

The Palace Theater Installs New Sound System

SOUND & COMMUNICATIONS

FOR CONTRACTORS, SYSTEM MANAGERS AND SPECIFIERS

July 1988

Automated Control Systems for Boardrooms

Binaural Monitoring

**State of the Market
in Voice-Only Intercoms**

**NSCA Contractor's
Expo '88 in Review**

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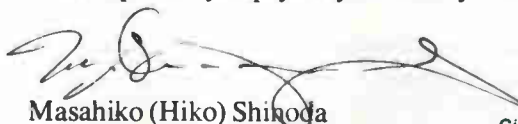
From the very beginning, we knew that intercoms were not meant to be the almighty communications instrument. They were designed to supplement major equipment like telephones and computers. There are numerous applications here that must be met.

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Masahiko (Hiko) Shihoda
President

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Photo courtesy of Industrial Communication Company.

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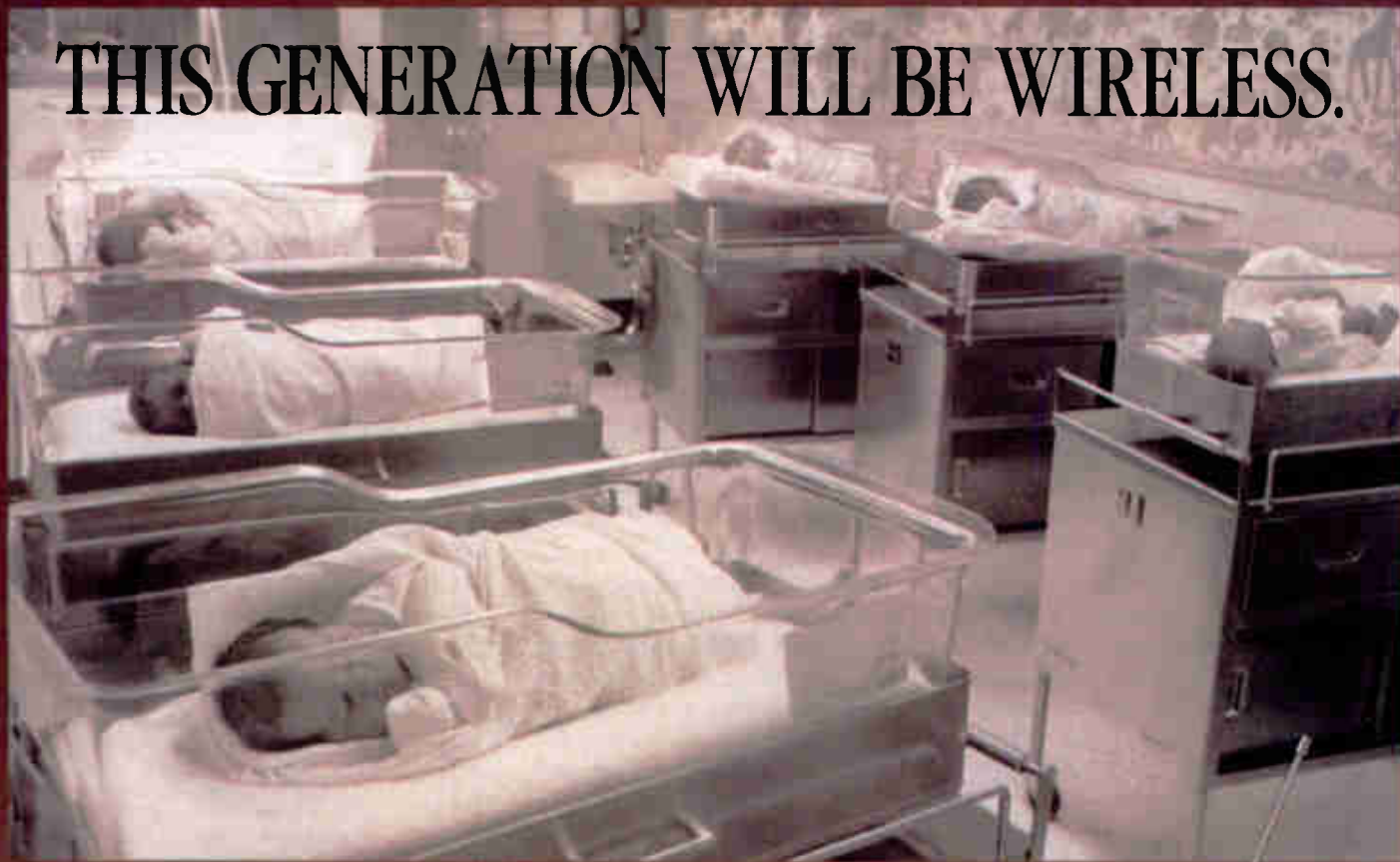
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Taking Care Of Business

The message is coming through loud and clear—the NSCA Expo is the number one show serving the sound and communications market. Exhibitors and attendees alike have praised its low-key format and lack of distracting display pyrotechnics. And the amount of business written demonstrates how highly qualified the attendees are—no tire-kickers at this show. Record turn-outs year after year demonstrate your support of the NSCA Expo's professionalism and maturity.

Sound & Communications magazine has been serving this industry with the same professionalism and maturity for over 30 years. In that time, *Sound & Communications* has grown as this industry has grown. And we are poised for growth once again. This September, we'll be introducing a newly designed *Sound & Communications*, one that will be more responsive to your changing needs. We are not changing our focus: we will continue to cover the well-defined and carefully chosen group of markets within the sound and communications industry that we've been covering for better than three decades. We are sharpening that focus: we will bring you in-depth coverage of the technological and economical developments that most concern you, that affect the way you do business now, and the way you will do business in the future.

The September issue—look into it! New departments, new features, a new look—and the same dedication to serving this industry's needs that has made *Sound & Communications* the respected magazine it is today.

Of course, August is *Blue Book* month. The 28th edition of the *Sound & Communications Blue Book Directory* will also have a new design. Throughout its 28-year history, the *Blue Book* has been the reference guide serving the sound contracting market, and it's only after careful deliberation that we would consider any changes to this successful format. We feel that the new design will make this indispensable directory even more effective in helping you stay on top of this market.

Finally, I just wanted to say what a pleasure it was meeting many of you at the show in Reno. I hope to get to know many more of you in the coming months. It's an exciting time to be a part of this industry, and to be a part of the magazine that best serves this industry. *Sound & Communications*—we're taking care of the business of helping you take care of business.

Bill Intemann

William C. Intemann
Managing Editor

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lowers the music level for announcements and paging. So the hostess can finally seat the starving party of four.

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THE HEAVYWEIGHT LIGHTWEIGHT.

The **AKG Q 15** is the perfect headset for monitor work, cue pick-ups, and two-way intercom communications. Feather-light and adjustable, comfortable enough to wear all day but snug enough not to slip, you'll hardly know it's there — and yet it's so rugged you can tie it in a knot and it snaps right back.

More important, the **Q 15** doesn't buy comfort at the cost of quality. Its pre-polarized condenser mic offers full-frequency response and its monaural earpiece — the one that rests gently on the ear instead of clamping down on it — is distortion free. There are even models designed to meet specialized needs, with additions like carbon equivalent pre-amps and squelch controls.

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HALF-RACK STANDARD PROPOSED AT NSCA

A group of manufacturers met at the NSCA Expo held recently in Reno, NV to begin the process of developing a mechanical and electrical standard for the increasingly popular half-rack format for pro audio equipment. The standard has been given the working name "HR" (for Half-Rack).

Like the universally accepted EIA 19-inch rack standard that preceded it, the goal of the HR standard is to assure compatibility in mounting half-rack products made by different manufacturers. A secondary goal is to provide a universal low-voltage powering method using identical supply voltages and connectors.

At this writing, the following companies are participating in the HR Standard Committee: Applied Research and Technology (ART), Ashly Audio, Furman Sound, Rane Corporation, and Symetrix. Companies wishing to be included on the HR Standard mailing list may contact Jim Furman at Furman Sound, 30 Rich Street, Greenbrae, CA 94904.

TEKCOM ANNOUNCES TRUMP PLAZA INSTALLATION

The TekCom Corporation recently supplied a major audio and video tie-line system, along with new sound reinforcement equipment, to the main showroom at the Trump Plaza, Atlantic City, NJ. TekCom coordinated with Trump Lead Technician Jay Paul, Eastern Acoustic Works, and Crown International. The system includes 10 EAW KF850 full range loudspeaker cabinets and 12 Crown amplifiers.

PEAVEY UNVEILS NEW DIVISION

Peavey Electronics, known worldwide as one of the leading manufacturers of music and sound amplification products, announced its entrance into the "installed" and "engineered" sound marketplace with the creation of its new Architectural Acoustics Division.

The announcement was made at the recent NSCA Expo held in Reno, NV as reported by this magazine's NSCA-TV news. "Our initial offerings will be a concise package of power amps, utility power amps, and mixer combinations," said Jack Wilson of Peavey. Wilson, who will head up the new division, went on to say that Peavey will offer the sound contracting market the same value and cost-effectiveness that they've been offering the music industry for over 20 years.

GENERAL INSTRUMENT POSTS FIRST QUARTER RESULTS

General Instrument Corporation announced last month that revenue for the first fiscal quarter, which ended on May 29, 1988, has increased to \$312.9 million as compared to \$280.1 million of the prior fiscal year.

According to Frank G. Hickey, Chairman and Chief Executive Officer of General Instrument, the latest results reflect increased margins from cost reduction programs and continued strength in markets for VideoCipher equipment, power semiconductors and military electronics.

COASTCOM PROMISES DELIVERY WITHIN 35 DAYS

Coastcom is implementing a new program that guarantees product shipment within 35 working days after receipt of order. Called "35 or 5," the program promises its customers a five percent rebate on purchase price if delivery is late. To qualify for the program, orders placed must be taken between May 17 and December 31, and equipment must be deliverable no later than March 31, 1989.

XEROX ANNOUNCES VOICE-MESSAGING SERVICE NEWS

Xerox Corporation has introduced a nationwide service-bureau network that allows users to rent voice mailboxes on the systems closest to their branches. Voice messaging allows users to send, receive, reply to and redirect individual or group messages from any tone-signaling telephone anywhere in the world. Rental prices begin at \$15 per mailbox per month. Training, documentation and support is available upon rental.

INTECOM SIGNS MULTI-MILLION DOLLAR AGREEMENTS

InteCom, Inc., a subsidiary of Wang Laboratories, Inc., has recently signed manufacturing and distribution agreements with BellSouth and NYNEX to purchase and market InteCom's Integrated Business Exchange Family of switching systems (IBX). These agreements include technical training, software support, support credit for joint advertising, enhanced software, software warranties and an enhanced software support policy for two software release levels.

