SOUND & COMMUNICATIONS

Volume 38 Number 2

February 28, 1992

TEXAS NIGHTCLUB

Booming bass in some areas and not enough volume in other areas were the main problems for this Texas City dance spot. Owner Berl Gassner decided to call Core Systems to cure this 8,000 square-foot club of its sound dispersion problems and redo its lighting and video presentations. But could it be done with limited time and a limited budget? **24**

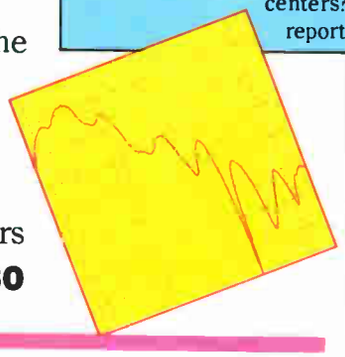
IN THIS ISSUE

DOING BUSINESS WITH CLUBS

Team work, creativity and firm knowledge of sound technology are some of the factors needed for club installations. Who is saying what on the clubs of today? What's in store for 1992? Are clients paying on time? Is the business still there? **46**

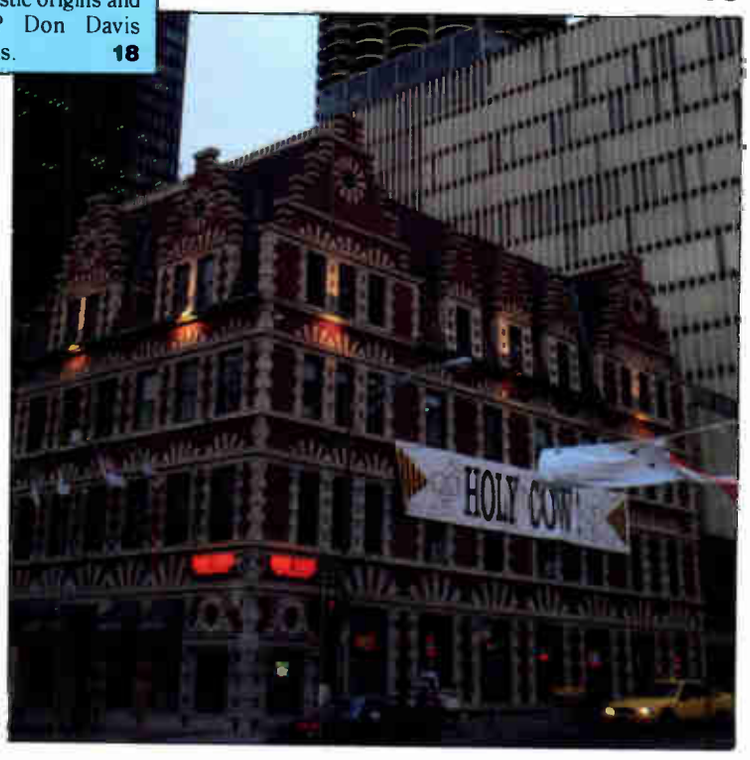
DISCS FOR CLUBS

Disc Jockeys hate them. But in the absence of LPs, CDs are making new demands on manufacturers and installers. Features come to the rescue, as equipment designers begin to recognize club needs. **30**



NORTH SIDE SPORTS BAR

Chicago's Harry Caray's, located in an historic near-northside structure, is one of the most profitable restaurants in the country. But the narrow bar was in need of a system that could be heard over cheering customers. Modular Sound was given the ball and came up with a solution that scored. **50**



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LETTER FROM THE EDITOR

The ADA, the Big Button Phone, and Implications for the Future

Almost coincident with the implementation of the Americans with Disabilities Act in January, the Electronic Industries Association sponsored a discussion during the Consumer Electronics Show of "Consumer Electronics Products for the Burgeoning Market of the Aging and the Disabled."

First, let's make clear what the discussion did not do and was not meant to do: It did not touch on the intricacies of the Act; the federal and state impositions on the electronics industry; the moral issues at work; or the opportunities for income growth within the provision of services and products for the aging and disabled.

What it did do was to make it clear that help for the disabled is sometimes very easy, very inexpensive, and serendipitously helpful to those who are non-restricted.

For instance: The number one "reduceability" in America is caused by arthritis. The most difficult motion for arthritics is a twisting motion. Non-twisting control knobs designed for arthritics can be easier for all of us. The visually impaired are helped by contrasting colors on control panels; but the readability in general of these panels is improved by contrast. Control indicators can be on a knob or on a panel. Check out the indicators when they're on the knob — they are harder to read, and at some point turn upside down. The best indicator is triangular, with printed information on the panel. That's best for the visually impaired, the mobiley impaired, and the non-impaired.

Epileptic fits can be triggered by tones of 20 Hz. Adjusting sound can prevent problems. Multisensory cues — aural, tactile and kinetic — make adjustments easier for everyone.

The CES Workshop was sponsored by the Assistive Devices Division of the E.I.A. Participants were Paul Fontaine of Digital Equipment Corporation, Dr. Gregg Vanderheiden of Trace Research at the University of Wisconsin, and Dr. Clint Gibler of AT&T. Some of the features on its regular products that AT&T has found applicable to the disabled: the Big Button phone with controlled volume and one-touch emergency buttons with icons; the speakerphone; the cordless phone. New models of AT&T cordless phones have big buttons with contrasting colors on the keypad. These features may help the disabled; but who among us doesn't appreciate the cordless phone? With up to 20 percent of the U.S. population having some sort of functional limitation (and that portion of the population growing faster than any other), the new focus is clearly demanded.

The point here is that while we're being forced by legislation to look at easing the way of the disabled, just looking, that is, paying attention, can help everyone.

The other point that I want to make is that as January 26 has passed and the ADA is a reality, we at Sound & Communications would like to survey how the Act's implementation is changing your lives. How have your clients responded after the fact? How many are in default? Is there any government enforcement going on in your area? Has the Act in fact brought any more ongoing business to your firm? Have you needed to add new lines to your product mix? Let us know. Write us, call us, fax us. We're preparing some articles and, as always, would like your input.

Best regards,

Judith Morrison
Editor in Chief

SOUND COMMUNICATIONS

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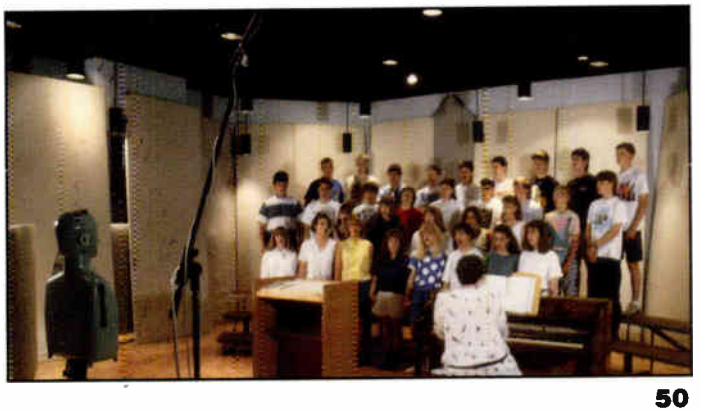

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FEATURES

DEPARTMENTS

SOUND COMMUNICATIONS

Introducing The Shure SM102. Now The Choice Is Black And White.

The new Shure Microflex™ SM102 makes the job of choosing a miniature condenser microphone an effortless one.

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And with a choice of in-line or wall plate preamps, both with switchable gain, the SM102 gives you the unmatched flexibility to hang it any way, anywhere.

In fact, the toughest decision you need to make is black or white. Take your pick.

The SM102 is a proud member of the new Shure Microflex family of miniature condenser microphones. For more information on the SM102 or other Shure Microflex products, call 1-800-25-SHURE. The Sound of the Professionals ... Worldwide.

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NEWSLETTER

MUSIC AND SOUND AWARDS

The Sixth Annual Music and Sound Awards were presented at a standing-room only gala program attended by over 700 people on January 18 in Anaheim, during the NAMM Winter Market. The nominees and winners were chosen by the readers of the Music & Sound Retailer magazine, which kept the winners a closely guarded secret until the event. NAMM-TV News covered the awards presentation, and presented highlights on NAMM-TV News the next day. Vincent P. Testa, publisher of the Music & Sound Retailer, hosted the event, which featured awards presentations by renowned musicians.

Among the award winners were: Most Innovative Product of the Year, DigiTech VHM-5 Vocalist; Most Innovative DJ Product, Peavey CD Mix 7032; Most Innovative Recording Product, Tascam 424; Most Innovative Microphone/Wireless System, Samson Concert Series II; Most Innovative Sound Reinforcement Product, Peavey SP-5ti; Most Innovative MIDI Product, ART X-15 Ultrafoot; Most Innovative Karaoke Product, Pioneer CLDV-820.

Winner of the "rep of the year" award (voted on by dealers) was Bob Gruenwald. Dealers feted (voted by manufacturers) included Gand Music & Sound for Promotion of the Year; Skip's Music for Music Education Program of the Year; Manny's for Most Effective Dealer — Sound Reinforcement and Microphones.

Nearly 50 awards in all were given out at the black-tie affair. The Music and Sound Awards are sponsored and hosted by Testa Communications, producer of NAMM-TV News, and publisher of the Music & Sound Retailer magazine (and Sound & Communications, Post, DJ Times, and Producers Quarterly).

RAULAND-BORG DISTRIBUTION

Osborn Sound and Communications of Georgia has announced that it has received a letter of intent from Rauland-Borg Corporation to exclusively market its lines of communications equipment in the greater Atlanta and Tampa Bay/Sarasota markets. According to Charles Hillebrand, senior vice president of Osborn Sound and Communications, "We hope that the strategies of marketing vertically to the health care industry will provide new business avenues for our Osborn Healthcare Communications division. Hillebrand also announced that David Weeden has been promoted to General Manager of Engineered Systems for southwestern Florida. Weeden was previously a district and product manager for Rauland-Borg.

JBL CONSUMER SYSTEM

JBL Consumer, following the pattern of its pro sister company, is about to introduce a theater system for the home. Although details were unavailable at press time, inclusions in the system would presumably include Harman Video projectors and Fosgate sound processing. (JBL's parent company acquired Fosgate last year.)

CREST AUDIO LAUNCHES NEW DIVISION

Crest Audio Inc. has formed a new division for the design and manufacture of low and medium priced professional mixer products. Development will be directed toward live sound and recording applications, with the first series of products slated for a summer 1992 introduction. The new division, called CrestMix, is headed by Chuck Augustowski as division manager/sales and product manager. Augustowski had been vice president/sales manager of Allen & Heath USA. John Petrucelli, also an Allen & Heath alumnus, is design engineer for CrestMix. A separate network of dealers and reps is being set up or CrestMix.

COMPACT POWER ENTERS AMP MARKET

Compact Power Company has announced it will make "a long term commitment to enter the commercial sound audio amplifier market." The company is a ten year old manufacturer of switchmode power products. UL approval of the amps is reportedly in process. Introduction will take place at the NSCA show.

NEWSLETTER

COMMERCIAL MEMBERS FOR NAMM

The National Association of Music Merchants' board of directors voted unanimously just prior to the NAMM Winter Market to request membership approval of bylaw amendments granting voting privileges to the Association's commercial members. As a retailer association, NAMM has manufacturers as adjunct members, but never as full voting participants. The action was the result of a study by a Long Range Strategic Planning committee. In other actions, NAMM's board approved a motion to change the title of its chief elected officers from president and vice president to chairman and vice chairman, and its chief executive officer from executive vice president to president. The president will be a voting member of the executive committee.

S.R.S. FORMED

S.R.S. — Sound Reinforcement Services — has been formed in Athens, Georgia, specializing in the design, manufacture, rental and sale of sound systems. The company's enclosures were designed in Europe by Rocky Norton, S.R.S. president. According to the company "the installation side of the business is taking off in a big way," with projects in Hawaii, Nashville and Georgia.

NEW ENGLAND SOUND ACQUIRES

New England Sound & Communications, Inc. has reported its acquisition of Rowe Custom Music of Dedham, Massachusetts. New England Sound provides direct broadcast satellite music services, electronic data and E-Mail, along with vendor-supported in-store messaging. Plans include upgrading the Rowe customer base of 400 to satellite music services.

AES EVENTS

The 11th AES International Conference will be held in Portland, Oregon, May 29 through 31 at the Marriott Hotel. The theme of the conference is "Audio Test and Measurement." According to the Audio Engineering Society, this is the first intensive examination of the subject that AES has offered the industry in the expanded time frame of an AES Conference.

The AES 93rd Convention will be held in San Francisco October 1 through 4, 1992 at the Moscone Center. The convention committee is headed by Leo de Gar Kulka.

PEIRCE-PHELPS DISTRIBUTES PICTURETEL

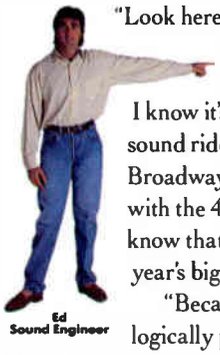
Peirce-Phelps, Inc. has signed an agreement to distribute the PictureTel Corp. family of videoconferenceing systems to "sub-Fortune 500" companies in New York, Washington, Philadelphia and San Diego. PictureTel Corporation develops, manufactures and markets software-upgradeable visual telecommunications products for use with digital networks.

T.C. SYSTEMS FORMED

T.C. Electronic of Denmark has announced the formation of T.C. Systems East and T.C. Systems West to provide factory direct sales of computer controlled equalizer and digital delay products in the United States. Ed Simeone and David Portugal have been appointed to head T.C. Systems West and T.C. Systems East respectively. David Portugal said, "This type of system is the future. . . I will be calling on consultants and contractors."

CEDIA MEET PLANNED

The third annual CEDIA Conference and Trade Expo is planned for October 7 through 13 at the Loew's Anatole in Dallas. The Custom Electronic Design and Installation Association previously met in San Francisco and in Florida. Dallas is expected to bring more attendees. Seminars will take place throughout the event, with exhibits opening on October 8. Rob Gerhardt and Eric Bodley are co-chairmen of the expo committee.



Ed
Sound Engineer

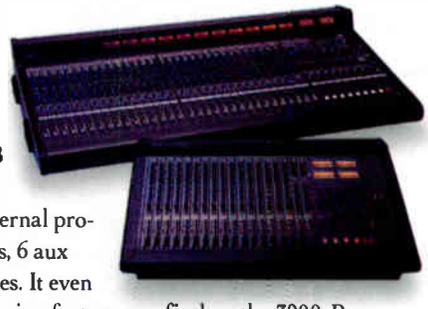
"Look here, I know the PM3000.

"I know it's at the top of the list of the best live sound-reinforcement consoles. I know it's written into all those big concert tour sound riders. I know it's in the major theaters on Broadway. I know it's in the 5,000-seat churches with the 400-seat choirs. And I also happen to know that it's in all those T.V. trucks producing this year's biggest sporting events. And I know why.

"Because the PM3000 is flexible. Because it's logically put together. Because it performs. Because it's a pleasure to use. Because everyone likes working with it.

"But, here's the news.

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



"The PM1800A was just updated. So it has an improved signal-to-noise ratio (6 dB better). And 0dB insert points for easy gain matching with external processors. It's got 8 groups, 6 aux sends and 4 mix matrices. It even has the same mute grouping feature you find on the 3000. But that's not the end of it.

"The PM1200 has the same roots. But in a more compact format. It's got 4 groups plus stereo, 4 aux buses, and 4 mute groups. You can get 16, 24, or 32 input channels and you still get two additional full-function stereo input channels.

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

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

Ed and his opinions are a composite of several obviously brilliant and successful sound engineers. © 1991 Yamaha Corporation of America, Professional Audio Products, P.O. Box 6600, Buena Park, California 90622-6600. (714) 522-9011.

Speaker Systems that Seem to Violate the Norm

Dear Answerman,

For the past 18 years I have been designing and building custom speaker systems for pro audio and consumer markets and have given much study to systems engineering and construction.

Recently, a spate of very small subwoofer satellite systems have been introduced to the consumer market by Bose, AR, Advent and NHT, to name a few. However, these subwoofer systems appear to violate many of the "norms" previously ascribed to by design engineering, and several characteristics are completely foreign to me.

First, these systems generally use small woofers with a half foam roll compliance such as has been widely used in acoustic suspension systems. Many of these subwoofers are sealed in enclosures with only a port tube for radiation of speaker waves, and several of these systems have no crossover other than the enclosure. When multiple woofers (usually two) are used, they are generally within a single chamber.

While the bass response is quite admirable, these systems seem to lack efficiency and have a somewhat higher resonant frequency than is truly desirable. These systems have nominal impedance in the four to six ohm range, which I find strange for most consumer uses. The Bose SE-5 system even claims to have two woofers in separate chambers, each tuned to separate resonances.

Conspicuous in its absence is, generally, any information regarding efficiency, rms power handling capability, or crossover point and attenuation rate. In a system where the woofer is in a sealed enclosure and where the port tube does not penetrate to the rear compartment, what becomes of the rear waves? It seems to me that this would raise the resonance frequency, reduce low frequency performance, cause great inefficiency, and adversely affect system impedance. Am I missing something here?

These systems appear to require much more power for adequate performance, yet lack adequate power handling capacity for sustained operation at a higher power level. It seems to me that manufacturers are sacrificing efficiency, dynamic range and impedance for smaller size and lower cost. And the types of speakers being used appear more suitable for automobile installations than for home stereo systems.

I am writing to request any information you can provide regarding theory behind these systems. Among other concerns: what effect do dual woofers in a single chamber have on system performance and long-term stability of consumer receivers and amplifiers, especially if a second pair of speakers is connected to the output at the "speakers B" terminals?

THE IDEA HERE IS TO REDUCE CONE EXCURSION OVER THE ENTIRE OPERATING RANGE SO HIGHER MAXIMUM ACOUSTIC OUTPUT CAN BE ACHIEVED.

As one who has built his reputation on honest representation and customer service, I find myself at a loss in answering consumer inquiries and explaining the concepts and principles of the small subwoofer systems. Any information you could provide would be greatly appreciated. I would also be grateful if you could recommend books to which I might refer for additional insight.

Marc W. McCord
Dallas, Texas

Dear Marc,

You ask a lot of good questions, and this topic happens to be one that the Answerman enjoys rambling on about. The type of subwoofers you describe are becoming common not only for home installations, but also for pro applications. This class of subwoofers is called "bandpass" because they are tuned to a narrow response range and exhibit a fast acoustical rolloff both in the bottom and top end of their response.

Bandpass speakers typically have some sort of resonator, sealed chamber, or other loading device for each side of the speaker cone. Patents go back to the mid 1930s for this class of speaker. The idea is that there is a gain/bandwidth trade-off and if you are willing to give up on bandwidth then you should get something in return. In the case of a subwoofer that is going to be used up to 100 Hz or so, with the driver having a response up to 1 kHz, either you must electrically cut off the response with a large inductor or electronic crossover and a separate power amplifier, or find an acoustic solution. By tuning a resonant enclosure to a narrow range of operation, efficiency ought to be improved — or at least cone excursion reduced for a given acoustic output.

Some early examples of bandpass speakers include the Karson enclosure of the 1960s which had all sorts of acoustic tricks on both sides of the speaker cone, although it is not exactly an example of the clearest acoustic thinking. A well-

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engineered example is the Janus subwoofer of the 1970s which used a sealed back chamber and a tuned front cavity. Bose introduced the Tandem-Tuned woofer for the pro market in the 1980s. This was an early example of two bass reflex chambers, one loading each side of the speaker's cone, each tuned to a different center frequency. The idea here is to reduce cone excursion over the entire operating range so higher maximum acoustic output can be achieved. Normally, in a direct radiator/bass-reflex design, the vent only helps over a narrow range of frequencies and the cone excursion increases significantly above this range. Let's say that we have tuned the enclosure to 30 Hz, then the cone excursion will be increasing by 70 Hz, and this is where most of the bass program material is. If we enclose the front of the woofer with a chamber and add a second vent with a tuning at 80 Hz, then cone excursion is reduced over the entire range (30 Hz up to maybe 100 Hz).

MY PREFERENCE IS FOR A WELL DESIGNED DIRECT RADIATING INFINITE BAFFLE.

The French, as usual, have taken a little different approach. A French engineer has developed a design with a sealed back chamber behind the woofer, and the front of the woofer faces into a chamber which has a vent that exhausts into the room. Many of the U.S. hi-fi speaker companies have adopted this approach as it is not patented (or the patents are not aggressively protected). Bose has a patent on their Tandem-Tuned design as well as a dual labyrinth subwoofer which they call an Acoustic Wave Cannon (a variation of which is the consumer Acoustimass, which you mention).

The French enclosure has a somewhat more limited bandwidth or for the same bandwidth as the double tuned enclosures, it is less efficient. You mention the lack of efficiency in your letter, and the trade off to this is to make the response range even narrower. You complain that these boxes do not go down low enough, yet if the passband was shifted downward, then the box would not reach up to the satellite speaker's bass limit. You question the use of a sealed rear chamber behind the woofer; that it would raise the woofer's free-air resonant frequency, reduce low frequency performance and inefficiency.

Actually the benefit of the French design is that loading at low frequencies is good, while the double bass reflex enclosures (or any bass reflex enclosure) is sensitive to overexcursion to program material below the box tuning. Below the tuning of the front vent, the French configuration loads the woofer like an acoustic suspension design. Acoustic suspension was first conceived by Harry Olson (RCA Labs) and was further developed and commercialized by Edgar Villchur of Acoustic Research with his excellent AR1 woofer of 1954.

