and Control SB Micro subwoofer to its Control series line of loudspeaker systems. The Control Micro is designed for on-console placement in recording studios, fixed installations or other applications.

The Control Micro measures 6.25 inches x 6 inches x 5.5 inches and features a single transducer, magnetic shielding and spring loaded connectors.

The Control SB Micro subwoofer features a dual chamber bandpass design which acts to extend bass response to below 40 Hz. It also features a dual voice coil low frequency transducer.

Circle 5 on Reader Response Card

Utility Mixer

Henry Engineering has introduced the MicroMixer: a four-input, two-output stereo utility mixer. It will accept up to four line level input signals and combine them to a stereo output. A level control is provided for each input, and "micro-assign" switches permit each input to be assigned to any combination of left, right, or both outputs.

Circle 6 on Reader Response Card

Indoor/Outdoor Speakers

Universal Security Systems Inc. has introduced the SP-1717 indoor/outdoor speaker system. Designed for use indoors and outdoors in inclement weather, the speakers are three-way units that can also be used in vehicles such as boats and vans.

Circle 7 on Reader Response Card

Test Set

Microwave Logic has announced the gigaBERT-2700 bit error rate test set. The transmitter and receiver operate with internal or external clock over the range of 10 MHz to 2700 MHz. The transmitter has 10 memory positions for clock frequency storage. The receiver measures total errors, average and current error rate.

Circle 8 on Reader Response Card

Separate Head CCD

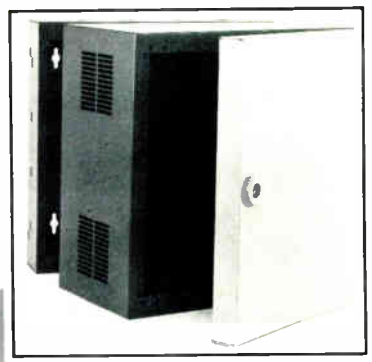
Audio Video Supply has announced its separate head CCD camera. The head dimensions are 40mm x 50mm and the weight is 100 grams. The CCD has a pixel array of 768 × 494 and accepts a standard or machine vision 'C' mount lens.

Circle 9 on Reader Response Card

Sectional Wall Cabinet

A lockable sectional wall cabinet is being offered by the Winsted Corporation. Designed for PA systems, amplifiers and other electronics the cabinet has 17 and one-half inches of rack space and mounts on 16-inch centers.

Circle 10 on Reader Response Card

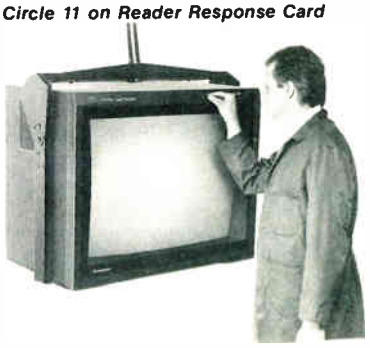


Monitor Mount

Peerless Sales Company has introduced its Jumbo Mount, designed to handle oversized wall or ceiling monitors from 20- to 35-inch screen size.

Manufactured of heavy gauge steel and MIG welded, the mount features bottom mounting plates adjustable in two directions.

Circle 11 on Reader Response Card



Q-Plus Improved

Vega's Q-Plus system now features "an improved range of up to 40 percent." Through the use of new dual-mode squelch, the company claims this increase in range has been accomplished without increasing the system's RF power out or shortening battery life. Dual-mode squelch employs signal-level detection circuits as well as excess-noise detection circuits. The Q-Plus system also has improved wired intercom interface capability and enhanced audio intelligibility.

Circle 12 on Reader Response Card

A and C Weighting

Audio Control Industrial has announced the model AC-10 A and C weighting filter. Packaged in a male-female inline XLR tube, the AC-10 requires 12-48V phantom power for operation. A two-position slide-switch selects between the two curves.

Circle 13 on Reader Response Card

20-Bit Amplifier

Crown has introduced the Macro-Reference amplifier. A 20-bit digital device, it uses an ultimately-damped, high-excursion design. The power supply is based around a toroid, the ODEP circuitry has been designed to obtain a precise transfer function and control of the amp's internal signal. A convection cooling system with a computerized on-demand proportional fan assist for the prevention of thermal overload has also been added.

Circle 14 on Reader Response Card

Mixer Shipping

Mackie Designs' seven-rack-space mixer, the CR-1604, is now in production and shipping. The CR-1604 features seven AUX sends per channel and four stereo or eight mono effects returns, balanced main stereo outputs, eight direct outputs, plus-48-volt phantom-powered MIC preamps and channel inserts on inputs. It is said to have a working signal-to-noise ratio of 90 dB along with 112 dB dynamic range. The unit can be used as either a rack-mount or table top mixer via a convertible configuration. Suggested retail price is $1099.

Circle 15 on Reader Response Card

Speaker System

Community has introduced its RS220 series of loudspeaker components. Based around the three-way RS220 loudspeaker, the series also includes the VBS210 subwoofer and the 220 system controller.

The trapezoidal RS220 is operable from 100 Hz to 18 kHz. Maximum output is greater than 127 dB at 1 meter.