GUARANTEE ELECTRICAL COMPANY FORMS SONACOM

Guarantee Electrical Company has acquired the professional sound division of Wired Music, Inc., and merged it with its own Hi-Tech Communications division to form Sonacom, Inc. Sonacom will provide installation services for paging, intercom, microwave, fiber optics, security systems and other local area networks.

The new company has exclusive rights in the St. Louis market for Rauland-Borg sound and communication systems, and will also handle other equipment lines such as JBL speakers, Bose sound products, Telex wireless microphones and Soundolier sound accessories.

MAXCOM ESTABLISHES OPERATIONS IN THE U.K.

MaxCom USA, Inc. has established a wholly-owned subsidiary, Maximum Access and Communications (MaxCom, Ltd.) in London, England. MaxCom, Ltd. will market in the U.K. the same communications services and products offered by MaxCom USA. The new subsidiary will also operate the telecommunications equipment based in the United Kingdom for MaxCom's expanding international data network, MaxNet.

85th AES CONVENTION PLANS ANNOUNCED

The Audio Engineering Society has announced that the 85th AES Convention will be held in Los Angeles, CA, from November 3 to 6, 1988. Exhibits will be at the Los Angeles Convention Center, with live sound demonstration rooms and an extensive educational program of workshops and technical sessions centered at the Los Angeles Hilton Hotel. The Hilton is just 4 blocks away from the Convention Center, and serves as host hotel for the convention. An expanded shuttle bus service will connect both locations.

"A Century Of Technology In The Service Of Artistry" is this year's convention theme. Convention Chairman Marshall Buck chose this theme to reinforce the interdependency of the creative and technological sides of the audio industry, and to celebrate the 100th anniversary of recorded sound.

PANASONIC ANNOUNCES \$5 MILLION SALE FOR ARCO ARENA

The Panasonic Industrial Company (PIC), a division of Matsushita Electric Corporation of America, has announced a five million dollar sale of electronic equipment to the Sacramento Sports Association for installation in the new ARCO arena, currently under construction in the ARCO Sports Complex in California.

THE SINGLE BOX SOLUTION:

BGW SPA-3 Signal Processing Amplifier

About two years ago, BGW decided to take a long look at the then-current state of the art in amplifying systems. And when we did, we saw room for improvement. The typical installation included several channels of amplification, of course, along with quite an accumulation of add-in and add-on boxes: An electronic crossover or two, a couple of time alignment delays, plus assorted EQ's, filters and more.

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That's why we created

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At the heart of the SPA-3 are not-two-but three 200 Watt (@ 8 ohms) channels of BGW-quality power amplification. Among the signal processing elements included are Low Frequency Parametric EQ and a High Frequency Contour Filter, a Switch-set™ High Pass Filter, a 3-way Electronic Crossover Network, two adjustable high-quality Delays for time alignment, even a full complement of Buffer Amps and Digitized Level Attenuators.

In minutes, the SPA-3's multi-pin "jumper header" plugs-in to let you set up the unit for dozens of different

wouldn't build it any other way!

The superior design, reliability and performance of the BGW SPA-3 has already proven itself in major installations from the Orange County (CA) Performing Arts Center to the OMNIMAX theatre in Australia. By the way, there's also a two channel Model SPA-1 with signal processing capabilities tailored to make it an ideal subwoofer amplifier. It's a time, space, aggravation and money saver too.

The logic of the SPA approach speaks for itself. But there's lots more to know about all the incredible capabilities of the BGW Signal Processing Amplifiers. For a full info pack, call us Toll-Free at 1-800-252-4800 (in CA 213-973-8090), or see your BGW dealer.



the BGW SPA-3 Signal Processing Amplifier—the single box solution that restates the state of the art. It's much more than just an amplifier, because the SPA-3 includes all the signal processing elements you'll

configurations, in the shop or in the field. The design is so flexible, you can even change the location of the attenuators, delays, etc. within the signal flow. And every processing function offers superb quality. BGW



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Large Room Sound System Design

While those of us who are directly involved in the practice of acoustics are particularly enthusiastic about the purchase and use of sophisticated and expensive test equipment, such as real time analyzers, TEF's, RASTI's, precision sound level meters, etc., the specific application of this equipment is certainly not essential to many audio projects. Competent systems can be designed and installed in "non-difficult" spaces using very little test process. As the veteran audio practitioner knows, experience is far more valuable in many cases than is the best of test equipment.

The problem of designing and installing audio systems in large rooms is in part the problem of knowing when a room falls into the "difficult" category, requiring a special look from an experienced sound system designer. The issues surrounding the "problem room" are as old as architectural acoustics, and there are many simple and many complex parameters that can be considered. This is a review of some methods that can be used by the non-test equipped audio dealer to define the problem room.

Reverberation

Reverberation refers to the "liveness" of a room, or more specifically to the period of sound decay within the room. Technically, reverberation is the time in seconds that it takes the sound field in a room to drop by 60 decibels (RT/60) once excited by sound. This excitation can take the form of steady pink (flat spectrum) noise; it can be in the form of an impulsive signal, such as a gunshot or balloon burst; or it can be a frequency sweep impulse, such as a TEF "chirp". Once the room is excited, the period of sound reduction can be heard and easily measured, and the reverberation time can be determined aurally or by measurement. Since listening for reverberation can be difficult, it is useful to have an alternative method of determining reverberation time, and a very simple formula, the "Sabine Equation", provides a good guideline in many cases (See Figure 1).

$$RT/60 = \frac{.049 \times \text{Room Volume}}{\text{Room Absorption}}$$

Figure 1

This formula is reasonably accurate in rooms where the absorption of materials is uniformly distributed (not limited to one wall or one part of a room). In order to determine the probable reverberation time of a room, the example below may prove useful (See Figure 2).

Since the calculation looks at the proportion of absorption in a room,

of over 1.5 seconds. This is commonly considered the borderline between difficult and non-difficult spaces. This simple calculation usually is referenced to reverberation time and surface absorption at 500 or 1000 Hz.

As reverberation generally decreases from the lower to the higher frequencies, the typical room reverberation curve (as in the case above) may look like this at various frequencies (See Figure 3).

In order to use this simple calculation, it is necessary to have a table of

CHURCH SANCTUARY	
Volume:	
100 (L) x 50 (W) x 30 (H)	= 150,000 Cubic Feet
Surface Areas:	
Long Walls (2)	— 3,000 Square Feet
End Walls (2)	— 1,500 Square Feet
Ceiling/Floor (2)	— 5,000 Square Feet
Total Surface Area (2)	— 19,000 Square Feet
Average Absorption — .20	(ex. wood)
RT/60 =	$\frac{.049 \times \text{Room Volume (150,000)}}{\text{Room Absorption (.2 \times 19,000)}} = \frac{7350}{3800} = 1.93 \text{ Sec.}$

Figure 2

one can conclude that rooms with average absorption levels (the average of walls, ceiling, and floor) of less than about .25 will have reverberation times

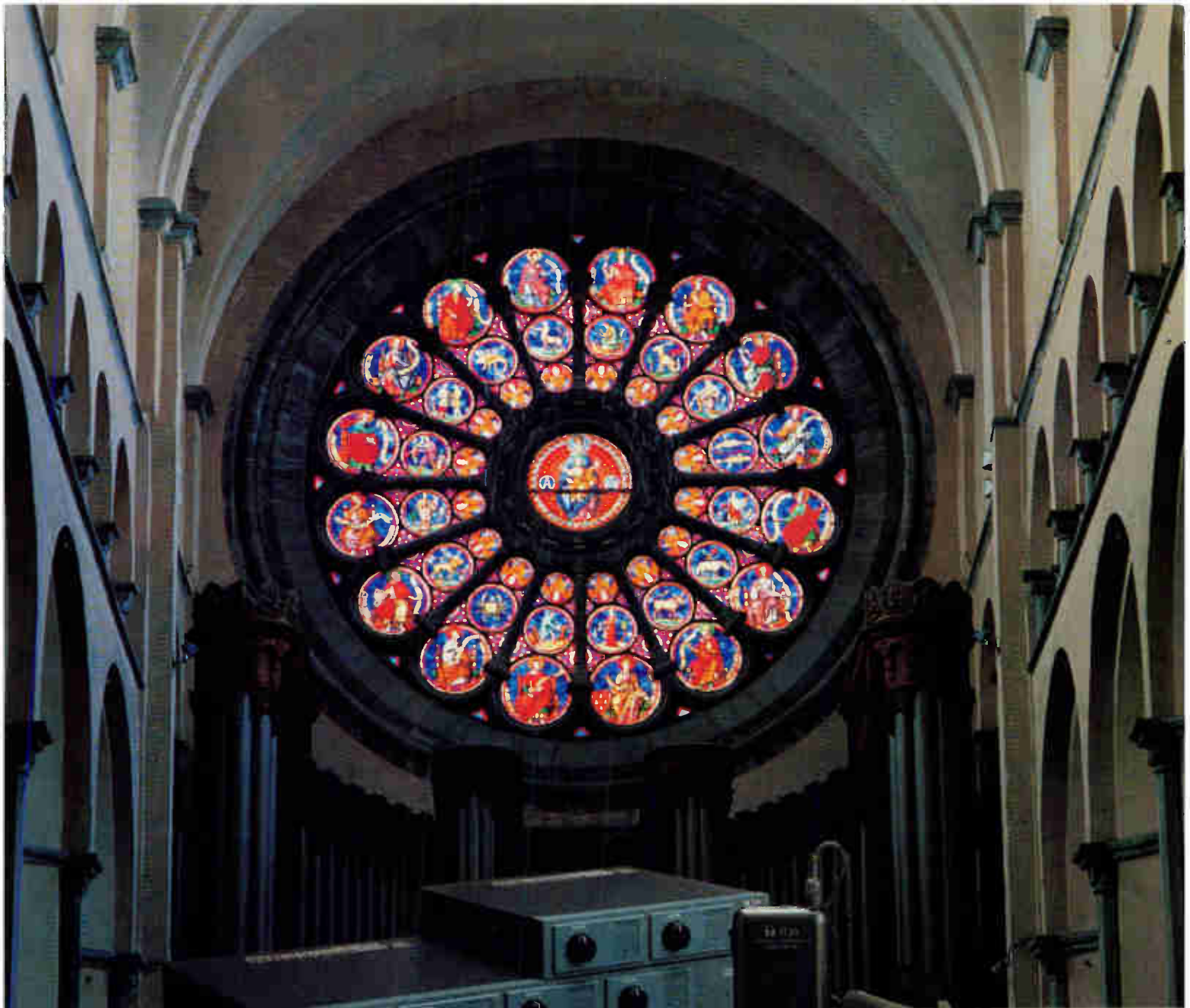
reverberation times of common large room materials. The table below is from *Concepts In Architectural Acoustics* by M. David Egan (See Figure 4).