The foam roll suspensions you mention are a key element as the compliance is mostly the trapped air in the sealed enclosure rather than the mechanical compliance in the woofer's foam surround. But you are right that sealed boxes, everything else being equal, have a higher resonant frequency and lower efficiency than bass reflex designs. Also, if the volume of air moved by the woofer cone becomes more than a small percentage of the total volume of air in the enclosure, than some distortion results. This is one of the limiting factors in large excursion sealed box designs.

Consumer hi-fi manufacturers like the French approach because almost no crossover network is needed, especially if a high inductance (four layer) woofer voice coil is used. If you have tested any of these "hi-fi" woofer systems (I have), you will find that many suffer from noisy ports, that their actual response is rough and output is less than computer-aided speaker design programs predict. The bandpass characteristic is there, but not a pretty sight to see. I should mention that many of the pro versions measure and perform quite respectably.

Did I say that computer-aided speaker design programs can model these speakers? Yes, as this bandpass technique is the favorite of custom auto sound installers (it helps if you are deaf in that market). These enclosures follow Thiele-Small parameters and LEAP, Speak, and SpeakEasy deal with all the variations of these designs. For realistic results make sure you increase the box losses (mostly due to vent losses). This year, *Sound & Communications* will be reviewing these speaker design programs.

One question you asked in your third paragraph concerns the use of two speakers within a single enclosure. Aside from increased acoustic output due to twice the cone area, and twice the thermal power handling, you will often find that one of the woofers is wired out of phase and

mounted backwards. The end result is that the cones of both woofers move in phase, but distortion/non-linearities of the magnetic system and suspension are partially canceled.

You later come back to dual woofers in the same chamber, but mention the condition that they are driven by different channels. A few years ago I would have said that this was not a real concern because records rarely had stereo separation at the low end as this made phono cartridges crazy. With CDs, stereo goes all the way down. At low frequencies, when one channel has significant bass information while the other channel does not, this can result in one woofer driving the other (with the woofer without the signal acting as an electrically damped passive radiator). Theoretically, this should screw things up. Certainly there will be program material dependent on dynamic changes in the frequency response, but subjectively this is not so noticeable (but I would not want this in *my* stereo system!). Other strange techniques that are in vogue for woofer/satellite stereo systems include the use of a dual voice coil woofer in which each winding is connected to an amplifier channel. I guess there are a number of hi-fi speaker designers that won't be going to hi-fi heaven. I am sure that there are cross-modulation effects, acoustical, inductively-induced, and otherwise, but none of this seems to have any real deleterious effect on amplifier stability.

As to lack of hard data on efficiency, power handling, crossover point and attenuation rate, most low cost consumer speakers are vague as to performance, and as I mentioned, as a group, the high resolution test results of frequency and transient response are not a pretty sight.

For audiophile and recording studio situations where pristine quality is foremost, my preference is for a well designed direct radiating infinite baffle or single-tuned bass reflex subwoofer. Years ago I had spent some time working with Velodyne Acoustics on a servo-control woofer system and this product is an example of a high-tech, yet clean design. Acoustically, it is simply a well designed driver in a sealed box. An accelerometer provides feedback to the subwoofer's own amplifier. The response extends down to about 20 Hz, distortion is less than .5 percent (even at 20 Hz!), and transient response has no ringing. Recently, Infinity, Yamaha, and others have introduced some very decent "servo" designs, both sealed box and bass reflex.

On the other hand, in commercial installations (clubs, movie theaters, sound reinforcement, concert sound etc.) where high efficiency, high power handling resulting in high acoustic output are critical, I have designed multi-tuned enclosures. But in the pro market the design engineer has a bigger budget for more serious speaker components and larger enclosures. Examples of decent pro subwoofers that load both sides of the speaker's cone are the Bose Tandem-Tuned 302, E-V's Manifold bass bins, and JBL's triple-tuned subs.

Finally, you ask about books that might help you understand more about multi-tuned subwoofers. This territory is covered in AES papers, patents, and the monthly magazine Speaker Builder, which thrives on these designs.

PHONE EVOLUTION

In the November Answerman column, Patton & Patton Software's Flow Charting 2 was recommended. Time moves quickly in software land and both the program and the firm's phone number has evolved. The current version of the program is Flow Charting 3, and you can now reach Patton & Patton at (800) 525-0082, ext. 2810. If you call this number you will get a free demo disk and literature on their flow charting program. The Answerman will look over this new release and comment in a future issue.

These systems appear to require much more power for adequate performance, yet lack adequate power handling capacity for sustained operation at a higher power level.

If you are willing to give up on bandwidth then you should get something in return. ■

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THE REVIVAL OF A HORN WITHIN A HORN

By Don Davis

In the late 1950s, at a hi-fi show in Los Angeles, Paul Klipsch introduced us to Art Crawford as the man who designed and built the first coaxial loudspeaker, though he never got credit in the literature.

In retrospect, I realize that during my 14 years at Altec Lansing, I never heard anyone within the Altec Lansing organization given credit for the design of the 604.

EARLY HISTORY OF COAXIAL LOUDSPEAKERS

John Wiggins of Community told us of the work of Hans Deitze, who worked on a team at RCA Princeton Labs under Harry Olson. Right after WW II, Mr. Deitze was given the responsibility for the development of the RCA LC-1C monitor loudspeaker along with Jon Sank's LS-11 floor cabinets to house them. According to Mr. Deitze, this monitor was described as a "co-planar, congruent coaxial loudspeaker."

These early designs were coaxial, but not matching acoustic centers or matching acoustic origins. That had to wait for Ed Long and Ron Wickersham's development of Time Alignment.

WHAT IS A COAXIAL?

Obviously part of the definition of a coaxial is that two loudspeakers share the same axis. But, if they do share the same axis, do they also have the same acoustic origins? Finally, if all the above is ascertained, do they share the same acoustic centers?

Now that the coaxial horn within a horn is becoming so popular (Community, Frazier, Renkus-Heinz and Electro-Voice to name only a few), we would like to take this opportunity to discuss the origin of the horn within a horn coaxial loudspeaker as we know it now.

FIRST HORN WITHIN A HORN

The concept of putting one horn in the mouth of another horn was tried by Blattner in the 1930s, Community (FRC, for Real Coaxial) in 1972, and Frazier in 1975, as well as others in past decades.

THE NETWORK ITSELF WAS MADE AVAILABLE IN TWO FORMATS — ONE WAS PASSIVE, AND THE OTHER A SYNTHESIZED ACTIVE NETWORK.

Unfortunately, the missynchronization that occurred as a natural result of the space available inside the larger horn (read lower frequency device) for the smaller horn (read high frequency device) was in a region where both devices then influenced each other's polar response. Without synchronization the horn within a horn was a doomed device.

The only horn within a horn design we are aware of that reconciles acoustic origins, acoustic centers and crossover polar responses are the PA 150 and PA 70 designed for the J.W. Davis Co. in 1982 and the AMC theater systems of E-V (all designed by Eugene Patronis.)

CROSSOVER NETWORK OF THE PA150

Dr. Patronis chose 750 Hz as the crossover frequency for the J.W. Davis PA 150 because he wanted to use a first order network (*i.e.*, 6 dB/octave slope rate). The prime advantage he sought with this first order network was to have both amplitude and phase sum properly at the crossover frequency; the drivers involved were sufficiently robust to allow the accompanying slope rates without danger of over excursion or high distortion. The network itself was made available in two formats — one was passive, and the other a synthesized active network.

A SYNTHESIZED NETWORK

A synthesized network is a carefully designed high pass filter which is the required high pass to the higher frequency unit but whose output is also subtracted from the total bandpass signal to obtain a low pass filter for the lower frequency device. Such networks in the hands of designers like Dr. Patronis can yield a seamless crossover region amplitude and phase response.

Obviously the two loudspeakers should possess similar polar responses throughout the crossover region (roughly three octaves). Not so obvious in the past, but increasingly so at the present time, is the need for careful precision signal synchronization of the acoustic origins of both units (*i.e*, where the signals originate in relative time and space). To meet this need, Dr. Patronis designed a passive "all pass" network with a signal delay on the order of 250 microseconds.

A DIFFERENT CONCEPT OF A HORN WITHIN A HORN

In 1987, consultant Jim Young of Ruston,

Louisiana approached Dr. Patronis, a physics professor at the Georgia Institute of Technology, for assistance in reducing the size of an array he wanted to design for a church. Dr. Patronis suggested the concept of a horn within a horn, utilizing the components Mr. Young had hoped to use in the array.

YOUNG'S CHURCH NEEDED THE POWER OF THE M4 DRIVER PLUS HIGH-FREQUENCY DEVICES, BUT HAD NO SPACE TO MOUNT THEM.

Young's church needed the power of the M4 driver plus high-frequency devices, but had no space to mount them. Dr. Patronis accepted the assignment and began by studying the polar response of the M4 at 0, 10, 20 and 30 degrees. (See Figure 1.)

Next he added the E-V HP 640 horn with an E-V DH1A driver inside the Community horn to convert it into a coaxial unit. During this part of the test the E-V horn was not operating but merely present as an obstacle within the larger device. (See Figure 2.)

Having carefully gathered these data, Dr. Patronis proceeded to analyze them in terms of the crossover network frequency and slope rates as well as considering how to provide precision signal synchronization through the crossover region. In this case, he chose 1250 Hz as the crossover frequency because he wanted to use a fourth order network (*i.e.*, 24 dB/oct slope rate). The prime advantage he sought with this active network was to get out of the response of the M4 very rapidly at the point where the coaxially mounted high frequency horn first became a physical interference due to it size and location.

OTHER CONSIDERATIONS BECAME ACADEMIC WHEN COMPARED TO THE NEED TO QUICKLY GET INTO THE OTHER DRIVER AT THE CHOSEN CRITICAL FREQUENCY.

Other considerations became academic when compared to the need to quickly get into the other driver at the chosen critical

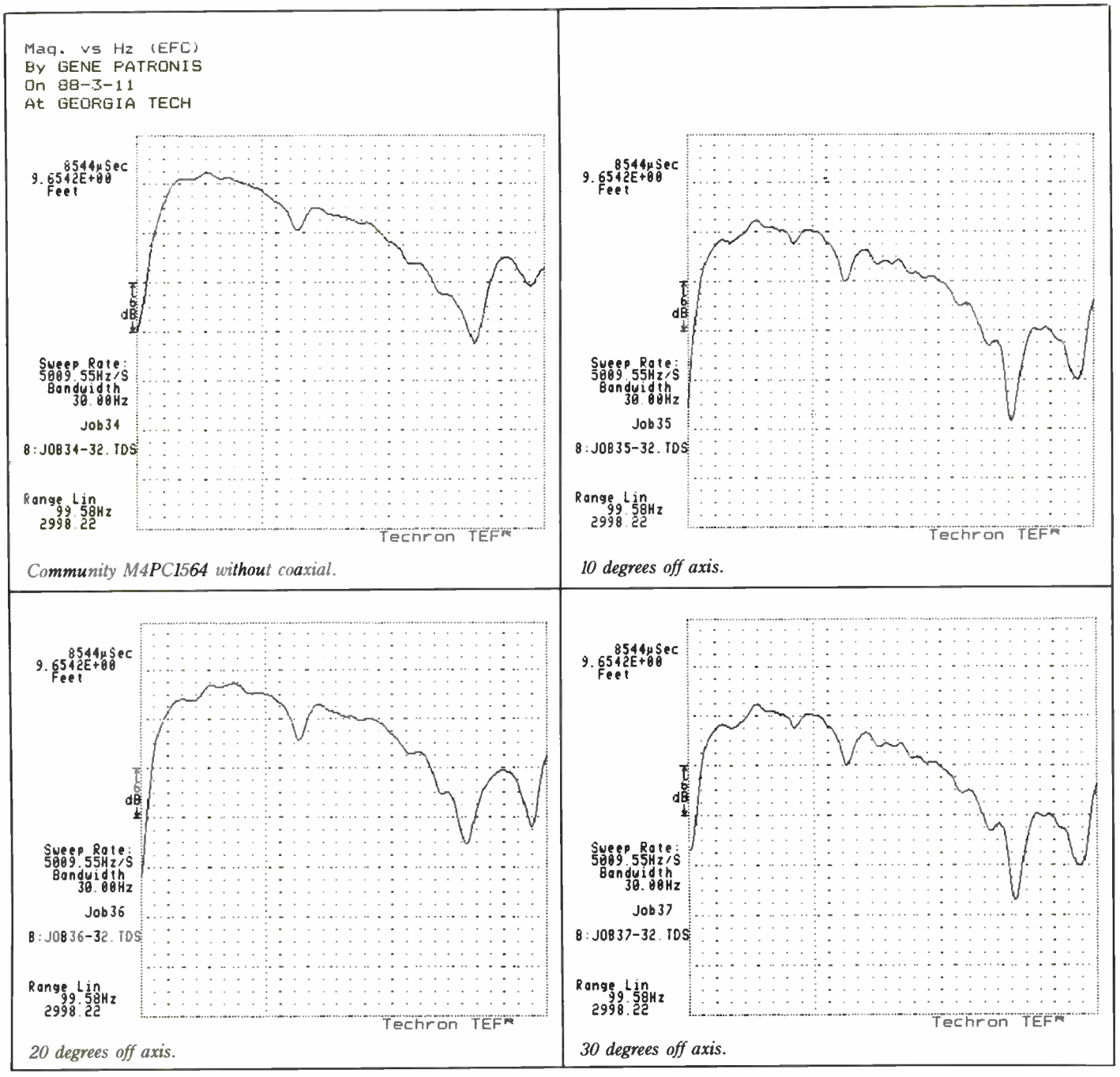


Figure 1. Polar response of a Community M4 at 0° on-axis and 10, 20, and 30° off-axis.

frequency the polar responses dictated. (The final result of this network plus the Klark-Teknik 20 microsecond/step digital delay line for precision signal synchronization is shown in Figure 3.)

REMARKABLY FAST ACCEPTANCE OF COAXIAL HORNS

We have worked in audio now for 40 years and we say that it often takes ten years from the introduction of a good audio product idea to its acceptance in the industry by the buying public — and often by audio manufacturers. (It took us five

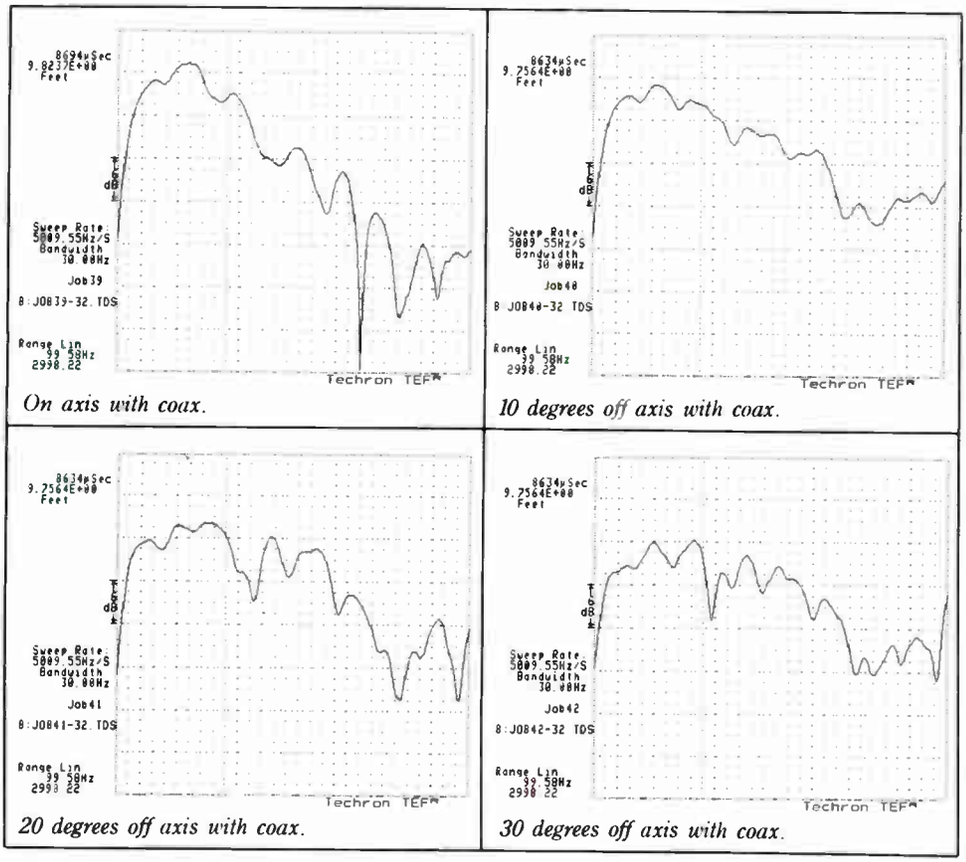


Figure 2. Polar response of a Community M4 at 0° on-axis and 10, 20 and 30° off-axis with an E-V DH1A driver inside the Community horn to convert it into a coaxial unit. The E-V horn is not operating but presents an obstacle within the larger device.

years of persuasion to get a manufacturer to build our conception of microsecond signal delay, and fortunately Larry Lynn, President at Sunn Music, did it as a favor in 1983 — not for commercial benefit.)

Within one year of our publishing Dr. Patronis' work for Jim Young in our Syn-Aud-Con Spring Newsletter (1988), we were writing of the introduction of the new Community M4 CoAx and the Frazier CAT 77.

The Frazier CAT 77 is a clever variation on the theme utilizing an "acoustic delay." Jay Mitchell a protege of Dr. Patronis, used a tube through the low-frequency unit from the driver of the high-frequency horn. Because the narrower bandpass of the low-frequency unit places the acoustic origin further behind the low frequency diaphragm, the locating of the higher frequency, wider bandpass unit must of necessity be behind the low frequency diaphragm. This occurs naturally in this particular design.

IT OFTEN TAKES TEN YEARS FROM THE INTRODUCTION OF A GOOD AUDIO PRODUCT IDEA TO ITS ACCEPTANCE IN THE INDUSTRY.

A good idea that was repeatedly tried in the past had to wait until measurement technology and the engineering understanding of the meaning of the results gathered from that technology came to fruition with:

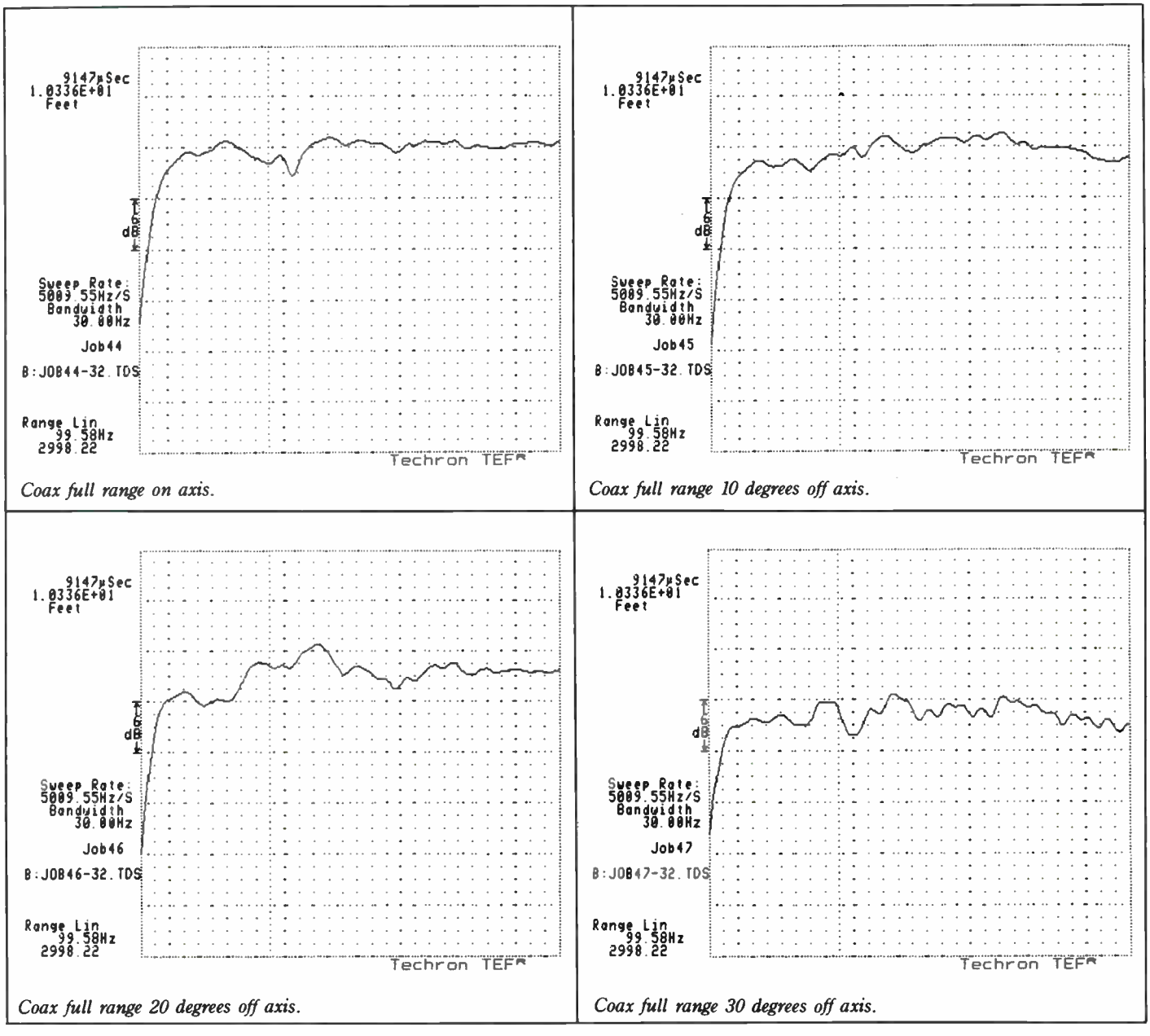


Figure 3. Polar response of a Community M4 at 0° and 10, 20 and 30° off-axis with an E-V DH1A driver inside of the Community horn to convert it into a coaxial unit. Here is the result of the use of the microsecond digital delay line for precision signal synchronization.