The VBS210 subwoofer is housed in an enclosure identical to the RS220 and contains a pair of 10-inch dual spider drivers which operate between 60 Hz and 150 Hz when used with the 220 system controller. The controller is a proprietary, dedicated system, and provides continuous monitoring and equalization at impending overload levels as well as independent compression.

Circle 16 on Reader Response Card

HD Video Printer

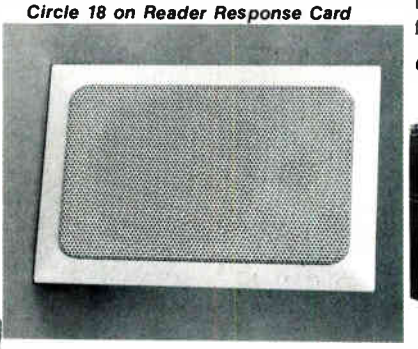
Javelin Electronics' high definition color video printer has a print density of six dots/mm (150 DPI). The JP2600 uses sublimable dye thermal transfer technology. Each of the three primary colors is available in 128 gradations resulting in a color palette of 2.1 million hues. Features include built-in frame/field memory, a memory through function, auto synchronous capability, and multi-compatible terminals, along with parallel and serial ports.

Circle 17 on Reader Response Card

Flush-Mount Speaker

The Model BGS-516 from Aiphone Corporation is a flush-mount, two-way speaker whose white metal grille and plastic rim can be left as is or painted. The unit includes a five-and-a-quarter-inch woofer and a nine-and-one-sixteenth-inch tweeter, and is compatible with Aiphone's LEF and NEM communications systems.

Circle 18 on Reader Response Card



Dual CD

Numark has introduced a "budget priced" model of its dual-transport professional CD player. The CD5020 has a suggested retail price of $1,275 and consists of a separate control unit and transport module that houses two CD player drives. Included are two sliding pitch controls, two Start/Stop buttons, track search and skip buttons and separate audio cue controls for monitoring each transport.

Circle 19 on Reader Response Card

Personal Videoconferencing

Sony has introduced its single monitor rollabout "Personal Video Conferencing System." The system is designed for one-to-one executive meetings or videoconferences of up to four people.

The system includes a 32-inch Sony professional color monitor, one Sony CCD video camera and the PCS-S1200 system controller. The controller supports up to four cameras and allows the user to access the system's capabilities through the Sony Remote Commander remote control. The remote commander gives the user control over various functions including camera pan, tilt and zoom, and A/V switching.

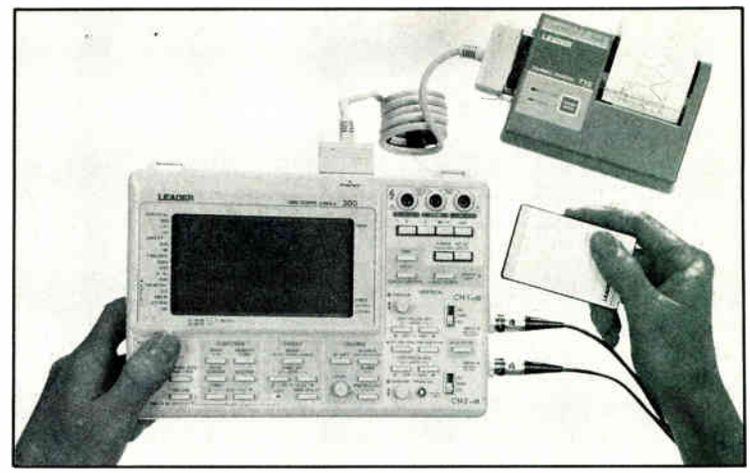
Circle 20 on Reader Response Card

New Mixing Consoles

Soundcraft has added new consoles to the Delta family. The Delta Monitor is designed for live applications, incorporates the chassis of the 200 Delta and Venue consoles and operates as a 12 bus stage monitor mixer with up to 40 inputs.

The Delta 8 is a compact recording console designed to fit a number of applications including post production and broadcast. It is designed for both 8 and 16 track recording and its split format is modular and offers 8 groups with a choice of 20, 28 or 36 input channels. Mono Input facilities include six independent auxiliary sends, a four-band EQ section with two swept mid-bands as well as high pass filter and phase reverse switches.

Circle 21 on Reader Response Card



Combo Unit

Leader Instruments Corporation has announced a new battery powered 30 MS/s combination digital storage oscilloscope/digital multimeter. With a sampling rate of 30 MS/s, the Model 300 features dual, add, subtract and X-Y modes, peak to peak voltage of channels 1 and 2 and frequency readout, plus auto setup and auto ranging for both time base and volts per division for each channel. Memory length is 1.8k words per channel and storage of 20 waveforms is standard (up to 80 waveforms with an optional card). The unit has a "supertwist" LCD display.