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Reverberation	2.6	2.4	2.2	2.0	1.8	1.6	1.4	1.2

Figure 3

MATERIAL	SOUND ABSORPTION COEFFICIENT						NRC
	125 Hz	250 Hz	500 Hz	1K Hz	2K Hz	4K Hz	
Brick (unglazed)	0.03	0.03	0.03	0.04	0.05	0.07	0.05
Medium-weight Drapery (14 oz/sq. yd. draped to 1/2 area)	0.07	0.31	0.49	0.75	0.70	0.60	0.55
Heavy carpet	0.08	0.24	0.57	0.69	0.71	0.73	0.55
Gypsum board (1/2" thick)	0.29	0.10	0.05	0.04	0.07	0.09	0.05
Suspended acoustical tile (3/4" thick)	0.76	0.93	0.83	0.99	0.99	0.94	0.95

Figure 4



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How an Aiphone made this little girl



intercom system feel more at home.

Meet Rebecca, one of the most doted upon girls in her class.

Like many families both of Rebecca's parents work. Which means, on a rare occasion, she's left in charge of the household.

As you can guess, this dilemma didn't sit too well with Rebecca's parents. So, to combat both fear and guilt, they bought an Aiphone intercom system.

With an audio/video system installed inside and out, she can safely regulate who comes and goes.

If an Aiphone intercom system can make a difference in Rebecca's home life, just imagine what it could do for your home or business.

For a free brochure or the name of your nearest Aiphone representative, call (206) 455-0510.

And tell 'em Rebecca sent you.

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Background Noise Level

The sound pressure level required of a sound system is generally dependent upon background noise levels, from the heating and cooling system (HVAC) and from the environment (traffic, aircraft, etc.). One guideline suggests that the system should provide 25 decibels of excess level above the background. Depending on the background level, this could be a very high sound level. As the level becomes higher it tends to excite the room to a greater degree, also causing increas-

Distance between talker/listener (until speech cannot be heard clearly)	dBA	NC
12 feet	50	40
18 feet	48	37
24 feet	45	35
30 feet	44	34
36 feet	43	33
42 feet	40	31
48 feet	39	30

Figure 5

ing levels of interference with clarity and intelligibility. Technically, the constant background level in a space is referred to as the NC (Noise Criteria) of that space. In larger spaces, problems occur as the NC values in-

HIGH-CEILING ROOM	
Height of ceiling	40 feet
Width of room	80 feet
Speaker height	35 feet
Direct talker/close listener distance	15 feet

Figure 6

crease, and a typical NC value in a well-controlled large room (500 occupants) may fall into the range of NC-25 to NC-30 (35 to 40 dBA).

While it is not difficult to measure NC values, they can also be determined (with less accuracy) by subjective listening tests of voice or tape recorder level. Since the average person speaks at about 63 decibels (normal voice measured at 3 feet), and since direct sound reduces by 6 decibels for every doubling of distance between the source and the listener, the following maximum hearing distances in a large room suggest the dBA and NC values shown (See Figure 5).

With a little practice, it is possible to determine the NC and dBA range of a room without test equipment (values above NC-30 suggest a more difficult space).

Room Shape

One of the most difficult room characteristics to assess quickly is the

Close listener versus wall reflection	65 feet difference
Close listener versus ceiling reflection	65 feet difference

Figure 7

shape of the room itself. This can be one of the most problematic features of a room, as it tends to be the basis for determining whether a room contains echoes. Echoes are normally caused by "multiple path interference": the listener is hearing the same sound arriving both directly and at various time delayed intervals. Normally, it is assumed that if sound between two paths arrives with more than a 50-millisecond difference (nominally 50 feet), it will be perceived as an echo.

One example of this phenomenon is the high-ceilinged room with the following proportions (See Figure 6).

While sound travels only 15 feet from the talker to the closest listener, it travels 80 feet from the front center of the room to the side wall and back. The direct, unamplified voice also travels about 80 feet to the ceiling and back to the listener. The path lengths for these two multiple path comparisons is as follows (See Figure 7).

Whether the listener perceives an echo or not depends on the level of the sound and the level of the reflection. An echo may not be perceived if it is below the background level of the NC curve or below the level of the reverb-

erent energy from the space.

The presence of a focusing shaped room plane, such as a dome or a barrel vault, increases the severity of the echo as far more energy arrives at the focus. Normally, ceiling focusing elements are most serious when the center of the focus is at or below listener height. Rooms with focus in plan (i.e., circular or polygon) tend to be problematic as well.

Determining Room Difficulty

It is the design intent of acousticians to resolve the average room well enough so that the sound system adds increased benefit but is not entirely necessary for speech intelligibility. The testing of room intelligibility in many churches quickly confirms this view: many of these spaces are as intelligible (or more intelligible) with the sound systems turned off. Some of this can be attributed to poor system design, but much of it is due to good basic room acoustics. (It used to be that the first consideration in the design process was whether a sound system was needed at all; now this need is often assumed.)

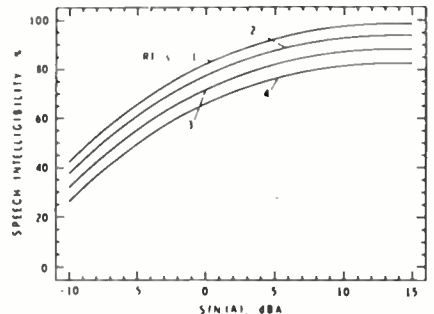


Figure 8

One method of determining room difficulty is by listening to speech tapes played at normal voice levels, on- and off-system, from the talker's normal position at the microphone. This
(continued on page 56)

TEST ITEM	FAIR	GOOD
1. Sound level meter (inexpensive)	\$250.00	\$1,000.00
2. Calibrator	250.00	500.00
3. Blank pistol	25.00	25.00
4. Balloons (alternate source)	—	—
5. Speech Tapes	100.00	100.00
6. Cassette Recorder/Powered Speaker	100.00	100.00
7. Measuring Tape (100 foot)	25.00	25.00
8. Procedures file	—	—
Total	750.00	2,050.00

Figure 9

"Hands-free" continuous wireless communications



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The master station operates on 115/230 Vac, 50-60 Hz, or + 11.5 to + 24 Vdc.

For more information, contact your nearest Cetec Vega dealer or sales representative, or call 1-800-877-1771*



QTR-1 Portable (top view)

Cetec Vega

Division of Cetec Corporation
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El Monte, California 91731-2204
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(818) 442-0782

Telex II: 910-587-3539
FAX: (818) 444-1342

*Toll-free number effective February 15, 1988.

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World Radio History

by Marc L. Benington
Jaffe Acoustics, Inc.

The Project Manager

After the bid is won, or the sale is made, there is always another project, not to mention regular business functions. Project management is the art of juggling all these things along with the problems of day-to-day life, and outwitting old Murphy and his law in an attempt to make a profit.

"Management" is a wonderful, modern buzzword. Unfortunately, nonsensical decisions and purchases are often made in the name of better management. Calendars, magnet boards, computer programs, and critical path charts are all management tools, but owning them or even using them does not, in itself, constitute project management.

At NSCA, *Sound and Communications* sponsored a well attended panel

discussion, which I chaired, on the topic of Project Management Organization. The transcript of this discussion will appear as a feature article in this magazine in a few months, but the topic is important enough to deserve some more discussion here.

The role of a project manager is reasonably clear — he is responsible for managing the project. But in doing so, he plays many roles and wears many hats. For better or worse, in a small company, the project manager may, in effect, be delegating work only to himself. He may be responsible for actually ordering the equipment, making the drawings, preparing the submittals, attending the project meetings at the site, calling the consultant, and perhaps even pulling the wire, assembling the rack, and installing the

equipment (although not necessarily in that order). In a larger company, the project manager may assign each of these tasks to an individual, or coordinate the work of several people, such as a site foreman or purchasing agent. Of course, the size of the project will also determine the number of people that can be efficiently involved.

In any case, the fact remains that *one person*, not a committee, should retain control of the project from the signing of the contract through completion. Unless illness or loss of an employee prevents this, responsibility for the completion of a project should not be "handed down" from one manager to another to meet short term needs. Continuity is lost, work is repeated and clients, consultants, owners, and others must establish new working arrangements. It rarely succeeds.

The project manager must know the status of the installation at all times and be constantly aware of the work schedule and which tools, equipment, people, and knowledge are required over the next week. He should also keep in mind how the work of other trades must be dovetailed into the sound contractor's work. He should prepare for conduit installation, wire pulling, AC power installation, partition and tile ceiling installation, furniture delivery, and final cleanup.

Does this sound too easy? Am I overstating the obvious? Then I ask you, why do problems relating to *not* understanding the requirements of the installation occur in so many instances? We all know that the sound contract is very frequently the last contract let, and this is the cause of many problems. But, it seems that these basic tenets of management are frequently ignored.

Technicians should have direct access to the project manager for procedural questions. Technical questions should be directed to the project engineer. If quick and effective answers are not forthcoming, work will not get done, or will get done the wrong way.

(continued on page 56)

The remarkable new 4650



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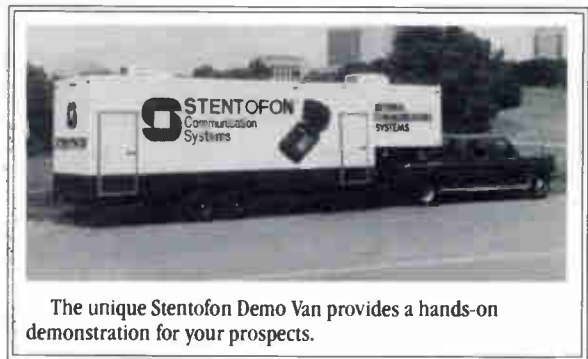
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Binaural Monitoring:

Sound Reinforcement Applications

by Ron Streicher

W

hen sound amplification systems were first introduced in public spaces, their function was simply to amplify speech (“public address”).

Soon, they came to be used for amplification of musical soloists as well. These early applications required simple techniques: one or two microphones, and amplification just sufficient enough to be audible (and intelligible) over the background sound. The sound system was turned on and left alone, and rarely was there an operator in attendance. In fact, the equipment was often kept under lock and key to prevent “unauthorized tampering” with the controls.