• properly chosen devices with complementary polar, phase and amplitude behavior in the desired crossover region;
• network design that allowed control of the phase response so that polar response could be controlled in the crossover region;
• signal synchronization, both active and passive, for the crossover region chosen;
• and last, but not least, a clear understanding of the end result desired. No one would properly take all the design steps above without a knowledge of what they were intended to achieve.

As we look at the present multitude of choices, let's not forget it's not that easy at the beginning, but after once proven, its acceptance becomes, "Oh! of course." ■

Time Align and Time Alignment is a trademark of E M Long Associates. CoAx is a trademark of Community Light and Sound.

CALENDAR

Upcoming Events

MARCH

International Conference & Exposition on Multimedia and CD-ROM: San Francisco, California. Contact: (203) 352-8297. March 10-12.

MusikMesse: Frankfurt, Germany. Contact: (212) 974-8853. March 11-15.

EIA Spring Conference: Washington, DC. Contact: (202) 457-4900. March 15-19.

RF Technology Expo/West: San Diego, California. Contact: (303) 220-0600. March 18-20.

Project Management for Telecommunications: Dallas, Texas. Contact: (800) 422- 4636, ext. 115. March 18-20.

Nepcon Europe: Birmingham, UK. Contact: (203) 352-8476. March 24-26.

Audio Engineering Society: Vienna, Austria: Contact: (212) 661-8528. March 24-27.

Mid-Lantic Electronics Show: King of Prussia, Pennsylvania. Contact: (215) 828-2271.

APRIL

COMDEX: Chicago, Illinois. Contact: (617) 449-8600. April 6-9.

NAB (National Association of Broadcasters): Las Vegas, Nevada. Contact: (202) 429-5350. April 13-16.

Basics of Telecommunications: Boston, Massachusetts. Contact: (800) 422-4636 ext. 115. April 22-24.

NSCA (National Sound and Communications Association): Anaheim, California. Contact: (800) 446-NSCA. April 27-29.

MAY

International DJ Expo/West: Los Angeles, California Contact: (516) 767-2500.

Society for Imaging Science/ Technology: East Rutherford, New Jersey. May 10-14.

International Communications Association (ICA): Atlanta, Georgia. Contact: (214) 716-4143. May 17-21.

Summer Consumer Electronics Show: Chicago, Illinois. Contact: (202) 457-8700. May 29-June 2.

JUNE

ShowTech '92: Berlin, Germany. Contact: (030) 3038-0. June 2-4.

International Conference on Consumer Electronics (ICCE): Rosemont, Illinois. Contact: (716) 392-3862. June 2-5.

Showbiz Expo: Los Angeles, California. Contact: (213) 668-1811. June 20-22.

Image World: Chicago, Illinois. Contact: (914) 328-9157. June 22-26.

JULY

Satellite Dealers Association: New Orleans, Louisiana. Contact: (317) 653-8262. July 8-11.

Spreading Rumors

How Good Sound Dispersion Corrected Neighbor Problems

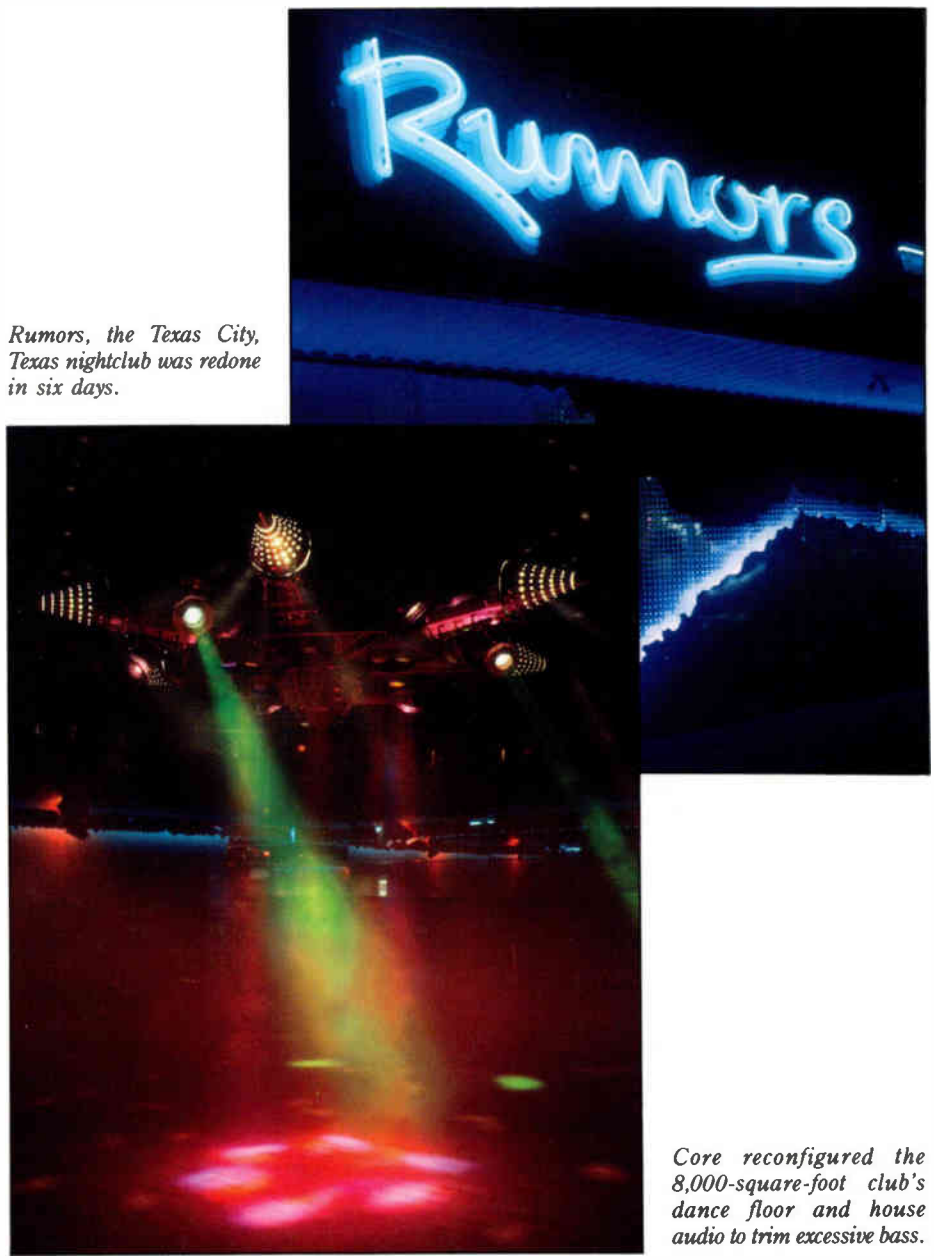
BY RUSSELL REDMAN

Neighbors of the nightclub Rumors in Texas City, Texas didn't like hearing booming bass until the wee hours of the morning. Club patrons, too, were often subject to overwhelming SPLs on the dance floor but had difficulty hearing the music when they moved to certain other areas in the club. That's when owner Berl Gassner called Core Systems Inc. in Houston to adjust the volume.

Gassner, who had previously worked with Core Music Service programming music, hired Core Systems to refurbish Rumors' audio system and to improve its lighting effects on the dance floor and sports video presentation in the game area. But, according to Grif Palmer, owner of Core Systems, the main problem was the club's sound dispersion.

"Somebody had gone and bought some stuff and tried to figure out how to put it all together."

"Basically, it was just an MI-type installation where somebody had gone and bought some stuff and tried to figure out how to put it all together, and it really wasn't thought out from a design standpoint," Palmer said. "There were a lot of 'hot spots' in the house, as well [as on the



Rumors, the Texas City, Texas nightclub was redone in six days.

Core reconfigured the 8,000-square-foot club's dance floor and house audio to trim excessive bass.

Russell Redman is the Assistant Editor of The Music and Sound Retailer.

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dance floor]. The off-dance-floor audio had a lot of holes in it . . . some really big 'hot spots,' and in other corners of the room you really couldn't hear at all."

Core reconfigured the 8,000-square-foot club's dance floor and house audio to trim the excessive bass and even out music volume throughout the rest of the club. Six JBL SR4722 loudspeakers were used for mid/high-range cabinets, and Core customized a JBL 15-inch bass horn to raise the mid-bass level on the dance floor without having to crank up the volume on other components. Sixteen JBL 8216AT loudspeakers were also mounted on Core custom brackets throughout the club so

Adding more loudspeakers playing at medium volumes did the trick. Previously, there were only eight.

the music could reach all areas of the building at medium volumes. Several EAW loudspeakers were also used for house audio.

"For the house problem, we pulled out the larger, dance-floor sized cabinets [two of which have been placed in the house] and went to a much more near-field design," Palmer explained. "Now it's just got a lot more loudspeakers evenly dispersed throughout the room and zoned so he [Gassner] can turn up different areas as loud as needed."

Core reconfigured the club's dance floor and house audio to trim the excessive bass and even out music volume.

Gassner said that adding more loudspeakers playing at medium volumes did the trick. Previously, there were only eight large loudspeakers to cover the entire club. "That pretty well solved the problem, and we haven't had any complaints from neighbors since the job was done," he explained. "The volume is a lot lower throughout the club and on the dance floor so people can talk to each other."

The club is zoned into two systems — dance floor and house — for optimum control of volumes in the dance, bar and sports/game areas. Besides the JBL loud-

RUMORS EQUIPMENT LIST

ENTERTAINMENT SOUND SYSTEM

DANCE FLOOR
- 6 JBL SR4722 LOUDSPEAKERS
- 1 CORE/JBL DUAL 15" BASS CABINET
- 1 CROWN MT 1200 AMPLIFIER
- 1 QSC MX1500 AMPLIFIER
- 1 PROTON SURROUND CEU UNIT
- 1 APHEX DOMINATOR CEU
- 1 RANE ME15 EQUALIZER
- 1 RANE AC 22 XOVER

HOUSE FOREGROUND SYSTEM
- 16 JBL 8216AT LOUDSPEAKERS
- 16 CORE CUSTOM BRACKETS
- 1 MXR EQUALIZER*
- 1 QSC MX1500 AMPLIFIER

DJ BOOTH
- 2 TECHNICS 1200 CD PLAYERS
- 1 SAMSON STAGE II WIRELESS MIC
- 1 CORE CUSTOM EQUIPMENT RACK W/POWER
- 1 RANE MP24 DJ MIXER

*from previous system.

DANCE LIGHTING SYSTEMS

MAIN CENTER ANIMATED FIXTURE
- 1 MAIN BODY STAR including
- 6 STAR ARM EFX NEON
- 72 OCTOSTROBES
- 6 PAR 46 DICHROIC SCANNERS
- 18 PAR 46 DICHROIC SPOTS
- 6 300W DICHROIC FIXTURES
- 6 300 WHITE FIXTURES

EMULATOR
- 4 EMULATOR LASER SIMULATORS
- 1 EMULATOR CONTROLLER
- 1 PULSAR MEMORY PANEL II

INTELLIBEAM
- 6 INTELLIBEAM 700HX
- 1 INTELLIBEAM CONTROLLER
- 1 PULSAR MEMORY PANEL II

DATAFLASH
- 8 DATAFLASH STROBE CANNONS
- 1 MINIFLASH CONTROLLER

PINBEAMS RECONFIGURE
- 4 PINBEAM FRAMES

BORDER SURROUND TRUSS
- 1 RAINBOW MOONFLOWER EFX

CONTROL AND DIMMING
- 1 PULSAR TOUCH PANEL II
- 1 CENTER CONTROLLER
- 1 CORE CUSTOM MOTOR SWITCHER
- 2 CORE RELAY PACKS

SPECIAL EFX AND MISC
- 1 F-100 FOG GENERATOR
- 5 GALLONS FOG FLUID
- 1 CORE GEL PACK

EXTERIOR EFX, DOORS AND BAR
- 26 ALUMINUM PANELS
- 2 ALUMINUM PANEL FRONT DOORS
- 1 4 SIDED ALUMINUM BAR TOP

SPORTS VIDEO SYSTEM
- 1 ZENITH PRO 841X VIDEO PROJECTOR
- 1 DRAPER 10' FIXED SCREEN
- 1 PANASONIC AG1250

speakers, the dance floor audio system has a Crown MT-1200 amplifier, QSC MX1500 amp, Proton Surround CEU unit, Aphex Dominator CEU, Rane ME15 equalizer and Rane AC22 crossover. The house foreground system has the mounted JBL speakers plus a QSC MX1500 amp and an old MXR equalizer (which the club already had). The DJ booth contains two Technics 1200 CD players, a Samson Stage II wireless microphone, a Core custom equipment rack with power and a Rane MP24 DJ mixer. Existing equipment from the original setup that Core used included Crown amps, a Numark mixer, Technics turntables and Technics CD player.

"We chose products with the ability to perform the job that was required and that were within the budget," Palmer said. "All of it is good gear, and none of it was expensive. But they certainly were reliable and fairly priced products. There was also some attention paid to matching components or brands of equipment he [Gassner] already had to make sure it was not a complete mish-mash.

"We chose products with the ability to perform the job that was required and that were within budget."

"And we did use an Aphex Dominator, because that's probably one of the best products for nightclub use that we've found in a long time. It's one of the better processor/limiters — instead of just a compressor/limiter — that we've seen. They [Aphex] won't give you all the low-down on the proprietary chip technology used to do some of the processing, but . . . it actually works. A lot of top limiters are either kind of 'on' or 'off,' which is tough in a nightclub application because they can actually stifle it when playing too loud. But this is very good about monitoring. . .about as good as we've found without going to Meyer or Apogee or somebody's processed cabinets. It's really a nice piece of off-board gear that does what it's advertised to do."

For the sports video system, Core added a Zenith Pro 841X diagonal video projector and a 10-foot Draper fixed screen, and improved sound dispersion in the sports/game area as well. Gassner said he originally had two 46-inch Panasonic AG1250 televisions for the sports system but kept only one after the addition of the Zenith projector.

Core also was asked to design a new six-sided custom lighting centerpiece for the dance floor using many of Rumors' original lighting fixtures. "The challenge here was ceiling height. We had to create a fixture that could move and alter its look without a lot of up and down motion," according to Bill Massey, Core fabrication director. What resulted was a centerpiece with three directional tilting motors and cones on each of six sides that spin to create an eye-catching lighting effect. Also installed were Emulator laser and Intellibeam lighting effects units (some of the first in clubs in Texas) as well as various strobes, pinbeams and other lighting units.

Palmer said the entire job — audio, video, lighting and work on the club's exterior — took about six days to complete, which was a challenge considering that the club was open and the Core crew had to work between 3 a.m. and 5 p.m. to finish the job by the scheduled debut date of the re-designed club. The installation cost approximately $80,000.

"We actually came in just a little bit under budget," Palmer said. "He [Gassner] was pleased with the financial part of it. We did end up using as much of his existing equipment as we could." ■

CD Players For Commercial Applications

Part One: CDs for Club Use

BY MIKE KLASCO

Even the simplest sound system must have a program source, whether it is a microphone in a megaphone or multiple turntables and tape machines in a dance club. The digital compact disc is revolutionizing the public's expectations for quality sound reproduction. CD players have added a whole new dimension including many enhanced capabilities to music playback options for commercial installations. CD players offer sound quality once only obtainable from master tapes played back on studio master recorders. Although CD players are not being accepted with open arms by DJs in clubs, the demise of the vinyl record is at hand. And this new medium has much to recommend it. For high sound and vibration environments, the players are highly feedback resistant. The medium is robust: dust and dirt can be easily cleaned off the disc's surface, restoring the original performance. The CD is a lot smaller than an LP/12-inch single. The programmability of the players can rival even the most sophisticated automated broadcast cart machine systems.

Aside from night clubs and discotheques, CD changers are an attractive alternative to tape media for background/foreground music applications. CD changers provide a full business day of music without the need for any attention. The stability of performance, freedom from maintenance, and operational reliability of CD changers is an order of magnitude better than open reel tape, or tape cassette/cartridge changers. And all this at relatively inexpensive prices.

Mike Klasco is the Technical Editor of Sound & Communications.

Consumer hi-fi products do not belong in professional installations.

Still, consumer hi-fi products do not belong in professional installations. You require, or at least prefer, XLR connectors, rackmount installation, and professional grade construction for the components that are used in your jobs. You might hope that designers of commercial grade CD gear would have engineered in higher grade switches, better noise filtering in the power supplies, and more robust and error-free operation.

The products fall into two main categories.

For example, the mechanism in a CD player is vulnerable to acoustic feedback (although less so than a turntable), and the ability of the laser to track a dirty, off-center, warped, or scratched disc depends on the quality of the design. A professional grade machine offers at least the implied promise of better tracking under adverse conditions. Mistracking in CD players can take the form of stuttering, looping (backward skips), and muting. None of these are tolerable, regardless of whether the playback is in a boutique, boardroom or club. For commercial applications, the war of the bits in converters (16 bits, 18 bits, 20 bits, 1-bit) and oversampling (2x, 4x, 16x, etc.) means nothing compared to the robustness of the error correction system used, the tolerance of the laser tracking servos, and jam-free disc handling.

So what CD equipment is out there for sound contractors? We are going to take a look at CD players for commercial applications. The products fall into two main categories — the first being players/controllers intended for creative work such as discotheques, production work, and audio-visual applications. These will be explored this month. The second category is changers for unattended operation, such as background/foreground music, cable systems, and multi-room home installations. These will be surveyed in our next installment.

PLAYERS AND CONTROLLERS

The most common configuration that is emerging is a rack mount transport with a separate controller. This category is occupied by two approaches; dual transports with controllers, and modular systems which allow mixing and matching single

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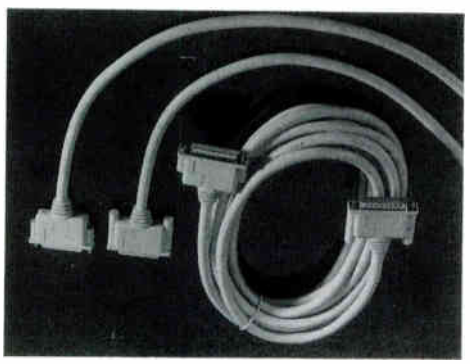
transports with controllers, including multi-unit controllers. Discotheques have proven to have the toughest demands to satisfy, and a number of manufacturers have introduced players specifically targeted for this application. Disco DJs want variable speed, flexible and sensitive manipulative control of the CD for scratch, stutter, and other effects, instant cue-start, high feedback resistance, and well thought out human engineering in the layout and operation of the controls. As pro CD players are still a limited class, I have organized this survey by manufacturer and included a bit of background here and there.

NUMARK

While Sony, Denon and Philips had developed professional CD players for quality evaluation of CD masters and high-end broadcast applications, Numark was the first to develop a "pro" CD player, the CD9000, for commercial uses such as disco and audio-visual. In 1986, Numark showed a prototype of its CD9000, which featured ±10 variable speed, CD disc carriers (similar to Denon's CD broadcast cart machines), and a controller separate from the transport. Instead of producing the CD9000, Numark decided to re-define the pro-CD product concept and instead conceived of the dual player idea. Both of Numark's product entries are twin transport CD players and are specifically intended for club use. When considering pricing, remember that these packages include two CD players and the controller.

Numark's CD6020 housed in a rack cabinet.



The CDX45 extension cable for Numark CD players.

The most common configuration that is emerging is a rackmount transport with a separate controller.

At $1,200, the Numark CD5020 is a cost-effective solution for many disco applications. The CD5020 has a rack mount double transport and a separately rack mountable controller. An optional 14-foot cable is available to separate the controller and the transport module. The transport has effective isolation feet, so when it is used in a rack I would suggest that a rack tray be used, rather than front panel rack mounting (to take advantage of the vibration isolation feet).

Both of Numark's product entries are twin transport CD players.

Each CD transport has its own section on the controller, including dedicated slide controls for variable speed adjustment. The variable speed control operation is very similar to the Technics SL-1200 turntable, most preferred by DJs. The CD5020 can produce a stutter effect by hitting the transport stop button and engaging the Audio Cue button. Start-up is not as fast as the Denon, Studer or Tascam CD-701/Ram Buffer, but still within about two beats (about the same as a Technics SL-1200 MK II turntable).

Numark introduced the concept of double transport CD players, with the CD6020, less than two years ago. At $2,000 it offers the general characteristics of the CD5020, along with expanded programmability and auto pilot features. The CD6020 offers BEAT-SYNC and INTEGRATE. BEAT-SYNC uses an internal beat-matching computer to automatically switch between players. Beats per minute are counted by the microprocessor, and compared to the CD that is cued up on the opposite transport. If the upcoming song is within eight-percent of the beats-per-minute of the song on the transport in use, 30 seconds before the end of the "aired" program, the speed of the opposite transport is automatically shifted until the beats match. The INTEGRATE allows preprogrammed playlists of up to 24 selections per transport. At the end of each song, the CD6020 will quickly start the opposite deck. Very handy for happy hour, wedding receptions, extended breaks, etc.

DENON

Denon introduced its first pro CD player about five years ago, although it was intended for CD mastering facilities. Denon's pro CD line now includes broadcast cart style and studio production CD players, a CD recorder and dual transport disco CD players. Although Philips and Sony first come to mind when most of us think of digital pioneers, Denon/Nippon Columbia was one of the first to develop digital master tape recorders 20 years ago for its record division. In fact, Nippon Columbia goes way back, as it started out as Columbia Records of Japan before World War II. although now only the trade name of Denon remains as it is now part of Hitachi's empire.