Circle 22 on Reader Response Card

LITERATURE

Electro-Voice Products, Modular Audio Modules

Full-Line Catalog

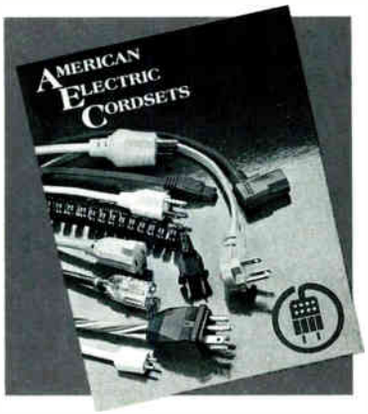
A new catalog featuring the full-line of Electro-Voice music equipment is now available. The EV Music Products catalog offers detailed information, specifications and photographs of EV's line of electronics, stage systems, microphones, components and accessories. The catalog marks the first time that all EV music products are listed in one source.

Circle 23 on Reader Response Card

Cordset Catalog

A comprehensive cordset catalog has been published by American Electric Cordsets featuring the company's custom manufacturing capability as well as its in-stock inventory. The catalog covers categories including: UL and CSA Approved cordsets, 2- and 3-conductor molded male plugs, right angle molded male plugs, strain reliefs, and hospital grade "green dot" molded plugs.

Circle 24 on Reader Response Card



NEC Code Chart

A free National Electric Code Summary Guide that helps users convert code requirements into cable specifications is available from Alpha Wire Corporation. One side of the plastic laminated guide displays a chart that cross references communications, remote-control, signaling, fire protective signaling, and other commonly used cables to the appropriate section of the NE. The other side has a flowchart that describes NEC-permitted product substitutions between plenum, riser, general purpose, and residential applications. Information summarized in the guide is based on the 1990 edition of the National Electric Code.

Circle 25 on Reader Response Card

Modules and Amplifiers

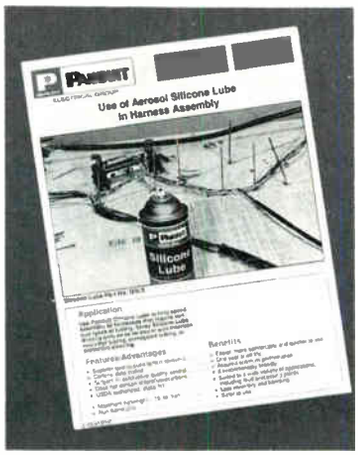
A 56-page catalog describing a range of audio modules and amplifiers for commercial sound, broadcast and industrial applications is available from Modular Audio Products. Technical data, specifications and applications information on over 59 different products is contained in the catalog. The catalog includes the IMPAC series of plug-in modules, along with the company's line of non-modular rack mounted audio functional blocks.

Circle 26 on Reader Response Card

Data Sheet

A new technical/application data sheet from Panduit Corp., Electrical Group, describes use of the company's aerosol silicone lube to speed harness assembly. Whenever harnesses require vinyl or corrugated tubing or other protective sleeving, the silicone lube is sprayed directly onto the wires for easier insertion, according to the company.

Circle 27 on Reader Response Card



Applications Guide

Lectrosonics has published an applications guide titled "Automatic Sound Systems," which outlines the applications for the Modular Audio Processor and the LCA16 Logic Controlled Amplifier. Individual descriptions of each module and examples of typical installed systems are included. The six sections of the book have chapters that range from input and mixing modules to example systems, including churches, conference rooms and courtrooms.

Circle 28 on Reader Response Card

Plastics Catalog

Ain Plastics, Inc. has announced the publication of its Ain Plastics Catalog 91. The 208-page source book offers full lines of mechanical plastics, sheet, rod, film, tube and accessory items. The 1991 catalog contains product information, government and AMS specifications, property charts on adhesives and engineering plastics, and a decimal/fraction/metric equivalent table.

Circle 29 on Reader Response Card

Multi-Room Remote

Video Link has announced the immediate availability of "The Book," a 39-page manual on IR remote control extension. The company says the book was initiated as a result of the company having spent "hundreds of man-hours each week responding to technical information requests from custom installers on how to meet unique multiroom remote control installation problems."

Circle 30 on Reader Response Card

Sealant Products

The newest product line catalog from General Sealants, Inc., covering extruded sealants, vacuum bag sealants, liquid, and paste products is now available. The six-page brochure has a description for each sealant along with technical information such as base materials, temperature ranges, adhesion, water- and corrosion-reisistance ratings, and methods of application.

Circle 31 on Reader Response Card

Champ Connector System

Catalog 73-152 from AMP covers the Champ connector family, including insulation-displacement cable connectors, printed circuit board (PCB) connectors and connectors for special applications. The catalog provides detailed information on all connectors, as well as details on mounting hardware, application tooling and technical documents.

Circle 32 on Reader Response Card

Military Sound; Moves in Europe; References Chosen

Electro-Voice and the Military

Electro-Voice is working with the U.S. Navy in developing loudspeaker systems for the aircraft carrier fleet, using speakers which incorporate EV's Manifold Technology. Prototype testing is currently being done on the U.S.S. Independence. The company has also developed a military headset featuring "Active Noise Reduction" which, according to the company, will help eliminate hearing damage sustained by personnel in high-noise situations in tanks, helicopters and aircraft. Electro-Voice's involvement with the military goes back to World War II when, according to the company radio communications in 1940 among U.S. military forces in combat situations were estimated as being successful less than 20 percent of the time, largely because of the microphones then available. Electro-Voice provided the military with a lip microphone which used a 180 degree phase shift to cancel background noise, and which raised the success rate of radio communications intelligibility to over 85 percent.