The evolution of modern “sound reinforcement” has led to an increasing demand for more sophisticated equipment, which in turn has led to an expanding role for the mixing engineer. Attending a performance today, it is not uncommon to find an expansive mixing console, with adjunct racks of complicated signal processing equipment, staffed by one or more mixing engineers—all right in the middle of the audience.

Greater variety, immediacy, and impact in theatrical, musical, and religious presentations are some of the benefits of the expanding use of increasingly sophisticated sound systems. There are problems, however, and one of the biggest is finding the best location for the mixing console. Frequently, the ideal location from the mixing engineer’s point of view is in the middle of the audience. Just as frequently, this location proves to be somewhat impractical. In temporary systems, cabling to and

from the mixing location requires long and carefully placed runs, and all too often the lament is heard, “You can’t get there from here.” This mid-audience location creates visual and aural distractions for those sitting near or behind the console. The security of the equipment, and of the mixing engineers, is a concern as well.

To the show’s producers, however, most troubling of all is the loss of revenue resulting from “all those prime seats” that cannot be sold. As financial considerations generally win out over technical practicality, the common solution is to place the mixing location under or to the rear of the balcony, where the sound is not at all representative of what the majority of the audience hears. Some theaters relegate the mixing location to an undersized booth at the back of the house, with only a small window opening into the soundfield.

There is a simple solution to these problems, and that solution has been available since the earliest



The binaural monitoring head in action.

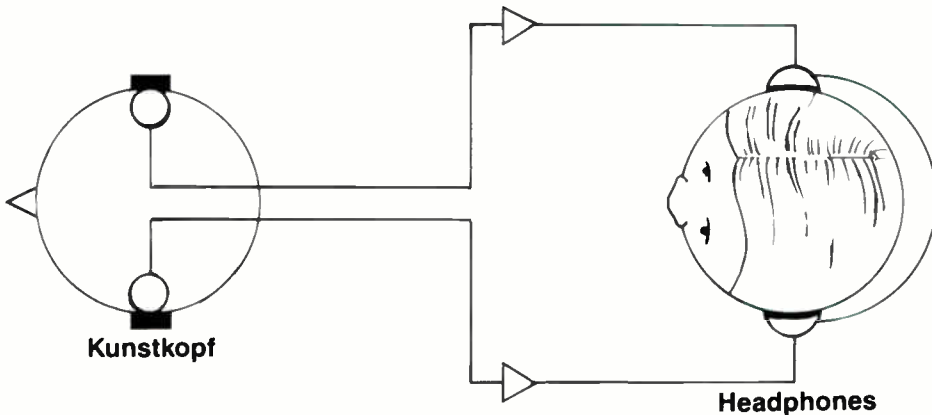
days of audio. In 1881, at the Paris Opera, binaural transmission was demonstrated in the theater for the first time. Discounted for many years as just a curio in the audio closet, recent developments have brought us to the point where binaural techniques are ripe for "rediscovery".

Binaural Transmission

A complex process involving physical and psychological acoustics, human hearing uses numerous cues to determine the size, substance, distance, and direction of a sound. For localization, the primary factors involved are the intensity and phase differences of a sound as it is perceived at the ears and processed by the brain of the listener.

Early experiments proved that by placing two pressure-responsive microphones at the ears of a "dummy head", and reproducing their signals via earphones, a listener could be given the very realistic sensation of being at the precise location of these "surrogate" ears. The size and shape of the dummy's head and ears are crucial to this process.

The popularity and widespread implementation of binaural transmission has



Basic Binaural Transmission Chain

been hampered somewhat by practical objections to some of its basic requirements. One objection is that the binaural head (Kunstkopf) is cumbersome and expensive, and can be in itself a distraction. In an effort to overcome this objection, other means of creating the necessary intensity and phase-differential signals have been tried. The simple use of two microphones, separated by the width of the human head, is one such method. Although this approximates the intensity

differences of binaural hearing, it does not provide the proper phase cues. (This technique does, however, form the basis for several common stereophonic microphone configurations.)

A second method involves placing two omni-directional microphones on either side of a sound absorptive baffle, again separated by the approximate width of the human head. This "quasi-binaural" technique (proposed by Jeklin, among others) is a simple alternative to true



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binaural monitoring.

However, the true binaural head must be just that: a head with anthropo-

established. To achieve this, a stable sound source should be set up in front of the binaural head. (Pink noise played

impression of what he is hearing.

Implementation

Binaural heads of high quality have been commercially available for several years from such manufacturers as Neumann (KU-81i) and Sennheiser (MKE-2002). Their use has been primarily for scientific study or commercial recordings, although some theaters have installed them for use by their audio facilities. (The Metropolitan Opera House and the New York State Theater at Lincoln Center in New York are two examples.) This affords the audio engineer the opportunity of locating the mixing and other production equipment in "that little room at the back of the hall" while retaining the ability to "hear what the audience hears". This is true even if the room has a sealed, sound-proof window overlooking the stage.

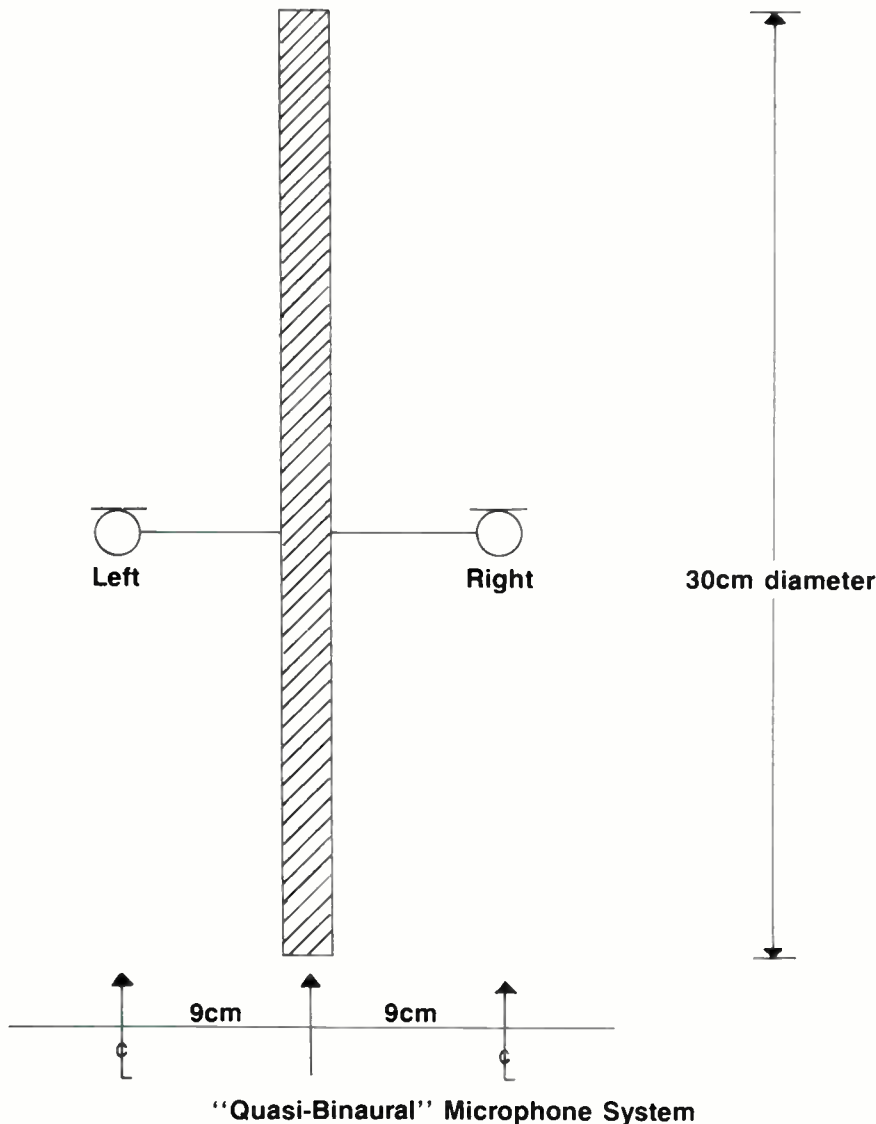
Placement of the binaural head is less critical than one might expect. It should, of course, be in the midst of the audience, but need not be in a "prime location." For example, it may be attached to the lighting rail at the front of the balcony where it is fully able to "hear" without being a visual or physical distraction to anyone in the audience. For temporary installations, the dummy head could be placed atop a microphone stand in a single seat or at an aisle. (At worst, one seat in each direction may need to be reserved to prevent curious audience members from tampering with the head. This would still result in fewer lost seats than if the full mixing system were located there.)



The author's homemade alternative to commercial binaural heads, with surface-mount microphone just visible at ear.

If the mixing engineer must be located where he is unable to see the stage directly, a closed-circuit video system can provide visual cues. A remote-controlled

Sound & Communications



morphic features and a microphone at each ear. Ears, a nose, hair, for critical applications even a clothed torso—all play an important role in providing the proper sonic clues to the listener.

Another frequent objection to binaural transmission is that the listener is required to wear headphones to achieve the desired effect. Several experiments have shown that with proper construction and equalization of the binaural signal chain, satisfactory reproduction over loudspeakers is possible, so that tethering the mixing engineer to a headphone cable is no longer mandatory.