The $2,000 DN-4000F is specifically targeted at the club market. The physical configuration of the DN-4000F is a rackmount double transport unit and a console top controller. All controls and status in-

Denon's DN-2000F CD player.

dication are on the controller, which is on a 10-foot interface cable. The DN-4000F boasts a few unique features, including a beat shift function, which allows the DJ to shift the beats of one deck relative to the other to synchronize the beat cross-face. Digital "scratch" is created by a Scratch function button. Variable speed of ±10 percent is available by use of a joy wheel. A jog or joy wheel is preferred to ± push buttons which take too long, although a slide control is the first preference of most DJs. The jog wheel also is assigned to control search, scan, scratch and beat shift. The DN-4000F boasts instant start, which is only matched by Tascam's CD-701 with the ram buffer option and Studer's. CD players. Effective vibration isolation is built into the transport and construction is very good.

Denon's CD-4000F requires the operator to assign which transport is to be activated by the single set of controls on the controller. This approach may be fine for post-production, but some DJs are not comfortable with this, as it is possible to inadvertently alter the settings for the transport in play instead of the transport that is being cued up. Denon has taken this into consideration and has just introduced the DN-2000, a dual transport player with a lower price and more straight forward controller operation.

The DN-2000 was introduced at the Consumer Electronics Show and also shown as the NAMM show this January. At $1,250, the DN-2000 dual transport CD player is going to establish Denon as a very strong contender in the dance club/DJ CD market. The DN-2000 benefits from Denon's insights from the DN-4000F, including a more affordable price and better layout and operation of the controls. Separate dedicated controls are featured for each CD transport. Varispeed (±8 percent) is by slide control, much preferred by DJs. A Pitch-Bend mode can be used when the beats per minute are being shifted or the music being cued in order

to match beats per minute for the segue (mix).

The DN-2000 auto-cues to the actual beginning of the music rather than to the digital index indicated on the CD's table of contents, a preferred approach that will be appreciated by the operator, as this will avoid missed cues. Physical configuration is like the Numark units, with separate rack mount controller and rack mount transport modules. The DN-2000 inherits the instant start of the DN-4000, and this makes it the least expensive double player to have this capability. I am looking forward to testing the DN-2000 as it promises to establish Denon as a main player (pun intended) in the pro-sound CD market.

At $2,600 for a single CD transport player, the DN-970FA is going to be limited to broadcast and other high-end applications. All of the Denon broadcast products (but not the dual-transport CD players) feature a cartridge holder for the CD which has the form-factor of a broadcast tape cartridge and provides extra protection for the disc. For the big money, it provides ±10 percent variable speed, instant start, and broadcast grade construction and interface. Complete controls are provided on the front panel, but external control must be provided by the installer. Obviously the DN-970 is intended for serious custom installations. Denon has another CD Cart player, the DN-950FA. It is a bit less expensive than the DN-970FA, but lacks the varispeed feature.

Denon, like Studer, Yamaha, and Kenwood, has introduced a CD recorder that will record on special optical discs. The Denon recorder shares the cartridge holder feature of the other Denon broadcast grade products, but the recorded CD can be easily removed from the cartridge and played on conventional CD players. The hardware pricing is too expensive for most applications, and even the blank recordable media is costly at $50 per disc (or about 40 percent less in large quantities).

STANTON

Stanton is best known for broadcast phono cartridges (do you remember Victrolas and records?) and has expanded its efforts in the discotheque market with the Japanese-made Vestax line of mixers and other components.

Stanton hopes to be shipping its first CD product by the time you read this. The CD-22 consists of two rackmount units, the dual transport assembly which has the CD trays and eject buttons, and the control unit, which has the rest of the controls and status indication displays. The CD transport can be located remotely from the controller. Advanced product information promises ±8 percent pitch control, a jog dial, and comprehensive status indications. The CD-22 is programmable with up to 10 cuts preprogrammed between the two built-in players. Status indication is by large LED readouts, with display options including remaining track time, elapsed track time, total disc time remaining, and check of programmed tracks.

TASCAM

TEAC's Tascam division has been developing professional tape machines and mixing boards for 20 years. Their first pro CD products, the CD-701 and the CD-401 were introduced in 1989, followed by the CD-401 last year and the CD-601 reaching dealers as this issue goes to press.

The CD-301 is Tascam's entry level pro CD player, with a retail of $550. The 3.5-inch high rackmount unit features balanced XLR outputs (also RCA jacks), center location for the CD transport mechanism with an integral CD stabilizer and .4 second start time from pause. A single play function stops the player after a single cut has been played, and a status display indicates elapsed time of a cut, remaining

Tascam's CD 401 player.

time for the cut, and remaining time for the entire disc. Multiple CD-301s can be linked for sequential operation. The CD-301 includes a wireless/hardwired hand-held remote control, which does not have any status indicators. When I tested the CD-301, I found that it benefited from use with aftermarket isolation feet, which could be used between the player and the console top or with use if the player was used on a tray in a rack. The CD-301 requires mounting on a level surface (not more than five degrees from level).

The CD-401, at $800, is upscale from the CD-301. The remote control is similar to the CD-301, although with the CD-401 it is an extra cost option. A fader start/stop facility enables the CD-401 to be controlled by the console, causing the player to start automatically on fade-in and stop at the completion of the fadeout. The CD-401 adds TEAC's ZD circuit, which suppresses low level distortion and has a Ready cue function which yields a .3-second start time from pause.

A Tascam package includes the CD-601 player and the RC-601 controller. At $1,400 for a single CD transport machine plus $750 for the controller, it would be $2,150 for the system and $4,300 for a dual player system, over twice the price of the Numark, Stanton, and Denon double players. Still, the 601 system features superior grade construction, very high performance and definitely warrants consideration. From my perspective, the CD-601 is functionally the most relevant product for clubs yet from Tascam. The CD-601 uses the broadcast cart machine form-factor and two of these units will fit, side-by-side, in Tascam's rack tray. Plus

or minus 6 percent speed change is possible from the CD-601's front panel, as well as from the RC-601 remote control. An RS-232 port is provided for external computer control. The CD-601 features a CD stabilizer. Both XLR and RCA jacks are provided. Start time is .3 second from pause.

The Tascam CD-701 uses the broadcast cart machine form-factor, and two of these units will fit side-by-side in Tascam's rack tray. Plus or minus 6-percent speed change is possible, but only by remote control. The CD-701 is intended to be used with one of Tascam's remote controls — the RC-71, RC-601, or the RC-701 — although a comprehensive status display is provided on the transport itself. Like all of Tascam's CD players, the CD-701

The transport has effective isolation feet.

transport mechanism features a CD stabilizer. The CD-701 also has an outstanding vibration isolation system and is a beautifully built piece of equipment, equaled only by the Studer machines. Only XLR balanced outputs are provided.

The Tascam RC-71 is a basic controller that controls a single CD-701 transport. Two RC-71s will fit in a 19-inch rack space, such as below a disco mixer. The finish, feel and overall construction is excellent, but I feel the lack of the status indicator on the controller and the speed control by pushbutton is less than ideal for club use (although the pushbutton arrangement offers inherently greater precision of adjustment).

The RC-601 works with either the CD-601 or CD-701 transport. An RC-601 controls a single transport. Unlike the RC-701, the jog wheel does not control speed, but instead separate ± push buttons are provided (too bad a slide control was not used instead).

The RC-701 can control up to four CD-701 transports, although it may also be able to control space vehicles. Like the Denon DN-4000F, a single status display and jog wheel are assigned to the transport to be cued, but operation is failsafe. Pitch control is available by the jog control.

SONY

Sony Broadcast developed one of the first pro CD players back in 1985, the CDP-3000 system consisting of two

The Sony CDP-2700 CD player.

CDP-3000 cart machine style players and the CDS-3000 controller. The CDS-3000 is only available on a custom order basis from Sony Broadcast. A more recent development is the CDP-2700, the first CD player to be introduced in Sony's Pro Standard series. Pro Standard is Sony's new product line for MI and sound contractors. The CDP-2700 is a rackmountable player (when used with the mounting brackets) that integrates the controls and

All controls and status indication are on the controller, which is on a 10-foot interface cable.

the single CD transport into a single unit. At $1,300 the CDP-2700 is priced less than the broadcast products but more (for a dual CD system) than the club oriented units.

The CDP-2700 has a wide variable speed range of ±12.7 percent, which can be indicated on its large and highly readable EL display. The CDP-2700 boasts state-of-the-art transport and error correction circuitry for reliable operation without mistracking even under high vibration conditions. Other features that will appeal to creative users are auto-cue to the actual music rather than the start location listed on the CD's table of contents, start/stop capability from the mixer, and rapid start. The CDP-2700 has both balanced and unbalanced outputs, plus digital outputs that conform to AES/EBU formats, which means the CDP-2700 will interface with and can be controlled by the rest of Sony's Pro Standard series, as well as many of the new digital products being introduced by other firms.

STUDER

Studer's pro CD products are the result of a joint effort begun with Philips in 1986. Over the years, Philips has introduced a

Some DJs are not comfortable with this, as it is possible to inadvertently alter the settings for the transport in play.

couple of pro CD machines (such as the LHH 2000) which have been marketed in the U.S. by Studer. Of the current crop, Studer's least expensive (ha!) machine is the A727. It is a rackmount (when used with the mounting brackets) CD player with styling reminiscent of the Studer-Revox high end consumer products. At $2,000, the price will quickly remind you of the professional and exclusive heritage of Studer machines. Both the transport and the main operating controls are integrated in the 4-inch high front panel. A spacer panel is available to fill out the gap to EIA standards, and the rack holes are standard. Outputs are provided for XLR balanced, RCA jacks and digital. Status indication is by LCD with electroluminescence and includes track number, elapsed disc time, regaining disc time, elapsed track time, and (most important to DJs) remaining track time. Variable speed is ±10 percent, but is only accessible by use through an outboard controller such as the A728.

The Studer A728 Controller, at $1,300, can operate up to three A727 players. Three sets of status indicators are provided — each allowing for simultaneous display of track and time functions, three sets of start/stop controls, along with a jog wheel for editing and special functions.

The A729 Controller is a modular unit that can be ordered for controlling a single A727, or up to four units.

At $3,000 for a single transport CD player, I think most of us will just be reading about this machine for intellectual curiosity. Basically, the A730 combines the operational features of the A728 controller into a highly refined CD transport. In general, features and functions are comparable to the A728 and the A727 units, but with a console top operational layout similar to the Technics SLP-1200.

If you have $12,000 and need a CD machine that can also record, then you ought to check out the Studer A740. This might be just what you need to transfer your background music library to CDs, although the cost of the blank media is about $50 per disc.

TECHNICS

Technics developed one of the earliest pro CD players, the SL-50P, designed for CD mastering facilities. In 1987 Technics introduced the SL-P1200, intended as the disco mate to the SL-1200 turntable (which is the standard turntable for this market). The SL-P1200 has become one of the most popular CD players for DJs. Its early success was partially due to lack of viable competition, but as can be seen from this survey, the competition has arrived.

The $1,600 SL-P1200 was specifically targeted for DJs, with an integrated single CD transport with all the controls on the top deck for console top operation (like a turntable). The jog wheel has appeal to DJs for manipulation of CDs, and the dedicated slide control for speed change (±8 percent) has been missed by the competition until the most recent introduction of the Numark units, the Denon 2000 and the Stanton CD-22. Of course, the SL-P1200 is not 100- percent loved by DJs. For example, the speed control works in the opposite direction from the SL-1200 turntable's control! The isolation from sound and vibration is good, although the integrated transport and controls results in a bulky unit. Status display is comprehensive, with all the usual capabilities. Start time is faster than a turntable's but not instantaneous, about .4 seconds. A wireless remote control is provided — I hope your customers have good aim if they are using more than one unit. In any case, it does not have any status indication, which will limit its usefulness, although a connection is also provided on the chassis for a homebrew wired remote.

SL-P1300

An updated version of the SL-P1200 comes in at $1,900, but essentially is the same. To keep DJs alert and on their toes, the upside down speed control has been retained, along with the wireless remote. XLR balanced outputs are now included along with the standard RCA jacks.

The DN-2000 autocues to the actual beginning of the music rather than to the digital index indicated on the CD's table of contents.

The SL-PS900 and SL-PS700 are actually consumer units from Technics, but they have a few unusual features that could make them attractive for certain installations. The SL-P700 lists at $340 and the SL-P900 at $500. Both have Technics' digital servo system which improves tracking of warped, scratched, dirty and off-centered discs. I expect to see similar systems adopted by most of the pro CD players soon. Both Technics units also offer center-located CD transports and floating suspensions for improved feedback immunity. A Disc link function is provided for continuous editing from multiple CDs to tape. Synchro Editing provides automatic editing with certain Technics cassette decks, and Time Fade automatically takes place at the time you have previously programmed.

SUMMARY

So for audio-visual applications, the CD-301 and CD-401 single CD players from Tascam offer wired remote control, rugged construction and reasonable price, but lack the variable speed and operation layout for club operation. The newer double CD players from Denon and Numark offer the features and layout DJs want for about $1,300. Stanton's new double CD player may also be joining the Denon and Numark units, although the price has not been set. Technics SL-P1200/SL-P1300 will continue to be popular for club use, although its large size and higher price will progressively limit its use as two CD players are used. Sony's new player may find acceptance in production environments because of its digital interface, while Tascam's new CD-601 deserves a closer look for big budget club installations.

Expect to see rapid developments in pro CD players, with price/performance ratios improving and operational idiosyncrasies fading away. The superior performance of Sony's new error correction ICs, the instantaneous start of Denon's units, Technics' digital servo systems (for tracking funky discs), and Tascam's built-in disc stabilizers should all become common rather than unique features on pro CD machines. I would also anticipate that there will also be adoption of certain techniques from Sony's new mini-disc system (not compatible with standard CD players) such as the use of its "look ahead buffer" which acts as a temporary backup when acoustic feedback or severe mistracking occurs.

In our next installment, we will survey the commercial CD changers available, from a basic 18-disc unit to computer- controlled touchscreen systems that archive hundreds of discs. ■

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Filling an Empty Orchestra

Karaoke Comes of Age in the U.S. Market.

BY PAMELA MICHAEL

Fulfilling the fantasies of frustrated shower singers, karaoke has become one of the fastest growing entertainment mediums in the world, with over seven million commercial and residential units in Japan alone. Korea, Taiwan, Hong Kong and Singapore also have sizable markets; Europe and North and South America seem to be warming up to the idea of amateur comedic public humiliation as entertainment. Which isn't to say there is not a lot of real entertainment, real fun, performing, sharing—real singing involved in the karaoke process. With some of the advanced equipment, in fact, it's hard for the singer to sound bad—digital echo processors on the mics mask the shaky pitch of singers, pitch shifters adjust the key to fit the singer's voice without changing the speed of the background music, "bilingual" earphones allow the user to hear the original singer's voice through the earphones, while the audience hears only the background music and the user's voice.

Karaoke (which means "empty orchestra" in Japanese) is an audio or video system with microphones attached, that allows participants to sing their favorite songs to prerecorded music tracks through the use of special playback equipment.

Most karaoke systems currently sold in the U.S. use prerecorded cassettes. The "A" side of the cassette will have background music only, and the "B" side will have a vocal demonstration of each song. Typically, the vocal will be recorded on the right channel of the "B" side, and the music on the left, so the user can "tune out" the vocal using the balance control.

Fleco's model KT1 digital key changer/digital echo mixer.

A growing number of new karaoke systems also work with compact discs and laser discs. In fact, it is estimated that 75 percent of all laser discs manufactured worldwide are for karaoke.

The library of available songs in all formats now numbers over 30,000 titles in English, Spanish, Japanese, Filipino, Vietnamese, Korean, and many other languages. Several years ago, karaoke manufacturers had trouble getting the rights to popular hits—songwriters and performers were reluctant to license their songs to be "interpreted" in public by amateurs; and many were leery because of the effect of yet another recorded music phenomenon that put a lot of musicians out of work — disco. Now, according to software sources, artists are more eager to have their titles included in the karaoke catalog. The software industry that has evolved in tandem with karaoke hardware offers selections from the '40s-'90s, by artists like Frank Sinatra, Michael Jackson, Bette Midler, and Gloria Estefan. Genres include pop, show tunes, Top 40, country, gospel and Latin. The distributor Trax, with over 27,000 songs listed in its catalog, updates its publications four times a year. And no longer is karaoke used only by amateurs: professional musicians are beginning to use the equipment for rehearsal.

According to Neal Friedman, Executive Director of KIIA (Karaoke International Industry Association), the newly-formed trade group of karaoke suppliers, dealers and manufacturers, there are currently about 2500 commercial karaoke installations in U.S. bars, restaurants and clubs. As public awareness of karaoke rises, KIIA expects the U.S. market to approach (and eventually surpass) the size of Japan's — $1.5 billion, a chunk of change equal to one-fifth of the entire U.S. record industry.

Marketing strategy, according to many of the dealers and manufacturers we talked to, emphasizes commercial installations and exposure as a means to develop a demand for home models. Jake Ramirez, of current industry giant Pioneer Laser Entertainment, the karaoke subsidiary of Pioneer Electronics, predicts that most laser disk machines sold in the U.S. will come equipped with karaoke in coming seasons. This consumer-driven marketing

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plan worked very well in Japan, where karaoke got its start in the 1960s and 70s. Nikkodo USA president K. Takagi, a former record store chain owner in Japan, is generally credited with "inventing" karaoke over 20 years ago after noticing Japanese businessmen singing along with jukeboxes in bars after work. He designed prototypes in the eight-track tape cartridge format (popular at the time) for the Japanese market and began marketing in the United States about 10 years ago.

The karaoke idea, however, was pioneered in slightly different form 43 years earlier by the New York-based "Music Minus One" records in which the instrumental part, such as the bass line, is omitted from the orchestral recording, allowing bass players to practice their part in context. One of the missing "instruments" offered by MMO was voice, creating one of the first singalong albums. They were not a big seller at the time and were not promoted; that is until 1985, when Music Minus One started Pocket Songs for the karaoke trade with 12 singalong titles, now numbering over 700.

Commercial karaoke mixing amplifiers now deliver 200 watts per channel and come with exotica like surround sound echo processing.

In the meantime, Mr. Tagaki and the Japanese had updated the concept, developed new hardware, added graphic display of the lyrics, full-motion video, and a host of bells and whistles. Some karaoke units are standalone, some patch into existing audio systems. New technologies are finally finding their way into the U.S. market, and laser disk, CD+graphics hardware, digital key (pitch) controllers are now available at many price ranges. Commercial karaoke mixing amplifiers now deliver 200 watts per channel and come with exotica like surround sound echo processing. The introduction of video disk systems that uses optical disks to present both video and audio information has given rise to what some are calling "the age of videkara." As Steve Itani, Executive VP at Nikkodo says, karaoke may be the "last entertainment of the 20th century and the first entertainment of the 21st century."

This sentiment is heartily echoed by the owners and management of The Cat's

Pioneer Laser Entertainment's commercial laser karaoke system.

Meow, a club which pulls in $3 million a year in 3,000 square feet on New Orleans' Bourbon Street — and that's with no food, no cover and no karaoke use charge. In 1989, the Cat's Meow was a successful "duelling piano" singalong bar that highlighted hits of the '60s, '70s and '80s. Pioneer came to them and offered to install a karaoke system on a trial basis at no charge to be used during happy hour and between sets. Soon patrons were booing when the piano players returned after breaks and happy hour kept getting extended due to popular demand. Management decided to devote one night a week exclusively to karaoke. A fire caused them to reevaluate their entire operation, and after a quick renovation, they reopened as a full time karaoke club, and as Manager John Spradlin put it, "never looked back." Now the number one grossing club on Bourbon Street, they alternate karaoke with DJed dance music between setups.

While the DJ music is playing, video screens show cartoons, an animated graphic or music video. Spradlin believes much of the club's success is due to the attention paid to DJ music selection — staying on top of hits and trends—and when to play what kind of tunes. The crowd demographics of any club change

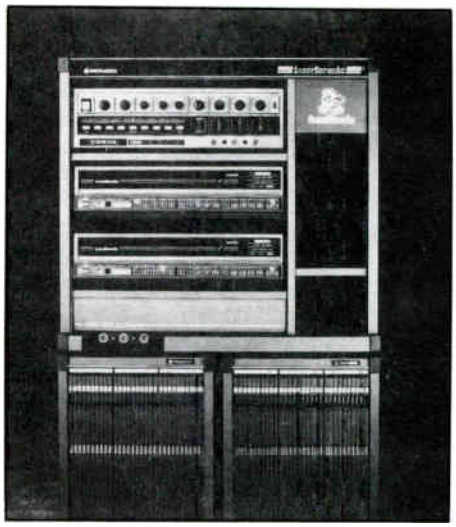
(often dramatically) during the course of the evening. The Cat's Meow programs '50s hits from 5-8PM, Top 40 and old disco hits from 8-midnight, and plays cutting edge dance music in the wee hours. Each karaoke performance is videotaped automatically. The customer can purchase the tape for $10 on the way out, and about 20 percent of them do. Unwanted performance tapes are recycled.

KIIA founder Ernie Taylor also stresses the importance of a good DJ and/or MC in determining the success of a large scale karaoke operation. The customers are the real "stars" of the show, so the host must act more as facilitator than entertainer, keeping the energy level up while making it fun and 'safe' for people to get up and sing. Taylor, who is also president of Trax Distributors, counsels that aggressive management is an important factor in the success of any karaoke installation. They must be promotion minded — karaoke is a new form of entertainment and must be pushed, he feels, like any new product. Pioneer chose The Cat's Meow as a test market because of the owners' reputation for flair and effective management, as evidenced by its successes with Fort Worth's Billy Bob's ("the world's largest honky tonk") and the gigantic entertainment complex, Dallas Alley.