New England Digital Chooses Meyer

New England Digital Corporation has selected Meyer Sound Laboratory's HD-1 audio monitor as the laboratory reference monitor to be used in the company's further development of its new DSP Option mixing and digital signal processing module for the PostPro and PostPro SD digital audio workstations.

CBS Plays Ball with Panasonic

CBS has purchased 16 WV-F250 3-CCD FIT cameras and remote control units from the Audio Video Systems Group of the Panasonic Communications & Systems Co. Twelve of the cameras were used to cover the baseball playoff games and the World Series. The cameras are used as point-of-view cameras, as unmanned cameras for sporting events, as robotic cameras in the network's news bureau, and as graphic-static cameras in the editing rooms.

Clair Brothers in Europe

Elliott Brothers (Audio Systems) Ltd., the Oxford, England based contracting company, has been appointed by Clair Brothers Audio to carry out their installations in the United Kingdom and Europe. Gene Pelland, General Manager of Clair Brothers Audio Systems, said "At Clair Brothers, we are committed to excellence before, during, and after the project. . . . We found it necessary to find a company in Europe whose philosophy is the same as ours." Elliott Brothers has "extensive experience" in the broadcast and recording installation fields. Pelland added, "We see this as a positive direction for Clair Brothers in the sound contracting field."

Color Plotter

Raster Graphics Inc. has added to its family of color electrostatic plotters a new unit capable of plotting on 24-inch × 36-inch paper. The new machine allows architects and engineers who must conform to this format to take advantage of the company's ColorStation "high speed, affordable full color" output device for the CAD workstation environment.

Automatic Ship-to-Shore

A new automatic call routing system developed by World Communication Systems automatically selects the most cost-effective communication medium for shipowners. The system is compatible with satellite, cellular and automated RF communications equipment and can be programmed to provide the least-cost routing automatically for ship-shore voice, data and fax calls.

QSC Sees UL as Opportunity

QSC has announced several recent installations. Austin City Limits has started its 16th season with a newly upgraded sound system which includes 16 QSC power amplifiers. The $150,000 upgrade was designed and installed by Xeno Sound, Inc., the Austin based audio-visual company. The QSC amps power an Electro-Voice Deltamax processor controlled house sound system.

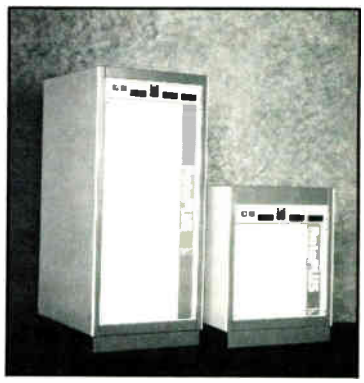
Forty-three QSC model 1200 and 1400 power amps will be installed in the Harold Washington Memorial Library in Chicago. The amplifiers have been specified by Electro Acoustic Systems of Evanston IL to power the paging system. According to the QSC representative for the Chicago area, Bob Newhuis of JAMM Distributing, "This is the first UL job that has been specified QSC in the city of Chicago. Now that QSC is listed, it opens up a lot of new opportunity."

JBL at Spartan

Communications Equipment Company in Greenville, South Carolina has completed the design and installation of two sound systems at the Spartan Foods Tower in Spartanburg, South Carolina. The two systems are part of a large audio-visual system for the facility's boardroom and auditorium. The installation includes a JBL 2365 Bi-Radial horn, a 2450J compression driver and a 4647 loaded low frequency enclosure. Three Soundcraft 200 Delta consoles were also installed at the facility.

Mobile Arrest Center

The New York City Transit Police have unveiled a Mobile Arrest Processing Vehicle, a customized bus that contains a holding cell and complete mobile arrest processing center. Nynex Mobile Communications' Brooklyn Cellular Center provided the six cellular phones and two fax machines that are being used. More vehicles may be introduced.