Technical Considerations

Since the Kuntskopf functions as the surrogate ears of the mixing engineer, an acoustical unity gain signal chain must be

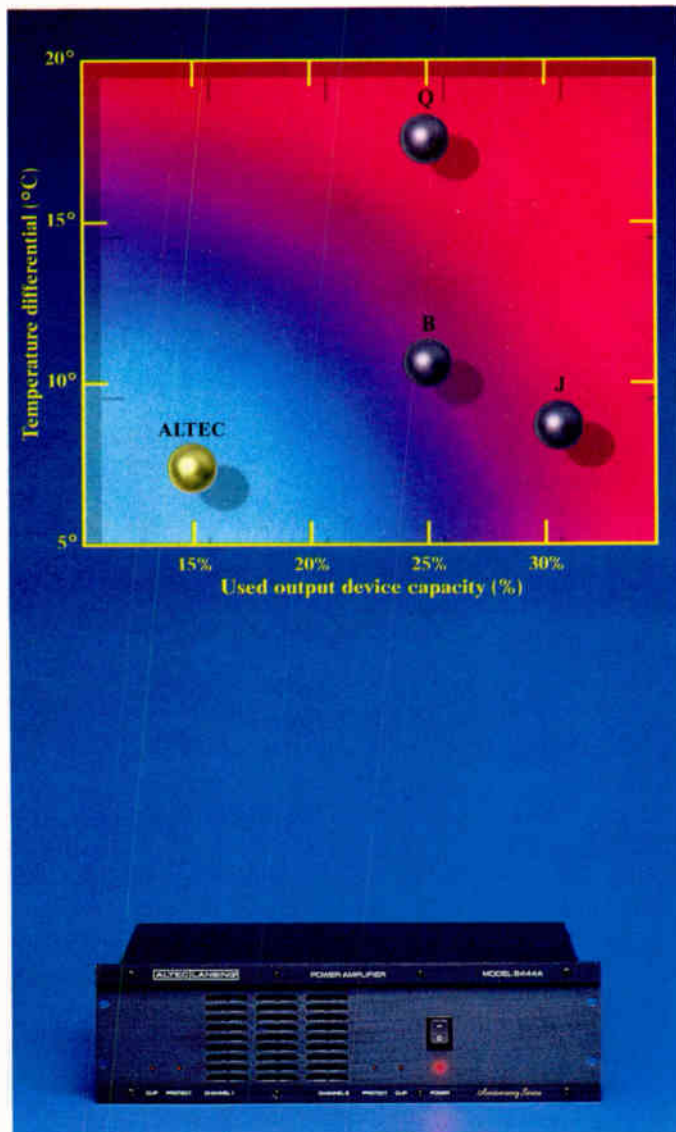
at a moderately loud level via a single loudspeaker is an appropriate signal.) The SPL should be measured directly at the location of each microphone ear, and the gain of the binaural system should then be adjusted so that the headphones reproduce the same SPL directly at the earpad. (If loudspeakers are used for reproduction, the SPL at the monitoring position should be set to match that at the binaural head.) Once this has been done, the gain structure of the system should be marked (or locked) so that it will remain at unity gain during all subsequent monitoring. The entire binaural chain should also have a very flat frequency response, to avoid presenting incorrect spectral cues to the mixing engineer. Remember, the binaural head is serving as his ears; it should not give him a false

In power amplifiers, less heat equals longer life. It is also correct to conclude that the reliability of a power amplifier often comes down to the reliability of its output devices. At Altec Lansing we compiled a detailed study of these devices in terms of their sturdiness and thermal behavior. We found that two criteria appear to have been ignored in the past.

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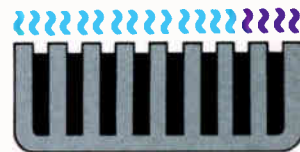
Altec Lansing engineers sought to reduce the variation in operating temperature from one output semiconductor to the next. We designed an asymmetrical heatsink that helps compensate for temperature differences between the transistor closest to the cooling fan and the one farthest away. This reduction in the temperature gradient evenly distributes the thermal stress placed on the devices. Our advanced heatsink has been incorporated into the design of the new Altec Lansing model 9444A power amplifier.

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designer's failure to reduce the thermal stress differential among output devices.

The second often overlooked consideration we studied at Altec Lansing is what our engineers call dissipation headroom. This is the percentage of the rated power dissipation of the output semiconductors which is actually used at the rated amplifier output.



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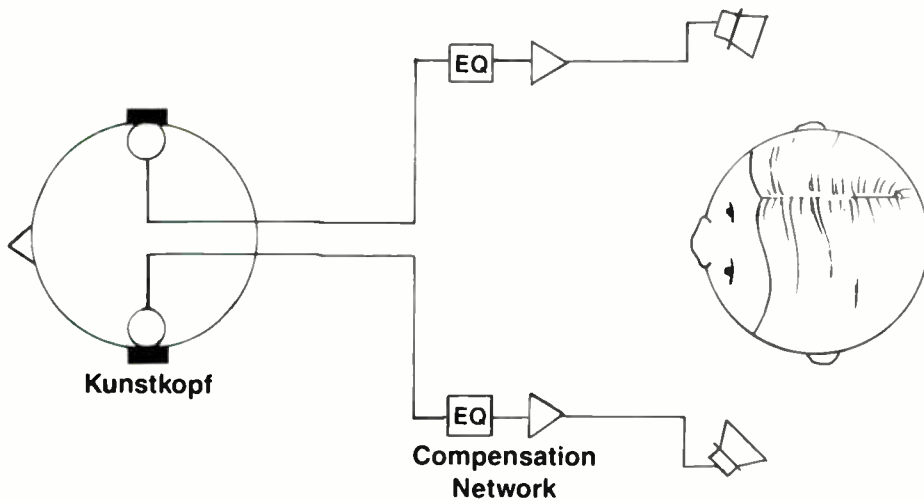
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zoom lens might even offer a better view than if he were seated in the audience himself. However, the camera must be positioned so that the visual perspective corresponds spatially with the aural cues of the binaural system. Otherwise, "disassociation" will result, causing severe confusion.

As stated earlier, the proper configuration of a binaural head is vital in providing aural cues accurate enough to allow the mixing engineer to function confidently. Some commercially available units still lack the necessary "human" features. The accompanying photographs show an alternative, constructed by the

author, using a department store mannequin and readily available surface-mount microphones located directly in front of the ears. This has provided successful monitoring in a variety of situations, and has also been used for several binaural recording projects.

Advantages

Unless there is a specific need to place the mixing location directly in the house, using a remote location provides many advantages: minimized loss of salable seating; elimination of visual and aural distractions; increased facility for mixing personnel to function and to communicate with other show personnel, without the hindrance of an "imposed silence" in the mixing area; and improved security for mixing personnel and equipment.

It is not the intention of the author to suggest that all mixing situations will benefit from the use of a binaural monitoring chain, for there are many instances where its use would prove difficult or even detrimental. Rather, binaural monitoring is proposed here as another instrument for the creative mixing engineer to pull from his "toolbox" when the situation warrants. ■

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210	224	238	254	271	288
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 O Other _____

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A Final approval/Buyer
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 C No Direct Authority/User

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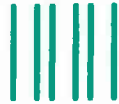
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 E over 100

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6	20	34	50	67	84
7	21	35	51	68	85
8	22	36	52	69	86
9	23	37	53	70	87
10	24	38	54	71	88
11	25	39	55	72	89
12	26	40	56	73	90
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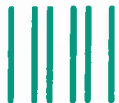
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			259	276	293

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Bill Fitzsimmons discussing his new rack power system, above.

NSCA EXPO A RECORD

The 1988 National Sound & Communications Association Contractor's Expo broke previous attendance records once again. From May 18 to 20, nearly 4500 industry people — up 400 from last year — met at the Bally Grand Hotel in Reno, NV, for what was by all accounts the most successful show ever.

Business was brisk on two roomy exhibit floors, with over 1500 contractors visiting the booths of more than 260 manufacturers, about 50 more booths than last year. "We have record attendance in every category — manufacturers, contractors, and consultants," said Harold George, NSCA president. NSCA Expo '88 Chairman Mel Wierenga agreed, calling this a "bang-up" show, adding that the attendees represented a real "who's who" in the industry.

According to Bud Rebedeau, NSCA executive director, the feedback from all attendees has been "terrific." "Getting to Reno might have been a bit of a problem for some," Rebedeau said, but once at the Expo exhibitors and contractors alike settled in for a great show. Transportation to next year's Expo site at Opryland, Nashville, TN, should be somewhat easier to arrange: Rebedeau indicated that 50 percent of the projected attendees are located within 500 miles of Nashville.

Fueling the steady annual growth of the show is the perception that the NSCA Expo has become the most important vehicle for reaching the sound and communications contracting community.

Many manufacturers share that perception: Tim Vear of Shure Brothers said, "The NSCA Expo is more manageable, more cost-effective, and less display-intensive than other shows, and the attendees

are better qualified. The show gets bigger and better each year." ART's Peter Beverage confirmed: "This was our fourth year at the show, and it's been getting better every year. It's our most favorite show." "The NSCA Expo is absolutely our favorite show," agreed Bob Davis of Yamaha's Professional Audio Division.

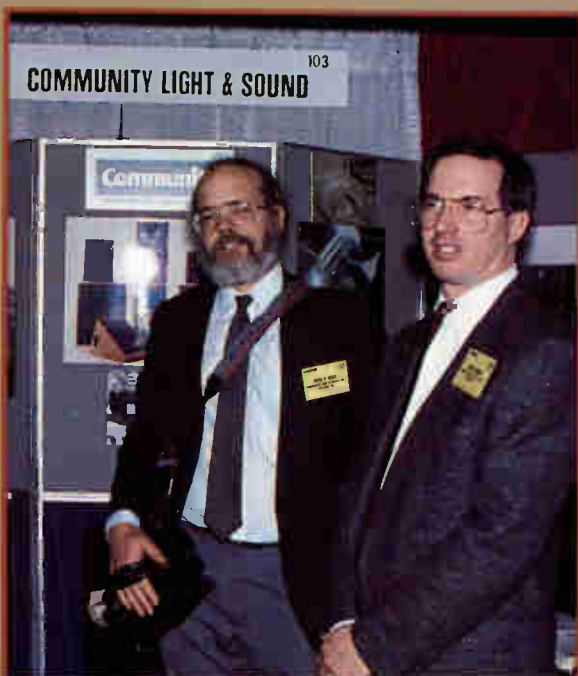
The show's low-key approach and quiet professionalism brought praise from the contractors as well. Phil Cartier of Baker Audio/Telecom, Atlanta, GA, said, "I like the fact that all the exhibitors have the same booth size. It's fair for both small and large companies. Overall, I thought it was a great show." Bill Schieffer of Acromedia, Los Angeles, CA, rated the NSCA Expo higher than any other show: "It's an excellent show, with a lot more 'meat' than other shows." He went on to praise both the general overview offered on the exhibit floor, and the in-depth view available at the demonstration suites.

"You really get the chance to see the latest and the greatest," said David Moore of ElectroCom, Seattle, WA. "The manufacturer's presentations were excellent overall, and the way the exhibit floors were set up enabled us to get to all the displays."

The consensus is that this is *the* show for the sound contracting marketplace. From the contractor's point of view, putting all the manufacturers



A look at Bally's roomy exhibit floor, above. Enjoying the Expo: Bruce Howze and John Wiggins, below.



KPO '88

BREAKER

on an equal footing (in terms of booth size and presentation limitations) enables the contractors to focus more easily on the products of interest, and makes it possible to converse more easily at the booths and on the exhibit floor in general. The manufacturers find that with less of their attention spent on display cosmetics, they too are able to focus more easily: "At this show, the 'show biz' aspect is kept under control, and that frees us [the manufacturers] to be more selective in choosing the products that are most acutely applicable," said Yamaha's Bob Davis. Tim Vear of Shure agreed: "Every manufacturer is in the same league [at this show], making it much more accessible for both the manufacturer and the show-goer."