Soon patrons were booing when the piano players returned after breaks.

Not every club lends itself to the karaoke format, though, no matter how dedicated the management. Ernie Taylor cites a recent example of a karaoke unit rented on a trial basis through his Los Angeles retail outlet, The Singing Store. The unit was set up in the lobby bar of the Pasadena Hilton. It attracted a lot of people, the bar made a lot of money, but ultimately the hotel management (wisely, Taylor feels) decided the atmosphere created by a boisterous crowd having a good time was not appropriate ambience for a hotel lobby.

But even given great location and great management, no karaoke club will last very long without great sound. Karaoke installation presents some interesting challenges to sound contractors. Often the hardware needs to be patched into existing audio systems, and in many cases set up to interface video with live performers. Don Drucker, president of New Orleans'



Pioneer's system includes an LD-V170 LaserDisc player, SA-V210 stereo mixing amplifier and key controller, CB-248D disc rack and a DM-V210 microphone.

Spectrum Systems, did his first karaoke installation at The Cat's Meow. The low ceilings presented a particular problem, so he needed a system that had fairly wide horizontal dispersion pattern. Drucker says he concentrated most on the "imaging" of the system, making sure that no matter where you are in the room, the sound would seem to be coming from the performer. He installed a cluster style system of JBL horns, drivers, tweeters, subwoofers, and electronic crossovers. The cluster was supplemented with delay stacks, slightly overdelayed, to help make the live performance meet up with playback and video. Instead of using the usual disco mixer, Drucker installed a Ramsa 8110 sound reinforcement console. The operator is able to feed all the different audio signals into the console and use it for playback as a typical nightclub would.

To avoid problems with the system from people shouting, or from operator volume overkill in an attempt to boost the sound above a loud crowd, Drucker installed JBL 7110 limiter compressors. "I tried to make the system fail safe, building in redundancy" he said, "it saves time on service callbacks at a later date and ultimately, adds to profit — satisfied clients will upgrade their systems at a later date."

And satisfied they are. Cat's Meow manager John Spradlin says that the Pioneer karaoke system installed by Spectrum Systems has been trouble free in a year and a half of daily operation. "We finally sent it in for servicing just as preventive maintenance," he said, "it gets a lot of hard use. It's been very easy to operate, though—you just punch up a number, slide the disk in the tray and punch up a track." While their equipment was out for servicing, the club used a backup Pioneer home karaoke system with no problem.

Pioneer has been in the karaoke business in the U.S. for about three years. They are using market strategies similar to those used in Japan to popularize and publicize the "karaoke experience," setting up demonstration models in malls, clubs (like the Cat's Meow) and restaurants. They also market their own software (song tracks) because "that's what keeps customers coming back, similar to the relation between razors and razor blades," says Mark Makabe, senior vice president of sales and marketing. Currently, Pioneer sells five models of karaoke in the U.S.—three consumer models, and two commercial models, with plans for more to come. The company's home machines are combination players; they can play movies and CDs as well.

Aggressive management is an important factor in the success of any karaoke installation.

Commercially, Pioneer is betting on laser disk format, while acknowledging market penetration is not what it should be. (Karaoke is seen by some as a high risk venture, with battling format options and untapped market potential. Both Panasonic and Sony entered the U.S. field a few years ago, then bowed out, although Sony is now back with a home version, as is JVC). Laser disks are more expensive — about $5 per song versus $2 for CD. But the new batch of videodisc hardware products coming out are going to have better digital/analog converters, bringing sound quality up. As it is, several formats — CD+graphics, laser disk, and now CD-I and CDTV are occupying the industry. Stay tuned.

At the moment, which format a client chooses is mostly dependent on how much money they have to spend. For $5000, you can set them up with an echo mixer and a CD+graphics player (CDG). This is not a bargain basement option in terms of per-

formance, though. The CDG format allows the user to follow the written lyrics of a song on a video monitor by transferring the graphic data on a disk to a television screen through the use of the karaoke unit's decoding mechanism. The system is quite flexible, allowing the user (depending on what equipment they have) to edit graphics behind the lyrics or insert video images behind the music, like a video tape of a sporting event. For a little more — $20,000 say — the customer can have a full laser disk set system, featuring laser disk players that (in addition to accepting prerecorded compact disk and laser disk movies) have a built in karaoke feature that allows the user to sing along with prerecorded karaoke disks. A playback component transfers music videos onto the screen while the user is singing.

One possible outcome of the CD versus laser disk issue is that laser formats will be more common in commercial karaoke equipment and CD+graphics or another format will dominate the consumer market. The popularity of camcorders may be a deciding factor here. With the CDG format, the user can insert any type of background, using a camcorder. The possibilities for customizing a performance are boundless.

The operator is able to feed all the different audio signals into the console and use it for playback as a typical nightclub would.

The ultimate decision-maker, though, will likely be software availability. As it stands now, there are far more laserdisk versions of karaoke songs than any other video format. JVC expects to have 20 CD+G discs (200 songs) available by the end of the year. This is a format that's just beginning, but is also more limited in its full motion video capabilities than is laserdisk. If karaoke becomes more a part of the American entertainment scene, sound contractors will undoubtedly be called upon in increasing numbers to do installations. Those contractors in on the first wave of installations will be deemed the "karaoke experts" by the time a tidal wave hits. To help sort out the applications options, we'll be taking a look (in Part Two of this article) at the array of karaoke equipment and services available in the U.S. ■

The Nightclub Today

Maximum Impact and Maximum Sound

BY MARIA M. CONFORTI

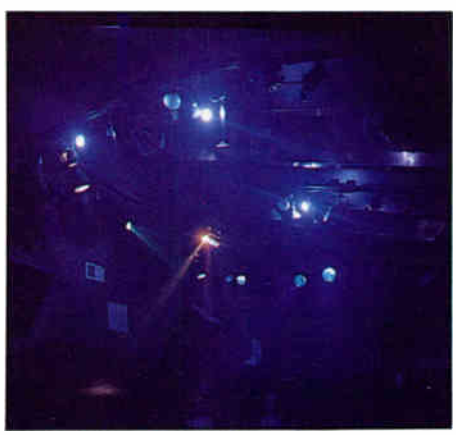
Bright days are still ahead for sound contractors who do club installs. Professionalism and service, coupled with a knowledge of the trends, are what will set some contractors ahead of the pack in 1992.

"A lot of people have to appeal to a much broader-based clientele than they had to previously," says Jerry Laidman, president of the Sound Chamber in North Hollywood, California. A combination of live and recorded music gives club operators another tool to market their night spots.

Clubs that want to make maximum impact want good looks and compactness included in the package, says Ken Berger, president of Eastern Acoustic Works of Whitinsville, Massachusetts. "One of the trends we've seen is a combination of both a small, live, cabaret-type environment, and high-level playback for dancing. The presentation has to address, in addition to the sound quality, how [speakers] function into the cosmetics and the aesthetic aspects of the job. . . . There's a call to more high fidelity, as opposed to just bump and sizzle that the club installation market has historically been big with."

On the other hand, Ferdinand Boyce, VP/marketing for DOD Electronics observes that club installations have gone from all-purpose installs to installations of very specific applications. "Does a club owner make a decision to use karaoke, or is he going to make a traditional DJ booth with a simple lighting and sound system, or is it going to be a sports bar?" Boyce asks. "Clubs in the past would more often than not try to put a system in that would try to accomplish three or four or five different tasks. They're getting more focused: I think karaoke is one reason, the maturity of the DJ market is another reason, and club owners are less inclined to give a sound contractor carte blanche to put a system in, without having a much

Chez Sensual was a recent installation in the Bronx, New York by Rosner Custom Sound, Inc. The DJ booth is shown here.



A recent Clair Brothers installation, City Lights Nightclub, contains C.B.A. R2-T 2-way loudspeakers.

Maria M. Conforti is a freelance writer in the New York area who has been the Assistant Editor of Sound & Communications and The Music & Sound Retailer.

clearer understanding of exactly what it is they want to do. So the purse strings aren't as open, and the owners are looking for value and purpose."

COMPETITION

Sound contractors who perform their work in a professional, fair manner will weather this recession just fine. Competition for club installations is now coming from DJs who have gone into business for themselves. While DJ/installers frequently give low quotes, the professional sound contractor can cut this competition off at the pass.

"In our sales presentation, we pay more attention to the dollars and we explain in greater detail — either verbally or in writing — what our philosophy is, and what exactly he's paying for," says Alex Rosner, owner of Rosner Custom Sound in Long Island City, New York. "Everyone's looking to economize, and a lot of people in the club market think that they can get over by spending less money, but there are no short cuts.

"I say, 'Look, we've been in business for 25 years. We're available for service at nights and on weekends. If you call at night, you get a human being, you don't just get a machine. Try a DJ sometime on a Saturday night at two in the morning, and see where he's at. See if he can come over and fix it right away.' "

CASH FLOW

Contractors can still profit from club systems — as long as club owners pay their invoices on a timely basis, says Gene Pelland, who manages the club installation division of Clair Brothers. "We're getting paid; our terms are typically net due upon completion, but we usually end up getting it about 30 days after the completion," he says.

"We might have let things slide in the past," Rosner says, "but now if we sense that the customer is having difficulty paying, we jump in and don't service until we get paid in full. As far as doing new clubs, we always operated with a major part of the investment up front and the balance on completion, with no exceptions, so that's no change."

Rosner's DJ mixing board at Chez Sensual.

EQUIPMENT TRENDS

Clair Bros. specs CD players 100 percent of the time, Pelland notes "The DJs are using them more and more. Things like the Numark 5020, which can cue things up more like turntables — my salesmen sell them all the time."

DJs really have no choice, Rosner asserts. "The engine that drives this thing right now is supply, not demand. They don't have the feedback problems they had [with turntables], but they have vibration problems. There does need to be some vibration isolation consideration. . . by the CD manufacturers themselves. They haven't really done their homework."

High-powered speakers necessitate club installers' using larger amplifiers to drive them, says Barry Ferrell, eastern regional sales manager for QSC Audio Products. "Where these amplifiers normally would have only been used in high-dollar touring installations, the big stuff is finding its way into the average club," he notes.

Cutting corners in the amp department is a mistake, Ferrell says. "There's a big trend toward loading up as many speakers as possible on a few of the biggest amplifiers as possible, and that results in loading an amplifier channel down to 2 Ohms, so they'll have four cabinets on a single channel of a really large amplifier. The installer should keep in mind that if they only use two speakers per channel in a 4-Ohm loading, not only is it easier on the amplifier, they can use two smaller amplifiers and have greater backup and redundancy," he explains. "If you get into a situation where you're using one or two extremely large amplifiers to power a whole system, if one should fail for any reason (and it doesn't necessarily have to be an [equipment] failure; one of the common things we see in our service department is club amplifiers with beer spilled in them), you could lose half or three-fourths or all of your system. If you use a larger number of amplifiers, then the loss of one is not that significant."

When selecting amps, go for reliability. "I don't care how good the damping factor is, or how flat the frequency response is, or how great the signal-to-noise ratio is," Ferrell says. "If it breaks down, it doesn't matter how good the specs are."

The popularity of high-end, very heavy-duty type rackmount cassette and CD products has increased significantly over the last couple of years, reports Greg Hildebrandt, Tascam Division Manager. "Before, we were always competing with some of the cheap hi-fi models," he says, "and it would seem to many of the installers that it's much better to spend a little bit more to get something that's designed for 24-hour-a-day usage."

LAYOUT

Dancing may move the bodies, but drinking moves the money in clubs. How about people who actually want to talk at the bar?

"We typically try to point the customer in the direction of the bar," Pelland states. "All of the clubs we do have distributed systems in them, [which]...are supposed to be turned off when the main dance floor's cooking so you can have some quiet at the bar areas. I think most night clubs try to achieve that, but some of them lose it by having the system operate at such a high pressure level."

Though he designs his bar areas to be "talkable," Laidman doesn't want the sound level to be too low: "Any part associated with a good night club has an energy level to keep people from getting too comfortable. Therefore, if you're in a living room atmosphere, you're in a cocktail lounge, not a nightclub."

PROBLEMS

The most common problem Laidman encounters is club owners' lacking experience. "The clubs that are good are built in a team effort," he says. "Before an interior designer is brought on, and before an architect, the team is established and worked out and everybody goes in the same direction."

Similarly, Pelland reports that architects don't allow the correct amount of space to install the main dance floor's distributed speakers. "It's always a problem finding a good place for subwoofers," Pelland says. "In new buildings, we try to bury them underneath something, like the raised area next to a sunken dance floor. Speaker placement in general, disco booth location, being able to have a place where you can do a nice, neat wiring job, a disco booth that's well-isolated from the noise that's on the dance floor," are some of the concerns.

Speaker location is a problem for Rosner as well. "Where do you put the bass speakers? Do you fly them, or must you put them on the floor? How physically high must high-frequency [transducers] be?"

Rosner estimates that about 80 percent of clubs have inadequate acoustic isolation for the turntables. Furthermore, he says, "From an ergonomic standpoint in the control room, there's a lot of work that needs to be done in making the control room hospitable. Rack mounting is not completely standard everywhere yet. There are design considerations with regard to heat dissipation in amplifiers. People think that all they have to do is buy an amplifier with a fan in it, and the problem's solved. That's not true. Ventilation inside the control room is an important consideration, as is power.

"There's a lot of equalization being done out there by people who try to equalize by ear without using spectrum analyzers, and it's not done right," Rosner says.

Clair Brothers installed four of the company's own 18-inch ported subwoofers in the City Lights installation.

"Also, some people use four-way equalizers that have a dip in the mid-range — because of faulty arithmetic in the design. The result is an unsmooth midrange."

STAYING VIABLE

"Nowadays, you've got to offer an entire environment," Laidman says. "Something that is strong thematically without the lights or without the video or without the audio, and therefore obviously accented even more once the video and audio are there. Internationally and nationally, the easiest formula for success is an interior theme that deals strongly with natural elements. If you deal with something that is a high-tech or post-modern design, you always find people that don't like that style. . . . I don't think anybody doesn't like the earth."

To get ahead and stay there, put together a team that includes a creative head, plus interior designers and sound and lighting contractors, Laidman recommends. "Without the creative aspect, it's pretty hard for the guy down the street to compete with people like Disneyland. That's what the public is expecting now: impact as strong as the Pirates of the Caribbean." ■

A Long Bar and a Narrow Room

Harry Caray's on Chicago's North Side Gets a Sound System for Sports

BY CHUCK SHRIVER

It seems hard to believe, but even popular Chicago Cubs television personality Harry Caray needed some help to be heard over the crowd.

Well, not Harry himself. His foghorn voice can be heard leading the cheers from the Wrigley Field broadcast booth almost without the assistance of the WGN-TV airwaves.

In this case, it was Harry's popular near-northside eatery that needed the help. His restaurant, appropriately called Harry Caray's, at 33 West Kinzie St., is located in one of Chicago's most historic structures.

Most of the time you couldn't hear the sound from the sports events on our TV sets.

Just north of the Chicago River and two blocks west of Michigan Avenue's "Magnificent Mile," the restaurant is almost literally within shouting distance of the Windy City's two major daily newspapers, most of its television and radio stations, and a majority of its advertising and media agencies.

WGN-TV Sportscaster Harry Caray is such a Chicago celebrity that when he opened his restaurant on Chicago's Near North area the city of Chicago renamed Kinzie Street "Harry Caray Street" in his honor. In the background is the 444 North Michigan Avenue building, home of many of Chicago's advertising agencies.

The building which houses Harry Caray's was the only structure left standing north of the Chicago River following the great Chicago Fire of 1871. Originally the home of the Chicago Paint and Varnish Company, it became notorious in the Twenties as a distribution warehouse for the bootlegging network of the famed Al Capone mob. Rumor has it that Capone lieutenant Frank Nitti lived in an apartment on the fourth floor which still exists.

The bar itself is 60 feet, 6 inches long (the exact distance from the pitcher's rubber to home plate).

In more recent times it had been the home of the Kinzie Steak House, until Caray's group took it over three and a half years ago. Now it is the forty-third largest grossing independent restaurant in the United States.

Chuck Shriver is V.P. of Public Relations at Meridian Creative Group of Schaumburg, Illinois.

"Our bar alone grosses more than most standalone bars in Chicago," said Harry Caray's manager, Steve Borchew. "Most of the time you couldn't hear the sound from the sports events on our TV sets, which is part of the draw, and certainly you couldn't hear a page."

The most effective application is the one that fits the needs.

Painfully aware of the need of a sound system in the bar that could be heard over the din, Borchew made calls to fellow restaurateurs. The result: "Modular Sound Systems was recommended to us several times."

The long, narrow configuration of the room, its decor, its seven windows opposite the bar, and the age of the building presented some peculiar problems.

"The bar itself is 60 feet, 6 inches long (the exact distance from the pitcher's rubber to home plate), but the room is only about 25-feet wide," Borchew said.

Harry Caray's Restaurant is nestled in the heart of Chicago's active Near North area in the only building north of the Chicago River that survived the famous Chicago fire of 1871.

The long, narrow configuration and many windows in the bar area of Harry Caray's Restaurant presented special challenges to Modular Sound Systems engineers.

"When it's packed to capacity — which it is most nights — you can't hear a thing. We were concerned about finding a solution that worked," he said.

After surveying the situation, Jim Wischmeyer, president of Modular Sound, and Henry Heine, Modular Sound's chief engineer and designer, came up with a unique solution.

We decided to make the loudspeakers part of the decor.

"We ruled out the ceiling as a location for the speakers for a variety of reasons," Wischmeyer said. "What we decided upon was to make the loudspeakers part of the decor rather than hiding them. The result

was a row of loudspeakers which hang on the wall between the windows, giving the effect of antique picture frames," he said.

Modular Sound decided upon six customized TA12 Bag End loudspeaker systems, with SE1280 speakers and E350 horns installed in particularly shallow

Modular Sound System engineers dealt with the problem of an inappropriate ceiling and limited wall space by custom designing shallow Bag End TA12 cabinets to house SE1280 speakers and E350 horns. The cabinets are mounted between the windows, and are finished to match the rest of the decor in the room.

custom cabinets between windows, finished to match the decor of the room — a seemingly simple, but extremely effective answer to the problem.

The bar's sound system is connected with the main sound system in the restaurant. It can be employed separately

The bar's sound system is connected with the main sound system in the restaurant.

or as part of the overall system. It is also patched into the room's video system so that all important Chicago sports events — particularly Chicago Cubs telecasts — can be heard clearly in every corner of the bar.

WHAT'S THE BOTTOM LINE?

"We're ecstatic," said Borchew. "The system is perfectly tailored for the situation and it does everything the Modular Sound people said it would."

Said Wischmeyer, "Sometimes the solution does not have to be complicated. After you have analyzed the problem thoroughly, the most effective application is the one that fits the needs — simple or complex." ■

"ROOM ACOUSTICS," THE THIRD EDITION — BY HEINRICH KUTTRUFF

By Neil A. Shaw

We all have experienced rooms that we have perceived as having either "good" or "bad" acoustics. This is something that all people can do — judge whether the acoustics of a space are satisfactory or unsatisfactory.

We all have a subconscious awareness of the acoustics to which we are subjected daily in the normal course of our everyday life. However, there are few who can explain what is meant by "good or poor acoustics" and fewer still who understand the factors which influence and give rise to various acoustic properties. In the third edition of his book, "Room Acoustics" [Room Acoustics, Third Edition, by Heinrich Kuttruff; Elsevier Applied Science, New York, New York; 1991; $120.00], Professor Kuttruff provides a very useful introduction to the objective and subjective knowledge and measures needed for at least a qualitative understanding of the nature of room acoustics: the generation and propagation of sound in an enclosure (the "room") which can be described by mathematics (the language of physics) and the physiological and psychological factors, which are at present beyond precise description. The Haas effect (perception of echoes versus arrival time and intensity), modulation transfer function (MTF) as the basis for RASTI (Rapid Speech Transmission Index) measurements, quadratic residue (QRD) diffusors, among many other factors, measures and principles are examined by Dr. Kuttruff in this concise book. The information presented in "Room Acoustics" is a clear and logical presentation of the basic physical phenomena that will enable one to understand the why and how of room acoustics.

In "Room Acoustics," the reader is introduced first to "Some Facts on Sound Waves, Sources and Hearing," where features of sound are introduced in an ideal environment, *i.e.*, no walls, free of losses, the medium is homogeneous and at rest. The acoustic wave equation, plane waves, energy density, sound intensity, spherical waves, sound radiation, non-harmonic sound signals, sound pressure level, sound power level, human hearing performance and basic properties of "natural" sound sources are introduced, defined and explained. A reasonable mathematical background (knowledge of lower division calculus) and some elemental knowledge of wave propagation is assumed in the derivations. These derivations may, as the author expresses, be omitted without detriment.

The formal presentation proceeds with what happens when a wall is introduced in our ideal environment. Sound reflection at normal and oblique incidence, reflection factor, absorption coefficient, wall impedance and random incidence are reviewed. Next, the author encloses our world and presents the formal solution of the wave equation for an enclosure (this is the basis for what is commonly called the "wave theory" of room acoustics). Behavior of phenomena such as normal modes is introduced as well as the consequences of same. Also revealed are the effects of non-rigid walls and the behavior of steady-state sound fields in rooms, along with decaying modes in rooms, and their relationship to reverberation.

Dr. Kuttruff proceeds with the limiting case of very high sound frequencies (geometrical room acoustics — where the concept of a wave is replaced by the concept of a sound ray which acts similarly as would a ray of light). The reflection of sound rays, sound reflection in a room, the temporal distribution of reflections and the directional distribution of reflections, as well as diffusion are examined.