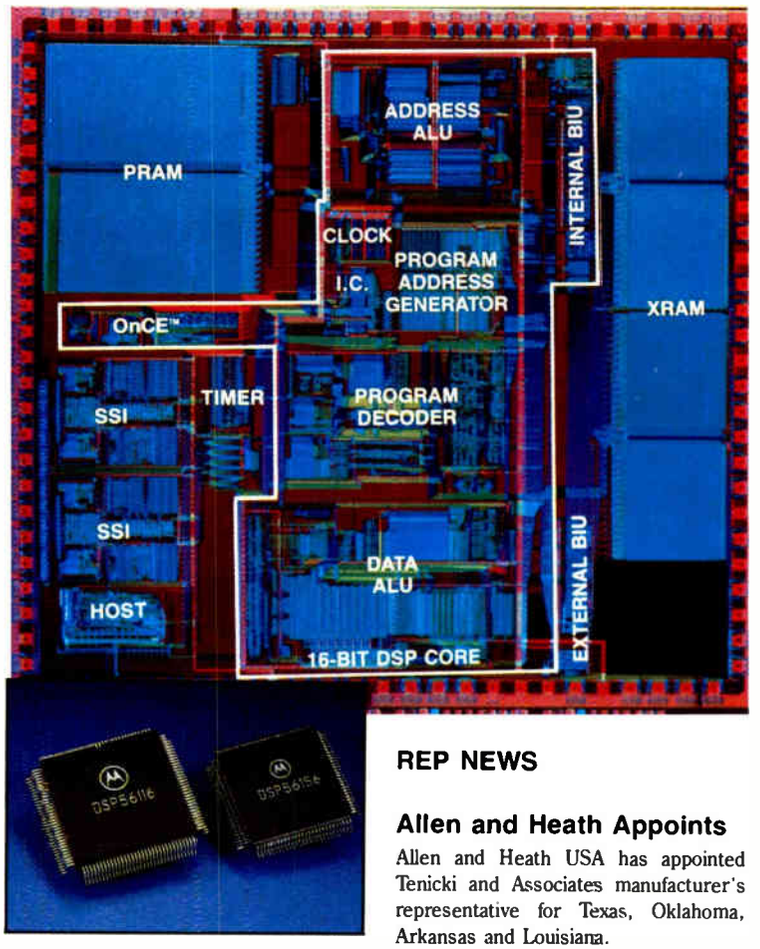
Frequency Converter

International Computer Power has announced a line of RotoPlus 50 to 60 Hertz frequency converters that come with power conditioning built in at no extra cost. According to Dick Bowyer, ICP president, "Our products are available in any combination of input/output frequencies/voltages with built-in power conditioning." An uninterruptable power supply feature may also be purchased.

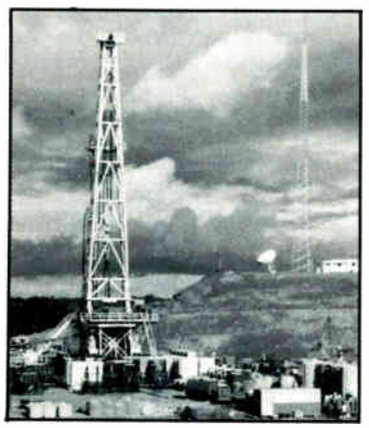
Magnavox Tactical Fax

Military Fax

A new option introduced by Magnavox makes it possible for users of AN/UXC-7 military fax machines to interconnect with IBM-compatible computers. With the new computer interface option, field commanders can transmit and receive computer text and graphics via fax.



Motorola's 56100 family is designed around the 5616 programmable CMOS 16-bit DSP core using silicon compilation tools.



Satellite communications system designed and installed in Ecuador. Courtesy IWL.

IWL Acquires Spacelink

IWL Communications, Inc. has acquired a controlling interest in Spacelink Systems, Inc. Spacelink designs, engineers, installs and maintains private satellite-based networks supporting offshore/inland operations for oil and gas companies. IWL represents manufacturers of microwave, two-way land mobile and portable radio equipment.

Trevor Cash

BBE in Europe

BBE Sound has mounted a campaign in Europe. The company has appointed Stirling Audio to "look after distribution, marketing and sales of its products in the U.K." In addition AEG Netherlands and Titan Audio have been appointed to distribution, marketing and sales duties in Holland and Belgium respectively. In Scandinavia, Sync Creative Software, Soundside Sweden and Supersound have been appointed for Norway, Sweden and Finland. Produktiv Grosshandel, B&T Musikinstrumentenhandel and Embag Musikengros have been appointed in Germany, Austria and Switzerland. In addition, BBE Sound has hired the services of pro audio and musical instrument marketing consultancy Trevor Cash International to spearhead an integrated European marketing campaign for the company.

SoundTrek Gets Tannoys

SoundTrek Plaza in Kansas City has installed Tannoy System 15 DMT monitors in its new audio post production suite. The DMTs are part of the new Tannoy Monitor Series. SoundTrek Plana is a digital video editing/audio post production facility with D-2 video equipment. The audio post production suite features the Lexicon Opus system.

Video Compression from Comsat

The Communications Satellite Corporation's (Comsat) Intelsat Satellite Services business unit has demonstrated Time-Multiplexed Television, a video compression technique developed by Comsat Laboratories. The TMTV technique digitizes, compresses, and combines up to three separate NTSC-format TV source signals and stereo audio pairs into a single TV signal that can be transmitted within a 36-megahertz satellite transponder. Likely users of the technique include earth station operations, network and cable TV organizations, and institutions with international teleconferencing requirements. Comsat has licensed its TMTV technology to Ikegami, Inc. for the manufacture and sale of video compression units.

Vendors Awarded

Del Norte Technology held a "Vendor Day" recently to "recognize the importance of its suppliers." The event was part of Del Norte's observance of National Quality Month. Del Norte Technology is the Texas based manufacturer of global positioning equipment and correctional facility security systems. Vendor of the Year awards were given out to Photopanel (manufacturer of the year), Future Electronics (distributor of the year).