Attendance was up at the seminars. Over 740 people signed up for the basic and intermediate Sound Design And Estimating courses. Some (but by no means all) of the topics covered at other seminars were *The Importance of Architectural Acoustics in Sound Reinforcement*, *Long Haul Transmission by Fiber Optics*, *Developing New Business From Marketing Awareness*, *Preparing A Proposal*, *Computerized Information Automation*, *Telephone Teleconferencing and Room Acoustics*, *Rigging Clusters*, *Project Management Organization* and *Designing Conduit and Wire Systems Via CAD*.

Feedback on the seminars was very positive. Yamaha's Bob Davis confirmed: "The response was fabulous. The seminars were logistically well-managed, as was the entire show, and the participants were attentive and responsive." Attendees agreed that the presentations were better organized this year than in previous years, and praised the wide variety and interest of the topics covered. (Audio and video cassettes of the seminars are available to NSCA members. For further information write to: NSCA, 10400 Roberts Road, Palos Hills, IL 60465, or call (312) 598-7070.

Now in its third year covering the NSCA Expo, NSCA-TV News was once again on the air around-the-clock with up-to-the-minute reports on the events, seminars, and people at the show. The news program, which was written, edited, and produced by the editors and publishers of *Sound & Communications*, aired on televisions on the exhibit floor and in hotel rooms at the Bally Grand, The Peppermill, and The Nugget. (All three days of NSCA-TV News are available on one VHS cassette from *Sound & Communications*.)

All in all, it was a very successful show. Not much in the way of revolutionary technology was unveiled, but much good feeling about this business was generated. Praise came from all quarters for the show's management and style. According to NSCA Executive Director Bud Rebedeau, the only change anticipated for next year's Expo is a slight increase in booth size, from 8 x 10 feet to 10 x 10 feet. NSCA Contractor's Conference and Expo '89 will be held at Opryland, Nashville, TN, from May 10 to 12, with basic seminars on May 8 and 9.



Contractors look over Bi-Amp's Advantage System, above.



Another look at the exhibit floor, above.

Altec's Ed Rusch and JBL's Steve Romeo compare notes, below.

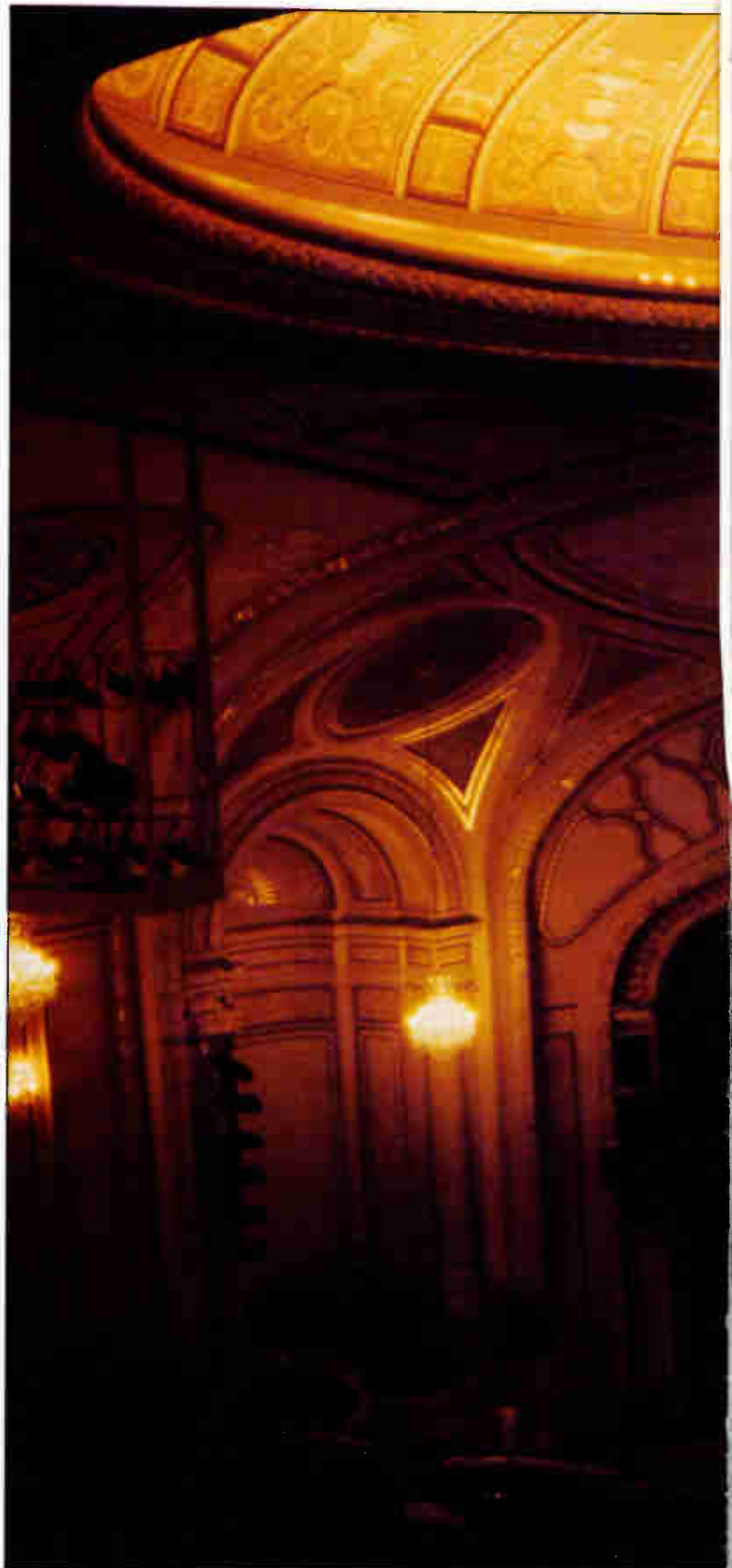


The Palace Theater: A Sound Renovation

by Rob McManus

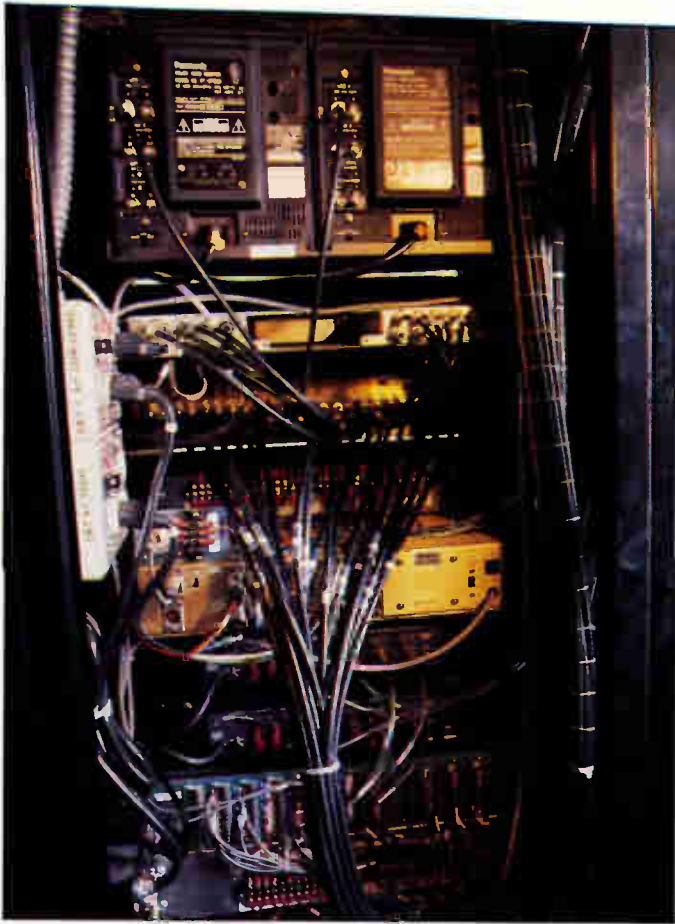
THE PALACE THEATER IS BACK, LOOKING AND SOUNDING BETTER THAN EVER. THE LARGEST OF THREE THEATERS COMPRISING CLEVELAND, OHIO'S PLAYHOUSE SQUARE, THE PALACE OPENED IN 1922 as a vaudeville theater. It has since then hosted a wide variety of entertainment, from big bands to cinerama. The newly-renovated Palace will feature a similarly varied program: Broadway shows, Las Vegas-style revues, comedy, jazz, and pop music. The sound system required adaptability and flexibility, and was designed accordingly.

The Palace's French Provincial design, executed originally by the architects Rapp & Rapp, features marble staircases, elaborate chandeliers, and gold leaf seemingly everywhere. The team responsible for what has been described as the most ambitious theater renovation in the United States was lead by





Inset: The house system equipment rack, including CCTV monitors, patch bay, intercom station, and custom control panels.



The back of the equipment rack showing CCTV and intercom wiring, and AC "clean power" outlets.

the architects van Dijk, Johnson & Partners, Cleveland, OH.

Other members of the restoration design team included theater design consultants Roger Morgan Studio, New York, NY, mechanical and electrical systems designers Byers Engineering Company of Cleveland, with construction management by Turner Construction Company of Cleveland. Jaffe Acoustics, Inc. coordinated with Byers Engineering in the areas of noise control and vibration isolation, and coordinated with van Dijk, Johnson and Roger Morgan Studios in the area of desired room acoustics (including sound absorption, acoustic materials, and insulation).

The 25,000 watt sound reinforcement system includes a 4-way center array, upper and lower side stacks, bi-amplified under-balcony speakers with custom enclosures, 120 stage line capability, and a 32-input console. The center array and upper side stacks are equipped with flying hardware, suspended from wench and steel supports respectively. Thus touring groups can fly their own speaker systems if they so choose. The lower stacks are portable deck-mounted units. Side stack speakers were originally to have been housed in transparent proscenium pockets, making the stacks visually unobtrusive and improving overall efficiency. However, a decision was made to restore the original proscenium, so the center array and stacks' enclosures were color-coordinated with the restored proscenium.