"Room Acoustics" then tackles reverberation and steady state energy density in diffuse sound fields. Basic properties and the realization of diffuse sound fields are introduced and then the mean-free path and average number of reflections per second are developed. We are then presented with how sound decays, and reverberation time.

Dr. Kuttruff develops the more subtle influences on the reverberation time of unequal path lengths (distance between reflections), as opposed to using the mean-value mean-free path. He develops the behavior of the steady state energy growth in a reverberant space with a diffuse sound field and then proceeds to the description of partially diffuse fields. In the

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final portion of the reverberation and energy density description, the behavior and performance of coupled rooms are detailed. An example of a coupled space is the void above the hung ceiling in an auditorium, and the auditorium.

The text then plunges into sound absorption and sound absorbers by briefly describing the most prominent loss mechanisms in air. A qualitative account, as opposed to a rigorous derivation, is given. For a quantitative derivation, one could see, for example, Kinsler and Frey, "Fundamentals of Acoustics." Unavoidable wall absorption is handled in a similar manner. Dr. Kuttruff then describes sound absorption by vibrating or perforated walls, extended resonance absorbers and single resonators. The sound absorption by porous materials is given extensive treatment and this leads to a discussion of audience and seat absorption. The reader will now find that it is easy to discern what various manufacturers are claiming, or hyping, when the reader is confronted by claims that seem too good to be true. The ultimate in sound absorption, the anechoic room, ends the discussion of sound absorption.

Up to this point in the text, "Room Acoustics" concerns itself with the physical side of room acoustics and objective measurable properties and the description of physical phenomena. However, an "end user" in a room does not require the room to have any certain value of measurable parameters except that the room "support the music being performed or to render speech easily intelligible." Dr. Kuttruff now begins the discussion of the subjective effects of combined sound fields. After some general remarks on reflections and echoes, the perceptibility of single reflections is described. Then, in succession, echoes, sound coloration and flutter echoes, the early energy and its relation to speech intelligibility and to clarity are examined.

The concept of MTF and sound transmission index (STI) as well as the more popularly known RASTI measure are derived, and the relationship of these intelligibility measures to actual speech intelligibility is explained. The temporal structure of the impulse response of a room has now been introduced along with the subjective consequences of same.

The author now looks at early lateral energy, or "envelopment," and its relationship to "spaciousness." The feel of a room is described as being dependent on early reflections, and the requirements for this "envelopment" to be effective and useful. The subjective effects of reverberation are reviewed, and the concepts of "optimum" reverberation times and preferred values for reverberation times are presented. The discussion of subjective effects ends with a very brief description of steady state pressure level and

THE FORMAL PRESENTATION PROCEEDS WITH WHAT HAPPENS WHEN A WALL IS INTRODUCED IN OUR IDEAL ENVIRONMENT.

acoustical quality, followed by an assessment of concert hall acoustics in which various rating systems, such as Beranek's elaborate system, are touched upon, along with other descriptors, such as Ando's. The concept of inter-aural cross-correlation (IACC) is also developed and described.

Leo L. Beranek, one of the founders of BBN, has written five excellent texts. One, "Acoustical Measurements," is available from the Acoustical Society of America [Acoustical Measurements; Acoustical Society of America; Sunnyside, New York, New York; 1988]. Yoichi Ando, a noted Japanese acoustician, has a slim, but not inexpensive, book, "Concert Hall Acoustics" [Concert Hall Acoustics; Springer Verlag; New York, New York; 1985].

Measuring techniques in room acoustics are next covered. After some general remarks on instrumentation and procedures for acoustical measurements, measurement of the impulse response and of correlation measurements are presented. An examination of the time structure of the impulse response follows and then the measurement of reverberation, the directional composition of sound fields, of wall absorption with the impedance tube and of absorption using the reverberation room, are detailed.

Next, the practical aspects of room acoustics are described and discussed in the chapter on design considerations and design procedures. The shape, volume, number of seats and their arrangement as well as the materials of the wall, ceiling, floors, seats, etc., must all be considered and their relative effects taken into account. Dr. Kuttruff examines the effect of room shape with regard to the direct sound and with regard to reflections. The effect of reverberation time is also reviewed. Noise levels, their prediction and reduction, are also covered in this chapter. The design tools of acoustical model measurements and computer simulation are reviewed to close this chapter.

Finally, electroacoustic installations or sound systems in rooms are examined. The directivity of loudspeakers, the design of sound systems for speech transmission and reinforcement are briefly addressed. Dr. Kuttruff also makes some remarks on the selection of loudspeaker positions and examines acoustical feedback and methods for its suppression. He ends with electroacoustic control of reverberation, where he describes reverberation enhancement systems. (The description given is derivative of that seen in the patent for Veneklasen's acoustic hall simulator AudSyn (Auditorium Synthesis), US patent 3,535,453.)

"Room Acoustics" is a well written and informative but not inexpensive book. The information is presented in a style that is easy to read and easy to digest. There is a brief but potent bibliography at the end of each chapter. As an intermediate text on room acoustics, "Room Acoustics" certainly is a welcome addition to the library of any person working in the field of or who has an interest in sound and communications. ■

Processing Loudspeakers

Part II: A Market Survey By Manufacturer

BY DAN SWEENEY and MIKE KLASCO

In the first installment of this series, we examined the development of processing loudspeakers as well as the basic forms taken by electronic signal processors themselves. In this part we will survey the professional loudspeaker marketplace for processing loudspeakers company by company, and indicate the applications and market niches addressed by each manufacturer, as well as the general design philosophies and capabilities embodied in each firm's product line. This is not intended to be a comprehensive product listing or a catalogue, but simply a market overview. Individual manufacturers should be contacted directly for more specific information.

It should be noted that today's professional market for processing loudspeakers is marked by an almost paradoxical combination of market maturity and rapid technological evolution. Many major manufacturers of loudspeakers for sound reinforcement or public address offer processing systems of one sort or another, and the concept of the processing loudspeaker is no longer controversial — though certain processing strategies remain so. It must be stated, however, that what stability prevails in the broad category of processor loudspeaker systems is likely to diminish in the face of an emerging trend toward digital processing. DSP, at least in the short term, is apt to result in a plethora of competing system design approaches as engineers explore the enormous possibilities of control and configuration made practical by software based processing. DSP is still fairly exotic, and as yet only a handful of manufacturers have embraced it, but the future surely belongs to it.

Dan Sweeney is a freelance writer based in the Los Angeles area and Mike Klasco is Sound & Communications' Technical Editor.

THE MANUFACTURERS

Adamson Acoustic Design Corporation

Adamson Acoustics is a Canadian firm with a prior concentration in the Canadian marketplace. It is now striving to make its presence felt in the U.S. The company specializes in sound reinforcement, and is totally committed to a processing approach. Both of the two concert systems offered by Adamson are designed to be used with dedicated processors. One of those processors, the DSPX 4000, is a digital unit.

Both Adamson concert systems utilize proprietary drivers and enclosure designs. Manifolding is utilized in one of the bass reflex modules, and all midrange and high frequency horns are designed according to wave guide principles. Both systems are three-way, and mids are handled by Adamson's own large format Kevlar compression driver instead of the usual metal domes. The larger of the two systems is based on the MH225 composite Kevlar midrange with trapezoidal enclosure and waveguide horn, and is mated to the S218 manifold with dual 18-inch drivers. The second system is built around the compact MH121 two-way full range system which includes a 12-inch woofer and which may be combined with the B118 bass module with one 18-inch cone. Both systems, the AX300 and the AX302 respectively, feature dedicated controllers. Either speaker system can be used with the new DSPX 4000 digital processor as well.

Both analog processors include limiting as well as unique sixth order electronic crossovers characterized by finite loss poles. Filters are said to provide attenuation of 70 dB per octave while minimizing group delay. The DSPX 4000 digital processor provides digital limiting and brick wall finite impulse response filters.

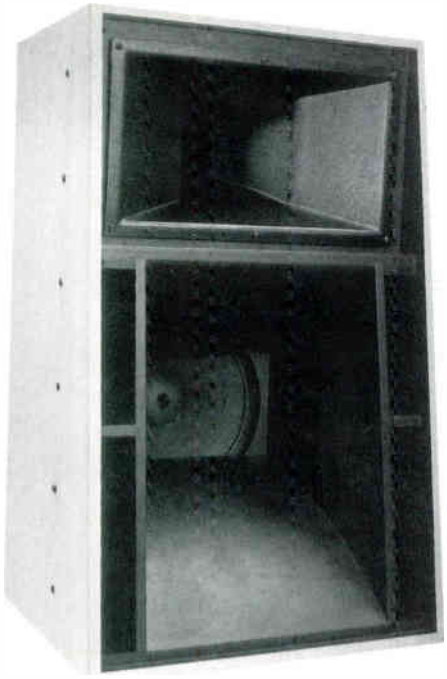
Altec Lansing

Altec Lansing, one of the oldest names in professional sound, is not a proponent of aggressive processing, but like most major manufacturers, offers processing options. Altec's only engineered processing speaker system is the A700, which appears in several manifestations. A two-way with bass reflex horn of traditional Altec design, the A700 is designed to serve as a compact sound reinforcement speaker, in public address applications, clubs, or portable music systems. It may be combined with the A700XLF dual 15-inch subwoofer. Both speakers feature trapezoidal cabinets. Suspension kits are optional.

Processing includes active frequency division and hard limiting. The recommended processor is the 1632A Electronic Crossover/System Protector. Altec also sells a number of nondedicated electronic crossovers and compressor/limiters.

Apogee Sound

Apogee Sound has a broad product line, from the small 8-inch woofer 2-way passively crossed-over AE-1 series 2 to the 3x3 series 2 all horn-loaded concert-sound arrayable 3-way system. Monitors of various configurations include personal monitors like the SSM, and stage monitors such as the A3-3M series 2 10-inch woofer (2-way) to the AE-6NC with a 12-inch woofer for high intensity monitoring.



Altec Lansing's A700 2-way with bass reflex horn.

The Bose 302 series II Acoustimass bass system.

Various subwoofer models include the double 15-inch woofer AE-10, the AE-12 series 2 double-18-inch woofer and AE-SB single 18-inch. All Apogee speakers have complementary processors, and a new series of processors have been introduced with integral power amplifiers in order to save rack space and speed rack wiring.

While Apogee Sound has been popular with pro sound rental companies, it is now expanding distribution with the Artist Systems series. These include compact roadworthy front-of-house speakers, floor monitors and a subwoofer. The Artist Series processors use the same PAR (positive amplifier return) loop through the configuration of the original Apogee designs. Amplified processors will be introduced this summer.

Bag End

Bag End is a small professional sound company located in Barrington, Illinois. The company manufactures one processing loudspeaker of interest to sound contractors, the highly unusual ELF subwoofer. In essence an equalized sealed box system operated below resonance, the speaker utilizes a dual integrator circuit to provide both low frequency boost and high frequency roll off. The integrator does not produce the phase lag associated with inductors, and is said to provide better integration with full range speaker systems.

Bose Corporation

One of the progenitors of the processing speaker concept, Bose continues to offer processing speakers today, though its current offerings do not exhibit particularly aggressive processing. Most Bose professional speakers are based on the use of arrays of full range 4 ½-inch drivers which are routinely equalized to extend frequency response in either direction. Examples of the basic technology include the 102, 302, 402, 802, and Acoustimass Pro. Bose full range professional speakers are designed for clubs, portable sound systems, and small scale sound reinforcement applications. The Bose Acoustic Wave Cannon subwoofer may also be regarded as a processing loudspeaker insofar as it is equalized as well as being provided with limiting and an automatic level control which follows the Fletcher-Munson curve.

Celestion

Celestion is an English loudspeaker company with a significant presence in home audio as well as the professional end of the industry. Celestion makes one group of processing speakers, the SR Series. SR speakers are compact direct radiator systems which may variously be used as stage monitors, portable sound systems, or PAs. The SR1 and SR3 speaker systems use full range 8-inch drivers of complex shape which mechanically decouple for high frequency reproduction. Corresponding SRC1 and SRC3 controllers provide equalization and low frequency limiting as well as a switchable electronic crossover to permit integration with matching subwoofers. Subs include the SR2, SR4, SR6, and SR8. Celestion processing speakers are available with optional stands, flying kits and wall brackets. Extra sensing cables are provided for direct connections between the controller and the loudspeakers.

Community Light and Sound

Community Light and Sound, a stalwart in the field of sound reinforcement, makes two groups of processing loudspeakers, the RS Series of full range three-way loudspeakers, and the matching VBS Series of subwoofers.

RS Series speakers are fully horn-loaded, trapezoidal, arrayable designs with integral flying hardware. Drivers are crossed over passively. All RS speakers are specified for concert, club, and public address applications. The largest, the RS 880, is suitable for use as a main sound reinforcement speaker. Each speaker has

The Celestion SRC2 Controller.

its own dedicated controller and matching VBS subwoofer. Controllers include electronic crossovers and protection circuits activated by remote sensing cables attached directly to the loudspeakers.

Dynacord

Dynacord displayed processing speaker systems at the New York AES, and has previously introduced a universal speaker processor as well as processors in its power amplifiers. Processors include thermal protection and limiting circuits as well as a sort of predistortion circuit which steepens waveforms fed to bass sections and increases the acceleration of woofers to match that of mid and high frequency drivers for better transient response.

EAW

EAW (Eastern Acoustics Works, Inc.) is a major player in the sound reinforcement field. While not as strongly associated with processing loudspeakers as Meyer Sound or Renkus-Heinz, the company does make several processing systems.

Basic EAW systems feature highly distinctive enclosure technology including compound flare high frequency horns, separate horns for the mid-bass region, and waveguide loading for the deep bass.

EAW offers two full range processing systems, the KF300i and KF600i — both compact, trapezoidal sound reinforcement speakers with secondary applications in clubs, houses of worship, and public address. When used in arrays, either system will purportedly provide absolutely uniform horizontal coverage. Optional flying kits are available. The systems are controlled respectively through the two channel MX300i CCEP (closely coupled electronic processing) and MX600i CCEP modules which provide compression, low frequency attenuation and equalization, and independently adjustable high and low pass filters within a three way electronic crossover. Phase correction circuitry is also provided.

EAW also offers the SB300, SB600, and SB850 vented subwoofers. The MX800 CCEP and MX800i CCEP two channel,

EAW's KF 850 Virtual Array System.

two-way electronic crossovers are used with these speakers.

Electro-Voice

Electro-Voice certainly needs no introduction to sound professionals. E-V manufactures several speaker models which may be considered processing types.

Fairly elaborate processing is used in the DeltaMax series of speakers and E-V has been extending the DeltaMax techniques with their Manifold technology first featured in their MT-4 Concert System.

DeltaMax encompasses four separate models, the DML-1122A and DML-1152A mid-high frequency speakers, the DML-2181 low frequency module, and the DML-1152MC floor monitor. Both mid-high frequency models are trapezoidal, while the DML-2181 embodies manifolding principles. Each speaker module has its own dedicated processor.

DeltaMax processors are provided with multiple protection modes to guard against overexcursion and thermal damage to loudspeakers. Sensing wires are run from the speaker terminals to the processors, and processor circuits are modeled to reflect the safe operating limits of the specific speaker to which they are matched.

The MT-4 concert system is a four-way system with manifolded subwoofer and midbass sections, and horn loaded upper mids and tweeters. The companion MTX-4 processor provides frequency division, equalization, and time delay.

JBL

JBL, another industry leader and an early opponent of the processing approach, now offers one of the most advanced processors in the field, the ES52000 Digital Controller. In fact JBL was a pioneer in signal processing, and its 5231 and 5232 electronic crossovers have been in continuous production for nineteen years.

The newly introduced two channel

ES52000 offers brick wall crossover slopes, digital third octave equalization, variable time delay, and digital limiting. Currently the ES52000 is configured for the 4892 trapezoidal-arrayable compact sound reinforcement loudspeaker.

Meyer Sound

Meyer Sound, more than any other manufacturer, has defined the processing loudspeaker in popular perceptions. Meyer pioneered a form of dynamic processing

Meyer Sound's UPA-1B UltraSeries loudspeaker system.

using sliding high and low frequency filters to extend the safe operating areas of its speaker system, and the company still espouses the same approach today. Meyer also introduced phase aligned quasi-Bessel active crossovers and trapezoidal arrayable modular speaker cabinets.

Today virtually all Meyer Sound speaker systems are specified for companion controllers. The company's product line of processing systems is very extensive, including main sound reinforcement systems, compact and sidefill concert systems, stage monitors, control room monitors, PAs, club and disco speakers, and subwoofers.

Popular models include the MSL-3 three-way main sound reinforcement speaker; the MSL-10A very high output main sound reinforcement speaker; the compact UPM-1 for concert sidefill, clubs, PA, etc.; the USM-1 stage monitor, and the UPA-1B compact sound reinforcement speaker. All systems have dedicated processors, and the MSL-10A mates with a processor rack. Most are trapezoidal and arrayable. Meyer also makes standalone programmable parametric equalizers which are typically used with their SIM II com-

puterized room equalization system.

Peavey

Peavey, a full line manufacturer of professional audio equipment, makes several processing loudspeakers as well as one of the handful of digital processors.

Processing speakers include the compact powered Prosys 112 and the HDH series. The Prosys 112 is full range three-way system with 12-inch woofer, direct radiator cone midrange, and horn tweeter. It is designed for small scale sound reinforcement applications and public address. Processing, which includes low frequency boost and infrasonic filtering, is built into the integral amp.

The HDH speakers are larger systems intended for sound reinforcement. All are controlled through the two channel Dynamic System Controller HDH Series which offers equalization, multi-band compression, and frequency division. The company also offers a Series 12 Dynamic System Controller which may be utilized with most Peavey sound reinforcement enclosures, and a separate Dynamic Controller Subwoofer Processor which is adaptable to a wide variety of subwoofers.

The HDH speakers are strictly designed for processing and employ manifolding of high frequency elements. The HDH-1 also employs a semi-manifold bass section as well as a horn loaded midrange.

Peavey's digital processor, the PC4-XL, is a universal processor with four channels, selectable crossover points and choice of fourth order Bessel or eighth order Linkwitz-Riley filter characteristics. It also offers equalization, and selectable time delay.

P.A.S.

P.A.S. (Professional Audio Systems) makes several processing loudspeaker systems. The large T.O.C. System-2 is a modular main sound reinforcement system controlled through a dedicated processor. The processor provides for active parameter synthesis through equalization and negative impedance drive for sixth order Bessel response from the bass system. Active frequency division, time offset cor-

P.A.S.'s SW-2 stage wedge.

rection, and soft clipping are also provided. The system includes the CXL-2580C coaxial full range system, and the EB-2 subwoofer. The CXL-2590C comes in two configurations, the trapezoidal SW-1, and the SW-2 stage wedge. All enclosures include integral flying points. The Processor utilizes a cardframe chassis with a single power supply.

Similar technology is used in the System 1 main sound reinforcement system, and the compact PI Systems for permanent installation.

Renkus-Heinz

Renkus-Heinz along with Meyer Sound is the chief proponent of aggressive signal processing in professional loudspeaker systems. The company conceived the notion of a sliding crossover point to protect drivers at high output levels, and the systems utilizing this technique have become highly controversial albeit very successful in sound contracting.

Renkus makes many processing speaker systems, not all of which utilize active crossovers with sliding filters. The Pro-Guard series of compact sound reinforcement speakers are passively crossed over and call for sensing wires from the speaker terminals to the processor module which limits input signals in the presence of an overload condition.

The Smart Systems, including the SR-121A/SR121D subcompact, LR-1A subwoofer, SR-1A/SR-1A6 and SR-2A compact sound reinforcement speakers, and C-1A Coaxial Point Source and MR-1A/LR-2MA main sound reinforcement speakers, all do use the sliding crossover technique, which is termed Spectrum Power Transfer by Renkus-Heinz. Processors for these systems have provisions for sensing lines to speaker drivers, loudness compensation, and digital time delay.

Speakers are trapezoidal and arrayable, and processors are built to accept individual programmable cards.

Turbosound

Turbosound, an English firm with a unique bass loading technology involving partial horn loading, makes one processing system, the Flashlight TFS-780 Ultra High Q main sound reinforcement system. The four way system provides active crossover filters with Linkwitz-Riley characteristics, phase alignment, limiting, and transformer balanced outputs.

Yamaha

Last year Yamaha introduced the S1520S 2-way loudspeaker, the first product in their YST Sound Reinforcement Series. This is more than a processor speaker, as Yamaha's YST servo control is used to interface any power amplifier with the woofer. The YST technique utilizes negative impedance drive to synthesize a low driver Q, permitting substantial downsizing in bass enclosure size and improved transient response.

The S1520S uses the C20 single channel digital processor. The processor includes a three-way electronic crossover, parametric equalization for each band, optimized compression/limiting within each band, and time alignment in 20 microsecond increments to a maximum value of 1300 milliseconds (when the speakers are used remotely from the main cluster). Crossover filters slopes are user selectable, as are all parameters.

At the New York AES, Yamaha introduced the D2040 dual channel digital processor, which features even greater control of equalization and remote operation through computer interface. At the winter NAMM show Yamaha started to fill out the YST product line with the SW1820S dual 18-inch subwoofer, the SM1525 15-inch coaxial stage monitor and the S1525 compact front-of-house monitor, all of which are supported by the C20 processor.

Next month we will take a close look at advanced amplifier/speaker interfaces, such as Yamaha's YST and Bag End's ELF, universal signal processors such as those from JBL, BSS, and Peavey, and discuss future possibilities for signal processing, such as distortion and reverberation cancellation, electronically steerable arrays, self-equalizing processors and more. ■

ACOUSTICAL PRODUCT SPECIFICATION: A PSYCHOPHYSICAL APPROACH

By Steven J. Orfield

In the design of facilities with significant acoustical needs (most facilities, in my mind), there is generally a set of competing interests which is hierarchically determined at the stage of "schematic design" (concept design).