Teleconferencing Via 700 Number

MultiLink has announced that Mid-Atlantic Telecom has selected a MultiLink teleconferencing system to provide unattended audio teleconferencing services to its business customers. The MultiLink system is used in its unattended, originator dial-out, mode. The customers of Mid-Atlantic call a 700 number to gain access to the system.

The Heart of DSP

Motorola's Digital Signal Processor Operation has announced its 5616 core, the heart of the 56100 family of 16-bit digital signal processors. The 5616 core is optimized for voice and data applications, including digital cellular telephones, ISDN, networking and high-speed modems. The 5616 core processes 30 million instructions per second with a 25-nanosecond instruction cycle time. Six operations may be performed simultaneously.

Notifier Cites Distributors

Notifier division of the Pittway Corporation held its "most successful" Distributor Conference ever in Fort Lauderdale recently. The Conference hosted over 260 people representing the Engineered Systems Network. During the conference Fire Detection Consultants of Houston was named Distributor of the Year. Seven regional distributors were also recognized: Industrial Time and Systems of Wallingford CT, United Fire Protection of Roselle NJ, Cincinnati Systems of Memphis TN, Tech Electronics of St. Louis MO, Foxbro Systems of Colorado Springs CO, and D & S Systems of La Habra CA. FCV Systems of Toronto was named Canadian Regional Distributor of the Year. And Ken Plummer was named Sales Manager of the Year Award. Plummer is the company's midwest regional sales manager.

REP NEWS

Allen and Heath Appoints

Allen and Heath USA has appointed Tenicki and Associates manufacturer's representative for Texas, Oklahoma, Arkansas and Louisiana.

Throckmorton Reps BBE

R.J. Throckmorton Sales of Glencoe, Missouri has been appointed representative for BBE in Iowa, Nebraska, Kansas and Missouri. Ron Throckmorton, Vince Throckmorton, Dave Kennedy and Terry Smithe are responsible for the line in MI, pro audio and sound contracting as well as the consumer audio markets.

Frazier Appointment

Frazier has appointed Chuck Olson Associates to represent the company in western Montana, western Idaho, Washington, Oregon and Alaska. Frazier — a division of Sound-Craft Systems — has also announced that it is "seeking a limited number of sound contractor/dealers in this region."

Audio Animation Names Reps

Audio Animation Incorporated has announced the signing of its independent representative network to handle domestic distribution of the company's "paragon," a digital broadcast transmission processor. The reps include: New England Technical Associates, Eaton Sales & Marketing, On The Road Marketing, Sound Sales, El Rep Sales Co., World Wide Electronics, Cambridge Pro Sales, JAMM Distributing, Excellence Marketing, RPM Sales, First Choice Marketing, and Pappas Consulting.

HELP WANTED

MANUFACTURERS REPS

Circuit Wire & Cable is looking for manufacturers Reps throughout the United States. If you would like to explore an oustanding opportunity, please send an agency profile to:

Bruce Ratskoff
National Sales Manager
Circuit Wire & Cable
7400 East Slauson Ave.
Los Angeles, CA 90040
or Telephone at:
213-728-2216
FAX 213-726-2971

SALES CONSULTANT

Minnesota sound contractor seeking aggressive sales consultant experienced in design, layout and bidding of commercial and professional sound systems. Must have product knowledge of major manufacturers and capability of using computer programs for design.

MTS Northwest Sound, Inc.
Robert Thompson
7667 Cahill Road
Minneapolis, MN 55439-2749

SALES POSITION AVAILABLE

Immediate sales position available with a diversified company. Nurse call, school systems, and security are our primary interests. Need aggressive individual to meet the challenges of a rapidly growing market. Experience in design and sales required. Experience with Rauland products helpful. Send resume with salary history to:

Spartan Engineering Inc.
Attn. John Moore
540 Parrott St.
San Jose, CA 95112
FAX 408-292-8887

District Manager

Rauland-Borg Corporation is accepting applications for District Manager. Extensive knowledge of Rauland product and its application is required. Candidate must be willing to relocate.
Please send resume in confidence to:
Harry Hahn, National Sales Manager
Rauland-Borg Corporation
3450 W. Oakton Street
Skokie, IL 60076-2951

ACROMEDIA CORPORATION LOS ANGELES, CALIFORNIA

Established electronics contractor seeks systems engineer to work on variety of projects. Experience desired, but will also train.

Call Mr. Ferreghy at 213/410-4141.

NATIONAL SOUND AND MUSIC COMPANY
System Sales Opportunity

National company seeks sales individuals that have a background and knowledge of sound, CCTV and video system sales. Blueprint and system design capabilities is a must. We are looking for career minded individuals in the L.A., San Francisco, Chicago and Charlotte, North Carolina markets. If you would like to explore an outstanding opportunity, please send a resume and salary history to:

Jim Sorenson,
900 E. Pine,
Seattle, Washington 98122.
All responses considered confidential.

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Rich Kobel
Classified Advertising Manager
Sound and Communications
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Port Washington, New York 11050

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Michael Hester
Michael Hester (LK)
General Manager
Le Com Engineering, Inc.