The stage monitor system consists of 8 bi-amplified channels, 4 full range channels, a 32-input console, and several monitors. For large productions requiring more than 32 inputs to the house console, the monitor console can be linked to the house console for additional inputs. The stage manager's system includes a rack assembly with CCTV monitors, intercom remote station and custom-designed stage control

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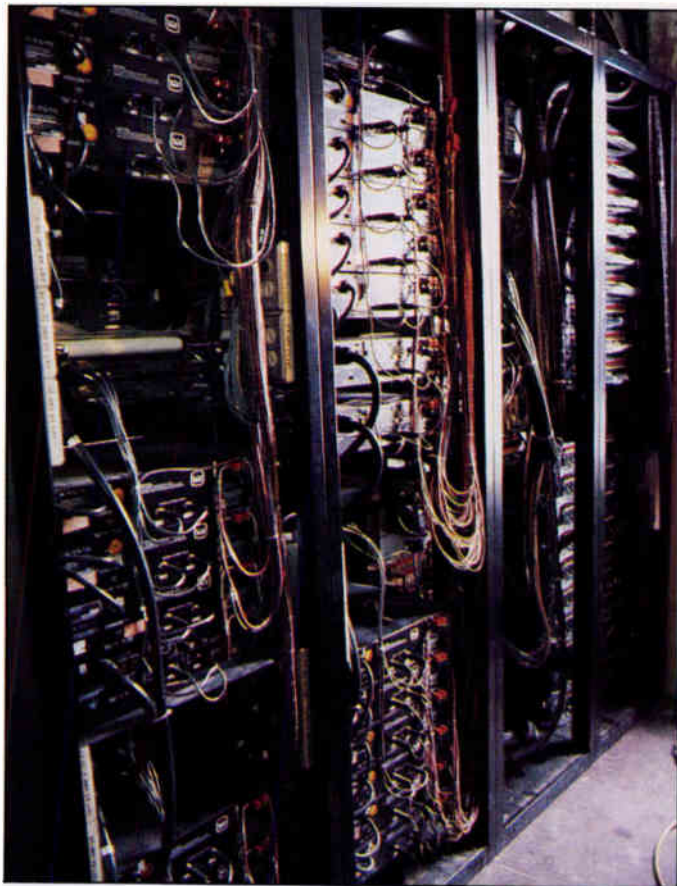
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panel. A backstage system provides speakers (each with its own volume control) in all dressing rooms, technical rooms, and other spaces as needed. The backstage speakers are tapped at 1/2 watt each from 70 volt transformers through which performance sound is fed. Priority stage call announcements from the stage manager will override the performance sound. A stage page system using speakers mounted to railings above the stage facilitates communication from the house mix position and control room to the stage.

The lobby system can function as an independent system providing separate programming from sources in the lobby or mezzanine level. The lobby system is similar to the backstage system in that priority announcements will override performance sound.

Ergonomic design features incorporated throughout the system make for ease of system operation. Control panels, plug boxes, intercom stations, and other terminations are found in convenient and easily accessible locations. Equipment requiring frequent manipulation, adjustment, or cleaning is located in rack spaces within easy reach. Custom panels are clearly marked and control placements, meters, and other components are logically designed.

As with all Jaffe Acoustics designed sound systems, the AC power system is a separately derived system using an isolated ground. Its worth was proven during a rehearsal for the Gala Opening when noise problems from the bass player's direct box connection to the system were traced to the bass amplifier being powered from a non-isolated ground receptacle. Once the amplifier was plugged into a "sound clean" outlet, the sound was, well, clean. All electrical power for sound systems is run through power conditioners. To reduce electromagnetic interference, conduit carrying electrical wire for audio was



Another view of the back of the equipment rack, including power amp and patch bay wiring.

Digital Record/Play Message Repeater



Shown: DigiMac Model DM-A digital record/play message repeater. DigiMac audio quality is excellent and completely natural, just like a tape recording.

- Up to eight minutes of message time
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- No moving parts, no maintenance, no downtime
- Natural voice, just like a tape recording
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MacKenzie's new DigiMac is a record/play, natural-voice message repeater that plays pre-recorded messages over public address and paging systems. Typical applications include public service messages, parking warnings, safety announcements and security messages. DigiMac is also ideal for museums, exhibits, displays and trade shows.

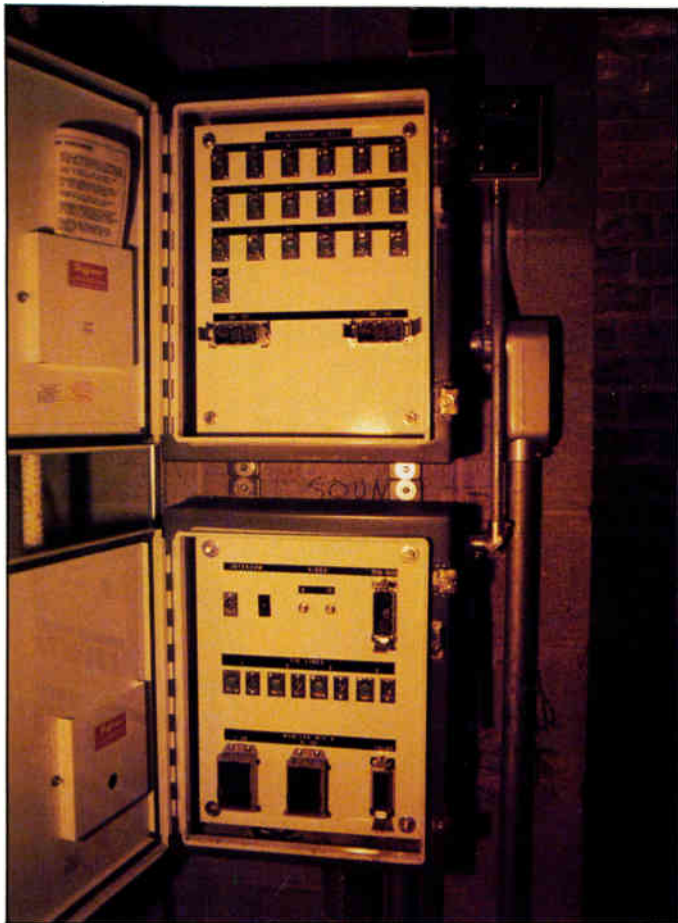
DigiMac is easy to use. Just plug a reel-to-reel or cassette player into the unit and transfer your pre-recorded program directly into DigiMac's memory. You can play your program immediately—over and over on command or continuously.

All DigiMac models come with built-in battery backup to protect memory. Models are available with sound/sync and microphone input for live recording.

For more information about the versatile new DigiMac, call MacKenzie Laboratories toll-free: **800-423-4147**

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Plug boxes, stage right.

installed in separate conduit at a "safe" distance from conduit carrying electrical wire for purposes other than audio. Sound system plug boxes and other terminators were similarly specified to be located away from lights and any other source of interference. Rigid specifications concerning the grounding, separation of conduit, and wiring methods insured the design of a safe and sovereign noiseless system.

To help assure the client of proper installation and operation, prospective sound contractors were required to meet certain pre-bid qualifications. Contractors were required to have sufficient field experience, enough employees to handle the installation efficiently, and the successful completion of a number of similar projects.

As the Palace was an existing building under renovation, and not a new building under construction, the specification required contractors to visit the site before making their bid. This allowed contractors to verify the condition of the building, and to see how that condition would affect their bid and ultimately, their work. The specification also required that all existing sound systems be removed and disposed of by the contractor.

Of the 9 contractors that met pre-bid qualifications, 5 submitted bids based on Jaffe Acoustics' specification. The contract was awarded to Sound/Com Corporation, Berea, OH.

In late 1987, shop drawings were submitted by Sound/Com, including custom panel details, rack space allocation, AC power control, AC power distribution, a power panel schematic diagram, and equipment cutsheets. With a few minor changes, the shop drawings were approved as submitted.

During construction, some changes were made to the sound system equipment list in an effort to better serve the client's

(continued on page 57)

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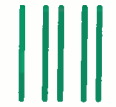
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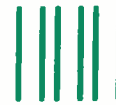
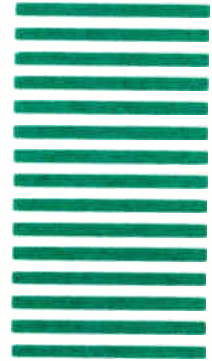
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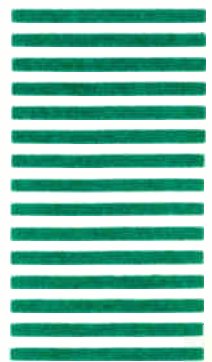
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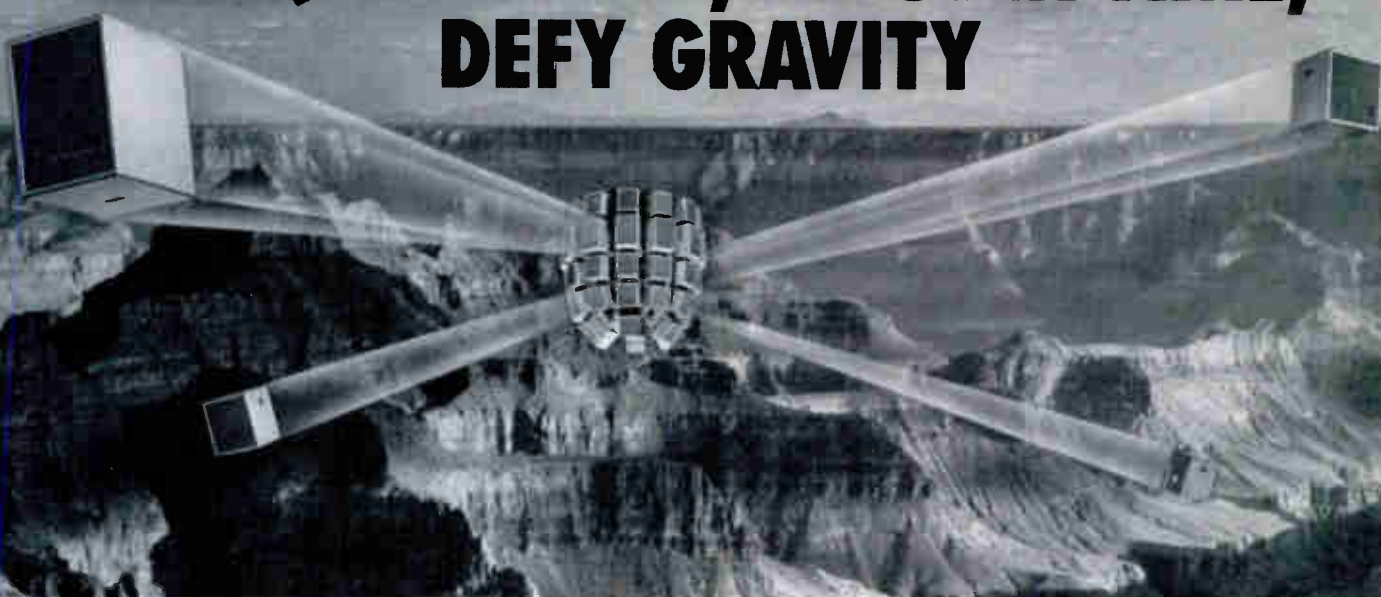


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A true system is more than the sum of its parts

The TSE System focuses Turbosound thinking, outwardly radical yet intrinsically sensible, on the problems of fixed installations. TSE is more than a collection of cabinets: it's a true system, with all elements working together. A variety of straightforward designs, all producing distinguished sound with security and reliability.