This determination affects final building performance quite thoroughly, as those issues identified for emphasis, analysis and solution are generally a very limited set.

On the typical building project, the set of variables most often accented is a list something like this:

1. Building aesthetics
2. Building cost
3. Building efficiency
4. Building program

With regard to building performance, those variables generally accented include envelope design efficiency (walls, windows, etc.) and HVAC (heating/air conditioning) design efficiency.

Often undefined or more poorly defined are issues related to the occupant's subjective response to and comfort in his space. These are issues such as lighting, acoustics, thermal comfort, and human factors design. While this general omission to specify important user-based performance issues is unfortunate, it is not without clear causes. Among the most significant reasons for this omission are three issues: One is the simple lack of training and understanding on the part of both the building designer and of the client of these psychophysically defined issues. Another is the fear of failure on the part of the designer and client since they do not have a clear understanding of these issues. A final source of failure to deal with these issues is the belief in the design community that there is a clear relationship between cost and performance with regard to these "perceptually-based" issues.

WENGER BEGAN TO DISCUSS THE IDEA OF VISITING SITES WHERE THEIR PRODUCTS HAD BEEN USED IN ORDER TO RECORD PERFORMANCES AT THOSE SITES WHICH COULD BE PLAYED BACK TO OTHER POTENTIAL CLIENTS.

While there are some solutions to the problems of designer education on the horizon, there is another very persuasive means of providing designer and client comfort with perceptually-based problems which has been around since the early history of design, and that is by means of demonstrations. When an architect of the pre-engineering past wanted to design a concert hall of quality, he generally visited those halls considered to be excellent examples of the building type, listened to performances, and incorporated proven ideas from their design.

It is now possible to "visit" spaces before they are constructed via simulation (See Sound & Communications December 1990; March 1991), using binaural recording technology (See Sound & Communications September and October 1990), and to determine their probable performance benefits and problems in advance of their construction. While there are now a number of means of demonstrating by simulation the quality of theoretical spaces, they are all expensive and complex. Therefore, it is interesting that one manufacturer of acoustical materials has taken it upon itself to create room simulations of problem rooms and of the benefits of the products. This article is a discussion of a specific case of product performance simulation, a method of presenting products to clients which will, I suspect, become the standard method of manufacturer-client marketing interface in the coming years.

THE PROBLEM OF DEMONSTRATION

Wenger Corporation is a U.S. manufacturer of support equipment for music practice, rehearsal and performance spaces in both educational and professional facilities. The uniqueness of this product area, referred to in general as the "music suite," has long been intuitively understood by educators and professionals using these areas, but has been difficult to com-

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municate and quantify consistently both among "insiders" to their use and to other non-music oriented design and administrative professionals, as there is no common qualitative language in use in the field.

With these difficulties in mind, prior to issuing its newest catalog, Wenger began to discuss the idea of visiting sites where their products had been used in order to record performances at those sites which could be played back to other potential clients. Part of their concept for this recording was a number of *before and after* product demonstration tracks.

Since Wenger had been using Orfield Associates for other acoustical consulting at that time, a discussion began regarding that recording and demonstration process. In order that those recordings actually could be used as accurate demonstrations, a number of variables needed to be controlled. (See Figure 1.)

Figure One.
Acoustical Recording Variables

- Room size
- Room shape
- Room acoustical description
- Background noise
- Music type
- Band or chorus

After consideration of this set of issues, it became apparent that Wenger would have to retain an instrumental and a vocal group, make a survey of existing facilities,

A BINAURAL DAT RECORDING WOULD BE MADE OF THE RESULTS.

test those facilities to determine which fell within reasonably similar acoustic performance standards, and finally, travel to the selected sites with the performers and recording equipment. Even via these efforts, they could not be certain that the resulting recordings were comparisons of their product benefit only.

THE RECORDING SOLUTION

At this time Orfield Associates was designing and installing our Acoustical Simulation Room, and we began to talk with Wenger about an interesting option for their intended demonstration.

Under this alternative, Studio 1 in our lab would be treated to reduce reverberation time to simulate a moderately anechoic space. Both a band and a chorus would be brought into this space and recorded performing a number of pieces selected for clarity and articulation. Those recordings would then be played back into our Acoustical Simulation Room under a variety of conditions simulating band and chorus rooms with and without appropriate acoustical characteristics (See Figure 2.). A binaural DAT recording would be made of the results. This DAT recording would then be reproduced on records (inserted into their 1991 catalog) and on CD for a high quality demonstration disk to be sent to interested clients.

AN INSTRUMENTAL AND A VOCAL GROUP WERE HIGH IN QUALITY BUT NOT PROFESSIONAL.

Figure Two.
Typical Demonstration Tracks

- Excessive Reverberation
- Excessive Absorption
- Poor Room Isolation
- Improved Isolation
- Poor Ensemble
- Improved Ensemble

Since this was the first acoustical product demonstration via room simulation that we were aware of, it was an exciting process for both the consulting-recording team and for the client and the selected band and orchestra.

Wenger was interested in selecting an instrumental and a vocal group that were high in quality but not professional, and

Figure Three. Actual Recording Session. Chorus

they quickly arrived at the use of the band and chorus from Owatonna High School, both of whom had won a number of awards for their performances. The recording sessions were scheduled over a two day period, with more time available, if needed. Risers were set up in Studio 1 and recordings were made using two B&K 4133 microphones placed 10 feet in front of the band and chorus and seven feet up. (See Figure 3.)

Figure Four. Recording Engineering.

The result of the Orfield and Wenger collaboration.

Recording engineering was performed by Rick Pierson and Dave Berg of our staff, assisted by Pete Ostlund, the acoustical product manager at Wenger Corporation. During this recording session, video recordings were made of specific pieces of music for later use in a demonstration video tape format.

After these "semi-anechoic" recordings were completed, the band and the chorus were brought into the acoustical simulation room to listen to the "dry" recordings and to listen to their performance as it would be heard in a number of venues already programmed into the ASR Room. On the one hand, they could hear any errors in performance easily on the basic recording, but the perception of any errors

EVEN VIA THESE EFFORTS THEY COULD NOT BE CERTAIN THAT THE RESULTING RECORDINGS WERE COMPARISONS OF THEIR PRODUCT BENEFIT ONLY.

reduced dramatically under ASR Room processing. (The positive level of the response from these students suggests the long term potential for the use of simulation facilities in schools, at least using headphones, to provide student performers with a realistic sense of their actual performance sound.)

After these recordings were finished, the ASR Room was programmed to simulate the conditions described in Figure 2.

Next, the binaural torso (Bruel & Kjaer 5930) was installed in the ASR Room and tied back to Control Room 1 and the TEAC RD 101T, a high precision DAT recorder known mainly in the acoustical measurement field. (The use of this recorder assured very accurate channel-to-channel phase match.) Recordings were made under the various conditions and were previewed and edited with the participation of our staff, the Wenger staff and their advertising firm.

CONCLUSIONS

The recording insert has now been distributed, and the CDs are now under production, and the resulting client response has been strong. The local NBC affiliate, KARE 11, has just completed a TV news feature on the project and on Acoustic Simulation Room.

IT IS TOO EARLY TO PREDICT THE LEVEL OF RESPONSE OR BUSINESS INCREASE DUE TO THIS EFFORT.

While it is too early to predict the level of response or business increase due to this effort, the initial signs are very promising.

With regard to their long term response to this project effort, Wenger has now adopted the view that products with technical performance qualities are unnecessarily difficult for clients to understand. They have taken the opposite view from most acoustical product suppliers; instead of forcing the client to understand and communicate in the complex and specialized language of acoustics, they have begun to understand that the manufacturer must increasingly learn to deal in the client's language and experience, so that the complex decision to use acoustical products can be simplified from a mathematical problem to the more interesting problem of listening to the quality of the results (in this case, music) under varying circumstances. ■

The Wenger CD demonstration disk.

Chicago Installations

Allen & Heath in Chicago

The Avalon Nite Club, a 7,500 square-foot venue on the North Side of Chicago, recently had an Allen & Heath console installed in the existing five-year-old system. The rock club, which has a dance room and a cabaret lounge in addition to its main stage room, is in the process of updating its sound system. The console was the first step in this process. Roger Jansen, co-owner and director of public relations and entertainment for the club explained how he decided on the console; "For the money it was an excellent board....Lake County Music and Sound [of Chicago] plugged us on it. They were the ones to convince us to go Allen & Heath." The installation was completed by Joe Stopka of Stern Marketing with no down time because of the installation.

Revamped Sound System

The 4,000 seat Christ Universal Temple in Chicago features a stage area that holds a 100-piece choir, two organs, a piano, bass, guitar, drums and horn section, soloists and the pastor. Allen Keilman, chief engineer for the church has revamped the sound system to include the Ramsa WR-S852. The installation was completed by Scott Bailey of Bridgewater Custom Sound in Harvey, Illinois. Christ Universal Temple plans to expand its facilities with another building including a 2,000 seat auditorium.

Sound Systems for Pavarotti

Pro Media of El Sobrante, California has prepared for two complete sound systems to leap frog a four city tour through South America for Luciano Pavarotti. All of the venues are arenas or soccer stadiums. Air service for one of the systems is provided by Federal Express. Each system includes Meyer products. Alexander Yuill-Thornton II is the system designer and equalization operator. John Monitto, Larry Schneider and Henry Cohen of Pro Media are responsible for the system setup and operation. Joel Magarian of Stage Rigging, Inc. oversees the rigging. James Lock from Decca Records oversees the sound system balance.

Allen Keilman, chief engineer for Christ Universal Temple.

Klipsch in Showcase Venue

The Rheem Performing Arts Theater in northern California has taken delivery of an eight-box Klipsch KP-600 installed sound system. The converted movie theater seats 1,100, and offers showroom-style tiered table seating under main system coverage, and upper loge seating coverage by four time delayed Klipsch KP-301s. The system was designed and provided by Mark Haynes of Leo's Professional Audio Systems in Oakland, with installation handled by Linear Productions and Theatrical Rigging. Amplification was provided by Crown equipment, signal processing by Klark-Teknik, dbx, Audio Digital, and Yamaha. Audio consoles are by Soundcraft.

Rewritable Videodisc

Pioneer Communications of America, Inc. ha announced pricing and availability dates for its rewritable videodisc recorder, the VDR-V1000 LaserRecorder. Due to be commercially available in November, the product will sell for $39,950. The 12-inch disc used by the hardware, available from Pioneer, cost $1,295 each. Pioneer plans to introduce a compatible playback only unit in the spring of 1992. The company is targeting the unit toward broadcast/CATV applications, since it offers instant replay capabilities with an average non-linear access time of .3 seconds. The recorder erases and records simultaneously. Using analog component recording, the LaserRecorder stores 57,600 frames per side, or 32 minutes of full motion video per side. The magneto-optical media can be recorded up to 1 million times. It can record audio and video either simultaneously or separately, enabling editors to dub PCM audio onto video; its dual-head system allows non-linear playback. Conforming to RS422 interface practices recommended by SMPTE, the units RS-232 interface offers both plug and protocol access used in Pioneer's line of LaserDisc players.

Vega Venues

The Vega UHF wireless microphone system is "making an impact" according to the company. The system, which offers up to 1,500 feet of range and features Vega's Dynex III audio processing, has been used by Liza Minelli, Garth Brooks, and the Tony Awards. Dave Andrews, president of Andrews Audio, who provided the audio to the Tony awards show, said that the Vega systems performed flawlessly throughout the live broadcast. The UHF systems are also being used by on-air talent on the Home Shopping Network. And the Walt Disney World Theme Park in Orlando is using a total of 24 UHF systems in their productions. Gary Stanfill, president of Vega, said, "I think you'll see the trend toward UHF systems to continue increasing, especially for higher end systems."

JBL Installations

JBL Professional has noted several new installations of its equipment. Audio Innovators/Pro Com Systems of Pittsburgh installed an audio system for the Carnegie Science Center. The fully programmable communications environment, called "The Works," functions in modes such as: exhibit, demonstration, and mixed media production. JBL equipment used includes JBL/Urei ES600 amplifiers, an SR6630 power amplifier, 4612OK compact sound reinforcement systems, and Control 1 monitors. The design was created by White Oak Associates, Inc. of Marblehead, Massachusetts.

MTV at West L.A. Music

MTV at West L.A.

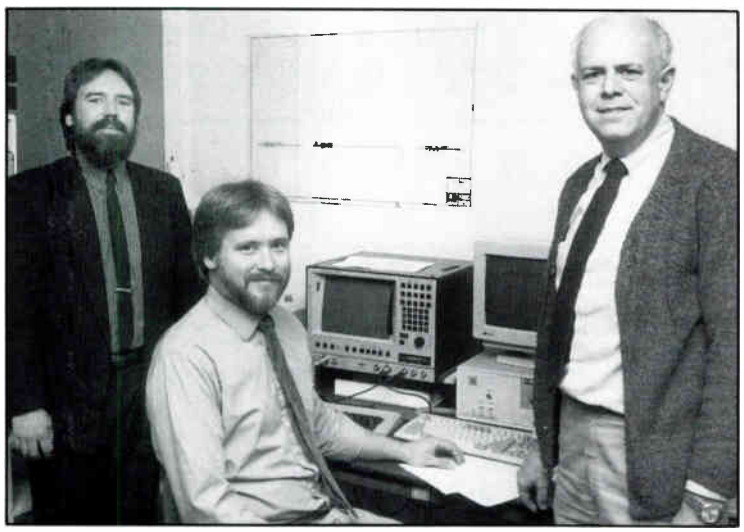
MTV News taped a segment for its show, "Day in Rock," at West L.A. Music's recent Keyboard Show & Music Expo. MTV interviewed celebrities at the event in addition to customers.

Joint Venture in Boardroom Electronics

In a joint venture, Weyel International and Verrex Corporation have teamed together to introduce and sell the Weyel Decision Center in the United States. The Weyel Decision Center is a combination of the integrated electronic boardroom using a Tele/Video Conferencing System. The patented "conferencing in the round" allows participants to face each other as they face the cameras. Included in the Decision Center are remote control, lighting, audio, split screen and document camera subsystems. The furniture, lighting and electronic configurations are flexible. Weyel has been a German manufacturer of visual communications products for over 80 years. Verrex, the contracting firm which has been in business for over 40 years, has built a complete operating Weyel Decision Center at their office in Mountainside, New Jersey.

Celebrity Amphitheater

Opryland USA has completed construction of the Chevrolet Geo Celebrity Amphitheater using 20.4 kilowatts of QSC supplied power to a Meyer Sound loudspeaker system. The park, which QSC says is almost all powered by QSC Series One and Series Three amplifiers, chose to use 32 of QSC's model 3500 amps to power a Meyer Sound speaker system consisting of MSL-3s, UM-1As, UPA-1As and 650- R2 subwoofers. Rick Shimer, technical operations manager for Opryland, said, "We chose Meyer Sound speakers for the house, both for their high fidelity and tight pattern control, as well as for Meyer's success and excellence in providing theatrical sound systems. We opted for QSC based on our past experience with their products, in terms of reliability and sonic quality. The amphitheater has two flown arrays, stage right and stage left, each with three Meyer MSL-3s for vocals and three MSL-3s for the band, plus three UM-1As for vocal underfill. Meyer 650-R2 subwoofers are used to supplement the low end of the system. Meyer CP-10 parametric equalizers were used, and the venue was acoustically measured and equalized with the Meyer Sound SIM system.



Left to right: Duff Kirklewski, Bruel & Kjaer; Michael Chamness, EAW; Kenton Forsythe, EAW.

EAW Gets Test Equipment

Eastern Acoustic Works has taken delivery of the new Type 2012 Audio Analyzer from Bruel & Kjaer Instruments. Kenton Forsythe, EAW director of engineering, said, "We will use the system on a variety of projects, including a comprehensive database on EAW products for use in computer modelling programs." The Type 2012 Audio Analyzer analyzes loudspeaker performance from perspectives including frequency response, distortion, directivity plots using ISO frequencies, time, phase, and group delay. The system incorporates Serial Excitation Parallel Analysis.

Circus Selects Sound System

The Big Apple Circus selected a PAS System-2 sound reinforcement system for its touring and resident Lincoln Center, New York season. The Big Apple Circus tent has a seating capacity of 1,900 on raised bleacher and box seating which is set around a single central performance ring. The specification developed by house engineer Rusty Richardson required a 320 degree horizontal coverage angle, solid low frequency response without the use of subwoofers, and intelligible output. The layout of the tent provided only four main masts to serve as hanging positions; and the speakers could not interfere with audience sightlines or aerial acrobatics. Richardson selected a PAS system with 16 of the RS-2 cabinets. The RS-2 features a PAS 400W 15-inch speaker, coaxially mounted with a two-inch JBL 2450 neodymium/titanium compression driver coupled to a PAS constant coverage 60x40 horn.

GSD Productions in Glen Head, New York provided the entire system to the Big Apple Circus which includes a 40 channel Soundcraft Venue console, BSS compressors, Tascam DAT players and Crest amplifiers in addition to the PAS system. Glen Davis, president of GSD Productions, worked with the Circus staff to design a complete touring package and flying system.

Korg USA Starts New Division

Korg USA has formed a Pro Audio division solely dedicated to servicing studios, production facilities and audio for video post houses. Mike Kovins, executive vice president of Korg, said, "We have decided to capitalize on our strengths in research and development as well as digital signal processing to expand our efforts in this area. Accordingly, we have called upon Rod Revilock to help us in this market." Also joining the Professional division is Dave Goldberg in New York and Mike Haprov at Korg West in California. The Professional Division's first product is a digital audio production system called SoundLink, which combines an eight track hard disk recorder/editor with an automated digital mixer with equalization and effects processing. The recorder provides 110 minutes of recording time at a 48 kHz sampling rate and is expandable to more than 11 hours.

Moscow Symphony Sound

According to JBL, the 1991 World Tour by E.L.O. and the 80 piece Moscow Symphony relied on JBL Control Series products to enable the Russian musicians to play in a rock and roll environment. The concert sound system supplied by Showco included a dozen Control 1 speakers and a Control SB-1 subwoofer for use in the symphony stage area. A monitor system was specified by sound designer/sound mixer David Scheirman for use by Konstantin Krimets, conductor for the Moscow Symphony. Scheirman's firm, Concert Sound Consultants, was sound consultant to the tour producers, Rockview Promotions. Scheirman said, "I specified the Control 1's with MS-1 mounts. They were set up in a four zone format for upstage and downstage left/right riser areas and used as needed for the various orchestral sections to receive subtle time and pitch information when they played with the rock group on the same stage.

"The conductor's platform was located on a scissors lift that took him eight feet up in the air. I needed to maintain a precise, consistent soundfield that did not change as the moveable stage set rose up for a special effect." A pair of Control 1's flanked the conductor at waist height, and the SB-1 subwoofer was hidden directly under the soles of his feet beneath an aluminum grid panel.

Soundcraft Sales

Soundcraft has announced several console sales. Yuma High School in Yuma, Arizona purchased a 32 channel Venue console from Consolidated Audio Visual in Tucson, to be used for sound reinforcement at the school. The Travel Channel in New York has purchased a 200B/VE console with VSA24 Serial Interface unit from A.F. Associates. The Salvation Army bought a 24 channel Spirit Studio console from Audio Images Corporation in San Francisco.

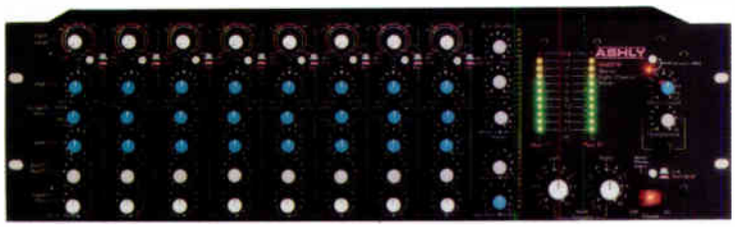
The Kitchen, the performance space in New York, has installed a sound system including a 32 channel Soundcraft Venue console, a 16 channel Soundcraft 200B console, JBL SR4732 12-inch three-way sound reinforcement systems, and G731 wedge monitors. The Kitchen's house audio technician, John Gernand, worked with Manny's Pro Audio manager Chris Tso and Tom Viola, JBL Pro representative from the John B. Anthony Company, to complete the system.

Lewis Sound in Milwaukee installed a new system at the Beaver Dam High School auditorium including 2386A Bi-Radial horns, 2380A Bi-Radial horns, 2445J compression drivers, 4648 low frequency systems, 4604B Cabaret Series wedge monitors and a Seck 1882 console. Lewis Sound has also installed a system at the First Assembly of God Church in Appleton, Wisconsin, using JBL equipment.

Sony Tape Changes Name

Sony Magnetic Products Group of America has changed its name to Sony Recording Media of America (SRMA). Shin Takagi, president and coo of SRMA, said, "Recent Sony advancements in high density storage technology, including a new generation of magnetic and optical media, have enabled us to diversify our product line-up to enhance our leadership position in the years to come."

Ashly and Furman Mixers



Rackmountable Mixer

The MM-508 from Ashly Audio is an eight-input stereo rackmountable mixer. Designed for use in applications such as churches, schools, meeting rooms and small clubs, the MM- 508 puts out 84 dB of gain for use with low-level or distant microphones.

The microphone preamp section claims better than –129 dBu Equivalent Input Noise (EIN). Low and High Shelving EQ is fixed at 70 Hz and 15 kHz, respectively. The Mid-band peaking EQ is sweepable between 140 Hz and 8 kHz. All equalization bands can be boosted or cut by 12 dB.