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Call David Saraf, (516) 767-2500 today!

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How To Place a Sound & Communications Ad

Print or type copy indicating capital letters and bold type. All rates are based on column inch.
1X rate for a classifed ad is $52. (Includes borders, typesetting and company logo if desired.)
1X rate for a marketplace ad (product) is $80. Frequency discount available. Call for information.

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☐ All product and services

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Address _____ Phone _____

Method of Payment ☐ Check Enclosed ☐ Visa ☐ American Express ☐ MC

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Sound & Communications Marketplace
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Phone: 516-767-2500 FAX: 516-767-9335

Aiphone Makes Appointments; Otari Awards Dealer

Aiphone Sales

John Mosebar has been promoted to national commercial sales manager by Aiphone Corporation. Mosebar, who has been with the company for eight years, will establish new commercial markets and manage the company's 17 nationwide factory representatives. Mosebar was previously technical sales manager and midwest regional manager. As technical service manager he assisted customers in designing specialized systems and organized technical seminars.

Mosebar

Midwest Region

Brand-Rex Company, an affiliate of Cablec Corporation, has announced the appointment of Mark Peterschmidt as regional sales manager of the 15-state midwest territory. Peterschmidt oversees the activities of six manufacturing representatives within the region. Peterschmidt was previously with Belden Electronic Wire and Cable, Spectra-Strip/Amphenol, and UFE Incorporated.

Peterschmidt

Birgh Appointed

Stefan Birgh has been named residential sales manager for Aiphone Corporation. He was previously with ADT Security Systems and Assa Inc. In making the appointment, Jun Matsumoto, president of Aiphone, said, "The residential markets offer our company a significant growth opportunity in the coming years, and Stefan has the experience to help us take advantage of it."

Birgh

Dealer of the Year

Otari vice president John Carey and national sales manager James Goodman have presented Audio Images Corporation of San Francisco with the Otari "Dealer of the Year" award. The award, based on "outstanding quota achievement, product expertise, dealer stability and growth, and quality interaction with Otari," was accepted by AIC president Ron Timmons.

Odetics' Omutec

Odetics has named Frank Borst marketing director of the company's Omutec division. Borst joins the company from the Engine Controls Division of Moog Inc. in Clearwater, Florida. He was previously with Lear Siegler and Goodyear Aerospace. Omutec designs and manufactures LVDT transducers.

Mark Bastani has joined Odetics as manager of electrical engineering for the company's Omutec Division. Bastani was formerly supervisor of engineering research and development for Kavlico Inc. and was with Omega Automation and UIP Engineering Products before that.

VP at Cellcom

Cellcom Corp. has announced that Barry M. Pelletteri has been named vice president of information technology. Pelletteri assumes corporate-wide responsibility for implementation and management of the company's management information systems. He has 14 years of MIS and data processing experience with over three years with Bell Atlantic Mobile Systems. He has held previous management positions with AT&T Bell Laboratories and has been a consultant to Peat Marwick Main & Company.

Aim Appoints

Maurice R. Rodrique has been appointed president and chief executive officer of Aim Telephones, Inc. The chairman of the board of Aim, Don Berlanti, also announced the appointment of Ronald Teixeira as executive vice president and chief operating officer. Rodrique was formerly executive vice president of WIN Communications Corporation. He replaces William C. Christopoulos, who also leaves the company's board of directors. Christopoulos started the company in 1974. Teixeira was formerly senior vice president of Vicon Industries.

Wieland Appoints

Marie Anne Colavito has been appointed marketing coordinator of Wieland Inc. Colavito has had more than eight years experience in developing and implementing corporate communications and industrial marketing programs. As marketing coordinator she now oversees all marketing services including advertising, promotion, trade shows and public relations activities.

Colavito

Bogosian to Board

USTeleCenters has appointed Brian A. Bogosian, vice president of sales and marketing, to USTeleCenters' Board of Directors. Prior to joining the company, Bogosian was vice president, sales and marketing for Aim Telephones. He joined his current company in 1988.

Innovative Announcements

Innovative Technology, Inc. has announced that Gary Hylton has joined the company as vice president of sales operations. Hylton returns to the company from Telcom Technologies. During his previous sting at Innovative Technology he was director of sales and marketing.

Innovative Technologies has also added three new regional managers to its staff: Scott Kennedy in the Western region; Connie McLellan in the Southwest; and Kevin Guerrieri for the Northeast.

JVC Pro

Ron Chubb has been appointed district sales representative for JVC Professional Products Company. Chubb's territorial responsibilities include San Diego, Orange County, Los Angeles and parts of Burbank and Hollywood. Chubb was previously with Fairlight Special Effects and worked for various video manufacturers and dealers, specializing in industrial video and closed circuit video.

New Position

Donald Mereen has been named vice president of corporate development for Telex Communications, Inc., a new position. He has also become a corporate officer and been appointed to the company's executive committee. The announcement came from Jeffrey S. Wetherell, president and CEO who said the position was created to meet the challenges of growth through line acquisitions, technology partnerships and strategic alliances. Mereen, a registered professional engineer, has been with Telex since 1974 and has held positions in product development, sales, marketing and strategic planning.