Circle 1 on Reader Response Card

DJ Production Mixer

The DJM-8 DJ production mixer, from Furman, has eight stereo inputs (two phono and six line) that may be routed to four input faders and then to a crossfader. The crossfader may be bypassed if desired.

Other features include a proprietary subharmonic processor called Punch for extra bass, and a "Beat Sync" LED at each end of the crossfader which facilitates transitions.

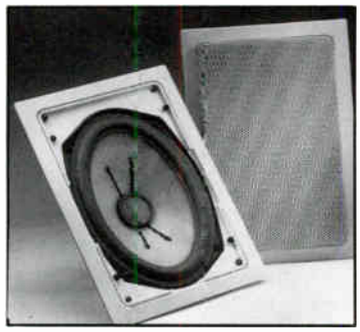
Circle 2 on Reader Response Card

Custom In-Walls

Two in-wall speaker systems have been introduced by Philips Consumer Electronics Company (PCEC). The model FB425 is a two-way speaker with a 6½-inch polycone woofer and one- inch soft dome tweeter. The frequency range is 40-20,000 Hz, the recommended amp power is 10-80 watts, sensitivity is 91 dB and the impedance rating is 8 Ohms.

The model SW420 is an in-wall stereo subwoofer system with a 6-inch × 9-inch dual voice coil polypropylene cone. It attains 12 dB/octave crossover on the subwoofer and 6 dB/octave crossover is provided for optional satellite speakers.

Circle 3 on Reader Response Card



The Philips FB425 in-wall speaker.

D/A Converter

Stewart Electronics has announced the ProDAC digital to analog converter. The ProDAC uses a hybrid D/A conversion system that incorporates aspects of traditional, oversampled "ladder DAC" technology and "one-bit" technology.

In this process, the original signal is converted to an 8X oversampled, 18-bit datastream. The data is split up and handled by two converters per channel. The upper 10 bits of data are converted to analog using the most linear portion of a 16-bit converter, while the lower eight bits are converted to analog via the one-bit process.

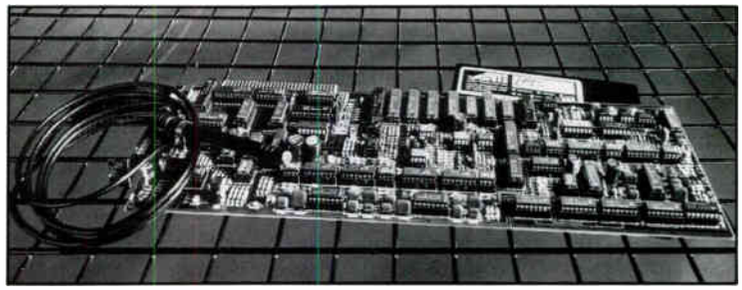
Circle 4 on Reader Response Card

Speaker Measurements

Audio Teknology Incorporated (ATI) has announced the LMS (Loudspeaker Measurement System); designed for those involved with loudspeakers and loudspeaker environments from designers to on-line production testers.

LMS is a PC-based gated swept sine wave test instrument for performing sound pressure measurement, impedance and distortion analysis on loudspeakers and other electrical systems. It consists of: a full length 8-bit slot compatible with PC286/386/486 computers; an 8 mm in diameter calibrated condenser microphone with built-in preamplifier; and a plug-in cable assembly with XLR-type connectors for oscillator output, line input and microphone input.

Circle 5 on Reader Response Card



Mounting Brackets

Peerless Industries, Inc. has introduced a line of TV and video monitor mounting brackets, called the Designer Series.

The Designer Series line includes: two ceiling mounts, one for 20-inch sets and one for 25- to 27-inch sets; three wall mounts for 13-inch, 20-inch and 25- to 27-inch sets; and an adjustable VCR mount that attaches to the ceiling or wall mounts.

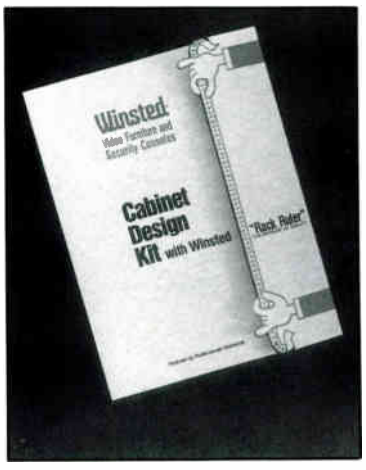
Circle 6 on Reader Response Card

Cabinet Design Kit

The Winsted Corporation has developed a free Cabinet Design Kit for customers planning and ordering cabinets for electronic equipment. The kit includes a "Rack Ruler" to measure electronics equipment for appropriate rack size.

The company will design rack cabinets to accommodate the customer's electronics equipment when all the pertinent information is sent.

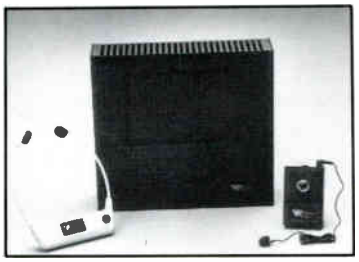
Circle 7 on Reader Response Card



Infrared Listening System

Williams Sound Corp. has added an infrared system to its line of hearing assistance systems. The TX1 master and TX2 slave transmitters are designed to cover areas up to 4000 square feet each. Multiple transmitters can be changed to cover larger areas. The RX1 is an under-the-chin style receiver and the RX3 is a lanyard style receiver.

Circle 8 on Reader Response Card



Program Selectors

The Quam-Nichols Company has announced ready-to-install program selectors designed primarily for satellite-fed, multiple-channel background music systems.

The model PS6H is a high-impedance six-position program selector with two outputs. The selector is mounted on a numbered, stainless steel plate. The model PS6L is a low-impedance six-position selector designed for distributed program material and balanced-line applications. The model PS6L/QC10 combines the low-impedance program selector with Quam's 10-watt attenuator for located, segmented attenuation.

Circle 9 on Reader Response Card

The Quam-Nichols PS6L/QC10.

Gem Sound's "Producer Series."

DJ Speakers

Gem Sound has added two speaker lines to its mix of DJ speaker products. The "Starter Series" is targeted to first-time buyers breaking into the DJ market. The high-end "Producer Series" features trapezoid cabinets and Electro-Voice low-frequency drivers, and is targeted to installers, touring acts and DJs.

Circle 10 on Reader Response Card

Touch Panel

Crestron has introduced its CTP-3000DST touch panel. The user control interface is designed for boardrooms, conference centers, training rooms, teleconferencing centers and so-called "smart homes." The unit features a high-intensity, high-resolution, black-on-paper white LCD display that's readable in bright light.

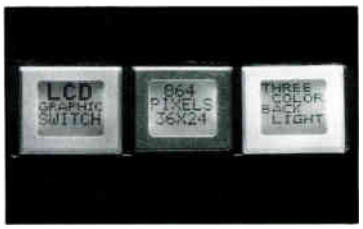
Posi-Touch software allows one and two axis joystick and slider-type controls. A graphics design package is included for creating user control screens.

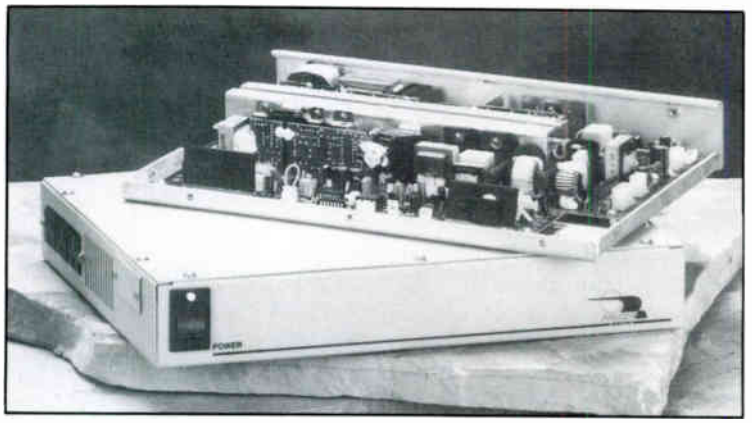
Circle 11 on Reader Response Card

Graphic LCD Switch Module

C. Itoh Technology Inc. Electronic Component Division has introduced the D880 Graphic Multifunction programmable LCD key switch. The key switch is designed as a man-machine interface that saves space and panel size. Operator instructions such as sequencing, timing system status and dynamic updating are made available on the keypad with changing color alerts, blinking or audio signals.

Circle 12 on Reader Response Card





"Uninterruptible" Voltage Source

Falcon Electric, Inc., a subsidiary of Nippon Steel Corp., has announced a series of on-line, uninterruptible voltage sources (UVS) for sound installations, sound reinforcement applications, broadcasting and recording.

The Falcon UVS Plus series units are regenerative power regulating modules that feature a programmable ride-through capability. It is designed to protect microprocessor and microcontroller-based equipment against power failures caused by brownouts, and voltage and frequency fluctuations.

Circle 13 on Reader Response Card

PCB Mounting Jack Sockets

Neutrik has introduced a line of PCB mounting 1/4-inch jack sockets, designated the NC3FDH6 series. The connectors are designed for direct mounting on printed circuit boards and are fully compatible with existing ¼-inch mono and stereo jack plugs.

The design features the complete separation of contacts and elements providing the plug retention force. Contact elements are gold plated. Connectors are available with or without a front thread and nut.

Circle 14 on Reader Response Card

A/V Security

Profile Consumer Electronics has introduced the V-600 hands-free audio video intercom system. The two-way audio, one-way video system is designed as a security system for doors and gates or as a monitor for infants and the elderly.

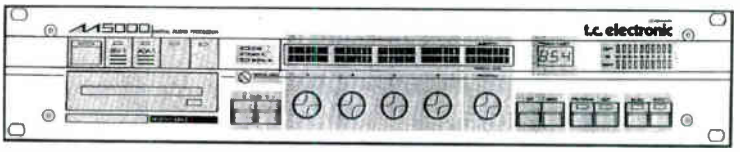
The video camera unit is equipped with a door bell button that when pressed rings a chime and presents the image of the visitor on the video monitor.

Circle 15 on Reader Response Card

Commercial Sound

Marsh Products, a division of Spectrum Companies has introduced the series 400 audio system. Each master is capable of up to 16 channels that can be used either as two-way or monitor speakers. When not used for intercoms the remote indoor/outdoor stations can be used for background music or paging.

Circle 16 on Reader Response Card



Digital Audio Processor

T.C. Electronic of Denmark has introduced the M5000 digital audio mainframe two-rack space stereo digital audio processor based on T.C.'s proprietary audio coprocessor technology. Programs include Reverb, Sampling, Pitch Shift, Chorus and Flanging. Interface ports include AES/EBU, SPDIF, Optical, MIDI, serial remote and SMPTE. Expansion slots allow for sound reinforcement configuration.

Circle 17 on Reader Response Card

Rack and Chassis Boxes

Sescom, Inc. has introduced a line of rack and chassis boxes. The units are shipped unassembled and can be drilled or punched with hand tools. They are then assembled into a corner extrusion with the use of a phillips screwdriver.

Circle 18 on Reader Response Card

Rack 'n Roll

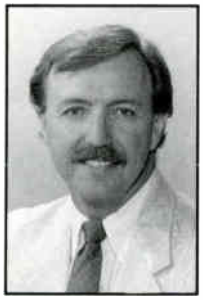
Sound Designers Studio has introduced its "Fox's Rack 'N Roll" racking system. Conceived by Bernard Fox of Fox and Perla Ltd., the system uses the building block structure approach. The "footprint" measures 20 inches x 20 inches. The basic eight-space unit is 14 inches high and units can be stacked.

Circle 19 on Reader Response Card

Aiphone Promotes Quanz: Sales at Rane

Aiphone Operations

Aiphone Corp. has promoted Harry Quanz to the newly created position of vice president of operations. Quanz is now responsible for customer service, warehousing, shipping and all of Aiphone's satellite offices. Quanz was previously vice president of marketing.



Quanz

Quanz has been with Aiphone since 1986, and has more than 25 years experience in sales, production, marketing and graphics.

Rane Appoints and Promotes

Ray Bloom has been promoted to the position of Director of Sales and Marketing for Rane Corporation. In this position, Bloom is responsible for managing the Rane sales staff. Bloom joined Rane in 1989 in the capacity of National Sales Manager.

Bloom

In addition, Rane has named Jeff Davies and Jon Ferren, Regional Sales Managers. Davies and Ferren are responsible for managing Rane sales representatives, maintaining existing accounts, developing new accounts and training sessions.

Davies and Ferren

Davies has spent the last few years in retail management while Ferren has also been involved in the retail audio business developing training and promotional programs. Both Davies and Ferren have territories on the east and west coasts and in between.

Ashly Promotes French

Robert C. French has been named Senior Executive Vice President and Chief Marketing Officer at Ashly Audio, Inc. French continues to oversee sales and marketing functions for the company, as well as adding additional duties.

French

French has held sales and marketing positions with Yamaha and Fender in their pro audio divisions before coming to Ashly Audio as Vice President of Sales and Marketing in 1985.

Moote at Leitch

Stan R. Moote has been promoted by Leitch Video International Inc. to President and Chief Executive Officer. Moote is responsible for overall operations at Leitch.

Moote

Previously, Moote had been Director and Chief Engineer of Digitel, Inc. and Executive Vice President of Leitch Video International.

Sharp Appointments

Sharp Electronics Corporation has made several appointments for the marketing and sales of its line of audio, video and video presentation products. Robert Soucy has been named national manager marketing and sales. His responsibilities include development, implementation and management of all aspects of marketing and sales strategies for the Professional Products Division.

Three regional sales managers have also been appointed. Gary Simon, Rick Goetz and Paul Leland assume the sales distribution for the eastern, central and western regions of the country for the line of professional products.

IED Adds Engineers

Innovative Electronic Designs Inc. has added three new employees to its engineering staff. Tom Hayes has joined IED as Software Engineer. He is developing custom software for use in the applications of IED's Computer-controlled sound systems. Previously, Hayes was Audio Director for the Krannert Center for Performing Arts at the University of Illinois, Urbana, and was most recently a Project Engineer with Ancha Electronics.

Hayes

Mark Young has been named Design Engineer. He is designing new product hardware and heading up the Engineering Documentation Department. In addition, Patrick Mullaney has been named Software Engineer. His responsibilities include designing software for in-house production testing and IED's model 596 Monitor/Test System, as well as testing software for UDAPS components.

Stentofon Regional Manager

Stentofon Communications, Inc. has appointed Edward J. Vignone Regional Manager for the Western Region. Vignone is located in southern California and is responsible for market development and territory management of manufacturer's reps, dealers and major projects in the Western Region. Vignone has prior sales management experience with ESM Technology.

Sanyo Promotions

Sanyo has promoted three staff members at the company's Industrial Video Division. Wayne Kennedy, former National Sales Manager, has been promoted to General Manager.

Kennedy

Thomas Thompson, former Western Regional Manager, is now the National Sales Manager and former Eastern Regional Manager, Tom Cunningham, has been promoted to National Accounts Manager.

Thompson

AudioEase Customer Service

Char Mikush has been appointed Customer Service Manager for AudioEase, Inc.'s computerized control system for custom A/V installations. Mikush is responsible for customer contact, coordination of ordering systems, as well as system layout and design.

Mikush

Previously, Mikush was a buyer and account manager for Lyric Hi Fi, Inc. in New York City.

A/V Buying Guide; Fiber History

Audio-Visual Guide

National Audio-Visual Supply has introduced its 156-page National Audio-Visual Buying Guide. The guide contains over 4,900 Audio-Visual/Video products and supplies in stock, with 450 products added this year. The guide is aimed at those who use Audio-Visual or Video equipment, accessories and supplies for school systems, libraries, training, sales meetings and other applications.

Circle 20 on Reader Response Card

Wire and Cable Handbook

Anixter Bros., Inc. has published the second edition of its Wire & Cable Technical Information handbook. The revision contains engineering and technical information on electrical and optical wire products for those who design, specify or troubleshoot wire and cable systems.

Circle 21 on Reader Response Card

Test Accessories

Pomona Electronics has introduced its 140-page 1992 Catalog of Electronics Test Accessories. New products include two lines of test probes and clips for miniature and heavy-duty applications, and an expanded line of oscilloscope probe kits. The catalog also features IC clip kits, coax/BNC universal adapter kits, digital multimeter test lead kits, cable and patch accessories and jumper kits.

Circle 22 on Reader Response Card

Everything You Always Wanted to Know About Fiber...

Fiber Options, Inc. has released an 11-page booklet, All About Fiber. The booklet includes information on the origin, uses and advantages of transmitting information over optical fibers. Examples of systems applications are also included in addition to information on installation.

Circle 23 on Reader Response Card

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FREE INFORMATION

Use the Reader Service Card opposite page 26. Just circle the RS# of products that interest you. Detach, and Mail!

HELP WANTED

MARKETPLACE

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Circle 226 on Reader Response Card

Circle 227 on Reader Response Card

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PRODUCT CHECK: BACKGROUND MUSIC SYSTEMS FOR OFFICES

Products used most frequently in office installations . . .

. . . NOW IN PROGRESS

PRODUCTS	FIRST PLACE	SECOND PLACE	THIRD PLACE
Tape Player/Changer	TECHNICS	TEAC	PASO
CD Player/Changer	SONY	TECHNICS	PANASONIC
Music Services	EMS	3M	AEI
Music Libraries	EMS	3M	MUZAK
● Ceiling Speakers	● ATLAS/SOUNDOLIER	● JBL/DUKANE*	● BOSE
In-Wall Speakers	JBL	DUKANE	ATLAS/SOUNDOLIER
Surface Mount Speakers	DUKANE	OWI	JBL
Amps/Preamps	PEAVEY	DUKANE/TOA*	UNIVERSITY
Zoning Controls	ATLAS/SOUNDOLIER	UNIVERSITY	OXMOOR

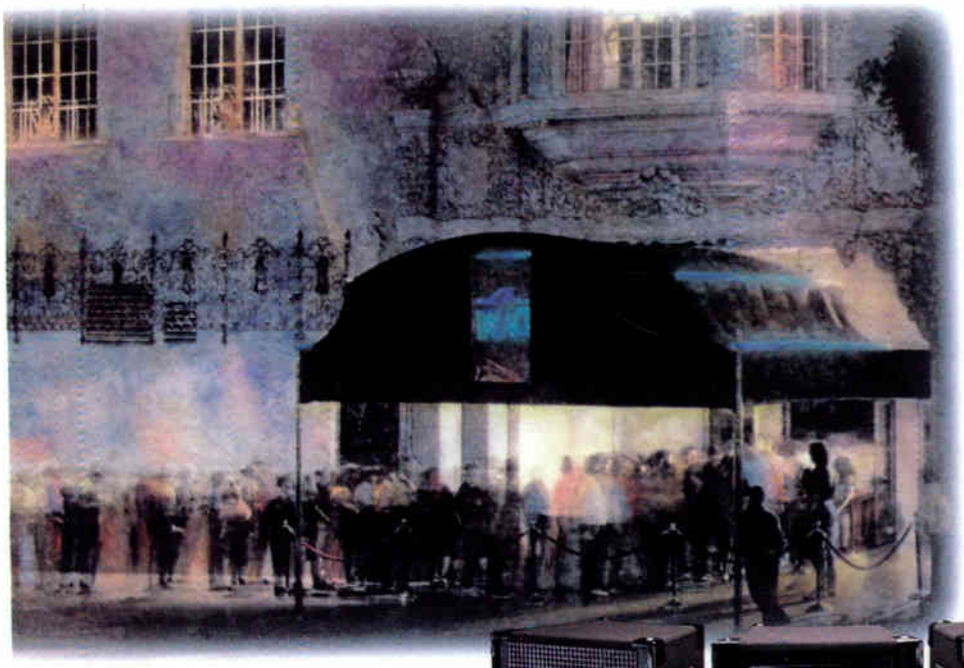
* indicates tie

. . . IN LAST SIX MONTHS

PRODUCTS	FIRST PLACE	SECOND PLACE	THIRD PLACE
Tape Player/Changer	TEAC	TECHNICS	3M
CD Player/Changer	SONY	TECHNICS	PANASONIC
Music Services	EMS	3M	AEI
Music Libraries	EMS	3M	MUZAK
● Ceiling Speakers	● ATLAS/SOUNDOLIER	● JBL	● DUKANE
In-Wall Speakers	JBL	DUKANE	ATLAS/SOUNDOLIER
Surface Mount Speakers	ATLAS/SOUNDOLIER	OWI	DUKANE/JBL*
Amps/Preamps	TOA	PEAVEY	BOGEN/DUKANE*
Zoning Controls	ATLAS/SOUNDOLIER	UNIVERSITY	OXMOOR

SURVEY METHODOLOGY

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



Even Our Smaller Systems Can Fill A Big Hall.

SR4700 Series

You've seen and heard our big systems, installed in major venues around the world and on tour with some of the biggest names in the music business. The SR4700 Series Loudspeaker Systems are equally at home on the road or in the hall.

Their legacy comes from Cabaret® Series, a prime player in small to medium club sound reinforcement since the seventies. Their influence is Concert Series,™ the new standard in packaged JBL systems. With Cabaret as the starting point and Concert Series as our current direction, we listened to your comments and suggestions, turning them into the sound system of the nineties and beyond.

The SR4700 Series is pure pro audio. Pure JBL components, the same caliber as those in our larger systems, including the Vented Gap Cooling™ low frequency drivers and the 2445J compression driver. Pure JBL enclosures, five times stronger than traditional designs, and protected by plastic-coated steel grills and super-durable fabric-laminated plywood cabinets. Pure JBL sensibility, interlocking enclosures with heavy-duty steel handles and recessed input connectors, so they travel tighter, set-up easier and last longer.

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