Mereen

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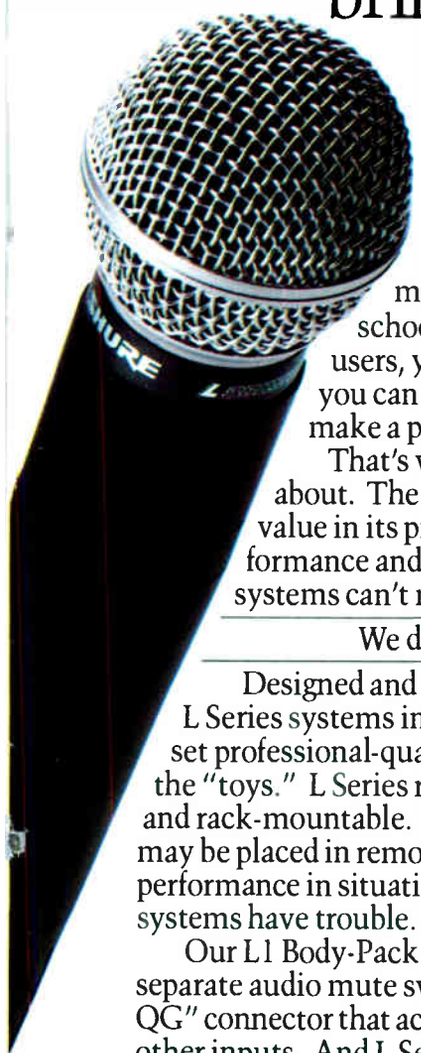
Shure L Series brings reliability to affordable wireless.

Why take chances with anything else?



If you're providing wireless microphone systems to churches, schools, or other value-conscious users, you need reliable equipment you can sell at an affordable price—and make a profit doing it.

That's what the L Series from Shure is all about. The L Series sets a new standard of value in its price range, offering features, performance and reliability other "economy" systems can't match.

We didn't forget the details.

Designed and built by Shure in the U.S.A., L Series systems include many of the features that set professional-quality wireless systems apart from the "toys." L Series receivers are sturdy, metal-cased, and rack-mountable. Antennas are detachable and may be placed in remote locations, providing excellent performance in situations where many other wireless systems have trouble.

Our L1 Body-Pack Transmitter has features like a separate audio mute switch and a universal 4-pin "Tiny QG" connector that accepts a variety of microphone and other inputs. And L Series lavalier systems come with the 839W, a reliable Shure condenser lavalier microphone designed for clear, natural vocal pickup. The L2 Handheld Transmitters, available with interchangeable SM58, SM96, and Beta 58 capsules, offer durability, compact size, light weight, and provide the same distinctive sound as their wired counterparts.

Performance meets economy.

Even though L Series components are economically priced, they incorporate sophisticated RF technology. The L4 Diversity Receiver utilizes "intelligent" MARCAD™ circuitry to monitor signals from its two independent RF sections, blending them in the optimum proportion—not merely switching them. The result is reliable, uninterrupted audio with no clicks, no pops. And all L Series systems feature Shure "Mirror Image" companding, plus high-gain, low-noise MOSFETs, a high-fidelity quadrature detector, and a 3-pole Chebyshev audio low-pass filter. It all adds up to outstanding audio quality with exceptional freedom from noise and distortion.

Why risk callbacks with anything else?

Other systems may not meet expectations. But you can recommend a Shure L Series system with confidence. So why risk callbacks—and your reputation—with anything else?

For more information about the Shure L Series, call Shure Customer Services at 1-708-866-2553. The Sound of the Professionals®...Worldwide.

THE SHURE WIRELESS
L SERIES

Circle 207 on Reader Response Card

Power. Play.

Loudspeaker design: To achieve high power handling capability, sensitivity suffered. You could get more power, but you had to accept less play.

Another Advance From JBL.
Ever since Jim Lansing flattened voice coil wire in the early thirties, JBL has continually edged loudspeaker design closer and closer to perfection. The introduction of our new 2200 Series models marks another JBL advance in transducer technology.

Vented Gap Cooling.™
As a voice coil's temperature rises, so does its impedance, causing power compression. Every dB of power compression translates into one less dB of output.

To reduce power compression and gain overall sensitivity, JBL created vents from the voice coil, through the magnet structure, to the rear of the loudspeaker. As the cone travels, heat is dispersed and cool air returned to the voice coil. The result, a true 600 watt loudspeaker with high sensitivity. You get twice the power handling plus greater output.

New SFG™ Magnet Structure.
Through computer modeling and simulation, the 2200 Series SFG magnet structure achieves optimum flux density and significantly lower distortion while realizing up to 20% weight reduction.

We Heard You Loud And Clear.
Whether you're looking for a mega-watt touring loudspeaker, or for a low distortion critical listening device, JBL has the model for you. All with the new SFG magnet structure with Vented Gap Cooling. The new 2200 Series models give you the best of both worlds. Power, and play.

JBL

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