What goes up must not come down

In large venues, a point source cluster is often best. TSE flying hardware simplifies cluster design and installation: complete systems have been installed and tested in one day. Each component is load-certified by a UK government-approved testing organization. An expensive proposition, but you should know how your system will perform. Equally severe testing confirms the audio performance of TSE enclosures.

Make full use of your skills

TSE components are made for each other. That makes it easy for you to optimize a TSE system for any installation, large or small. There's no easier way for you to bring your own ideas about sound reinforcement to reality: Dozens of different TSE systems in major venues worldwide prove the point.

TSE systems can't grant you supernatural powers, but they will give you superbly natural sound.

TSE Flying Frames remove load stress from the cabinet. Connected with Quicklinks, frames and cabinets pivot to form a smooth coverage arc. Vertical dispersion is easily adjusted with the TS-6 or TS-10 strap connected to the bottom flying frame and the suspension quadrant.

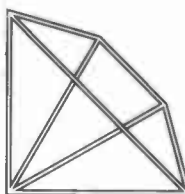


TSE-111—10" TurboMid + HF horn/driver.

Fits the FF-111 Flying Frame, with a square frontal cross section to let you change dispersion patterns by rotating the frame.



Horizontal dispersion is provided by 90° Suspension Quadrants: each quadrant will hold any combination of TSE enclosures. Combining quadrants yields horizontal dispersion of 70°—360° and vertical dispersion of 50°—270°.



TSE-211—2 x 10" TurboMid + V-2 HF unit. Superior Mid and HF projection. Switchable active bi-amped or passive two-way operation. Dual vertically-coupled TurboMid devices double power handling. The V-2 extends frequency response, enhances intelligibility.



TSE-260—V-2 HF unit.

Two HF drivers coupled with Turbo loading techniques, minimizing phase cancellation and distortion.

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Balancing TSE frequency response is easy—LF units are separate from mid/high cabinets. With six units to choose from, generating the proper frequency response and coverage pattern for any venue can be as simple as laying dispersion angles over the blueprints.

Other bass enclosures available: TSE-115, and TSE-118.



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The meeting is called to order. At the touch of a single recessed button lights dim, curtains are drawn closed, a screen descends from the ceiling, and a videotape is projected from a sound booth just outside the boardroom. This is not technology of the future; this could be the scene of any automated boardroom in corporate America today, thanks to the local sound and communications contractor.

Automated boardroom and conference room construction and retrofits are on the increase, say leading control manufacturers. Professional presentation techniques do not just impress clients; many times they win contracts. Businesses realize this, and are demanding better, more sophisticated presentation techniques. More meetings are being held using video, audio, teleconferencing, sound reinforcement—businesses are using every tool available to help them look their best.

Corporations account for a majority of the automated conference room contracts generated each year. With meeting costs at hotels and conference centers on the rise, corporations are more often electing to “stay at home.” Feeling the impact of this decrease in the number of corporate meetings and conferences, hotels are digging into their pockets and upgrading their meeting rooms with automated controls. As a result, hotels are second only to corporations in generating automated conference room contracts.

Before there was manufactured equipment, contractors were forced to manufacture control panels and other boardroom equipment in their own shops (and some still do). A relay here, a rheostat there, a few knobs and switches from used equipment—that was how a control panel was put together 10 years ago. However, making controls a decade ago was easier because boardroom requirements were simpler. Today, with the emergence of microprocessors, teleconferencing, infrared controlling, etc., fabricating controls is more difficult and time consuming for a contractor. And while large systems may have included as many as 30 functions back then, today even modest systems may require 3 or 4 times that number of functions. “We see that the industry is generally going to a much higher level of computer base because the level of automation has gone much higher,” says George Herbert, sales manager for Crestron Electronics Inc., Cresskill, NJ. “Clients are going beyond just the simple slide projector.”

FSR Inc., Cedar Grove, NJ evolved in response to that increasing demand for more sophisticated controls. FSR was originally a contracting firm that fabricated its own boardroom controls. Sensing a need for good manufactured equipment, they made the move from contracting to manufacturing. “FSR started because no one had looked at installation from a contractor’s view,” claims Janice Sandri, vice president. “We saw a need for product that was not being manufactured.” Sandri and other manufacturers say it’s not economically feasible to continually build new controls for each job.

At the core of a boardroom’s many audio and visual components are the automated control system and the control panel. Corporations are now demanding that a wide variety of functions be included in the boardroom design: VCR’s, slide projectors, audio cassettes, reel-to-reel audio decks, automatic sound mixers, video projectors, drapes, shades, screens, lights, recessed maps—even coffee makers. These

AUTOMATED CO



FOR BOARDROOM

control panels can be made to function as more than on/off switches. As long as the hardware is compatible, control panels can be programmed (or wired) to focus lenses, manipulate playback volumes, control video cameras, and so on. Lighting systems can be programmed for different moods, producing an even level of light, or mixing light levels (moderately lighting the board members, for example, while spotlighting a product being presented). Crestron’s Creslite System 7, for example, is a microprocessor-based dimming system offering 12 different lighting presets.

Most manufacturers offer hard-wired systems, 4-wire digital panels, and wireless systems. The 4-wire and wireless systems are quickly outdistancing the older hard-wired systems in popularity. Sandri explains the advantages of the newer systems: “When you come right down to it, you can probably save a week of labor, not to mention the cost of cable—just

CONTROL SYSTEMS



The Controlline Series from York Controls

tion on them,” Otruba says. “The panels can be easily operated, but executives don’t want to bother with controls. They want the meeting to be a success and get it done with.” Since fumbling with controls can detract from a presentation as much as poor production quality, many manufacturers have added one-step buttons to their panels. The pre-programming capabilities of microprocessor controllers have enabled contractors to combine a particular presentation’s program and its environmental controls into one push of a button.

A panel’s appearance can be as important as its controlling features. Various wood grain and plastic finishes are in demand because boardroom designs are paralleling current fashions. “There’s more color being used now, replacing the big oak tables and leather chairs,” said Ron Suttle, AMX national sales manager. Suttle attributed this to a “changing of the guard” as a younger generation replaced retiring executives.

Colored buttons and custom engraving using in-house computer-aided design are now common requests. “The average dealer wouldn’t do these things because of costs, but we do it daily,” Suttle adds. FSR’s Sandri described their fully computerized metal shop that enables them to complete most custom requests. “There’s a choice of aluminum or brass and many finishes, plus the client can choose engraving, screening, button color, and LED color,” Sandri adds.

“The irony is that all the expensive items—the video decks, tape decks—are all out of sight, and what the executive has in front of him is this \$40 panel which represents the power,” says York’s Christianson. “So they have to be aesthetically pleasing and we’ve (the manufacturers) all worked at it,” he adds.

Video projection and camera equipment demand is on the increase, according to FSR’s Sandri. “We’ve just introduced a 12-channel modular video switcher (VSS-1200),” she adds. The VSS-1200 satisfies video codes TTL, CGA, RGB-Plus sync, and VGA, and leaves an additional 8 channels for user innovation.

“Video projection is the coming thing, because most clients don’t want just audio anymore,” Otruba confirms.

Suttle agrees, and AMX offers an SX-DCU 44-channel beta control unit. “Virtually every job we do now has video in it,” he added. Instead of having 3 or 4 infrared remotes, you can use one control panel that controls this state-of-the-art, almost consumer-oriented equipment.

Audio systems are also becoming increasingly sophisticated. Say for example that a hotel wanted to outfit a large ballroom, capable of being divided into 8 smaller sections, with a system that could supply a multitude of audio functions to any combination of rooms. This would require an audio system that could furnish sound to the entire room or service 8 sections with separate music programs or sound reinforcement capabilities. A unit such as FSR’s ML-112 or ML-132 audio combining system makes this possible.

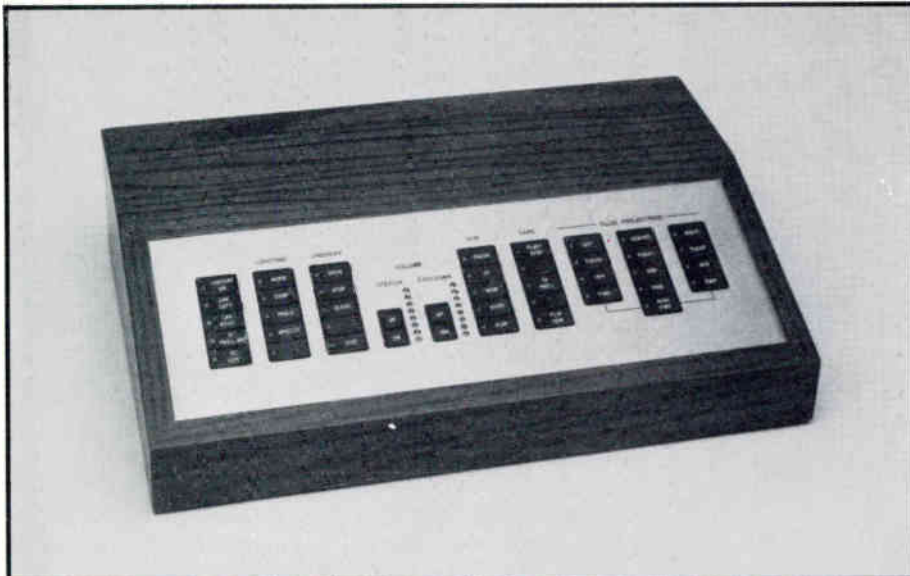
Another player in the automated field, although they don’t make control panels, is Innovative Electronic Designs, Inc., Louisville, KY. IED manufactures an automatic mixer system, the Model 4000 Series, that allows mainframe link-up. Each of the 4 inputs on the card may be individually

imagine the cost of 100 conductors as opposed to only four.” Robert Otruba, president of AVDI, NY (audio/video facility consultants), recommends installing conduit as a safety backup in case the proposed wireless system is changed in favor of wiring in the future.

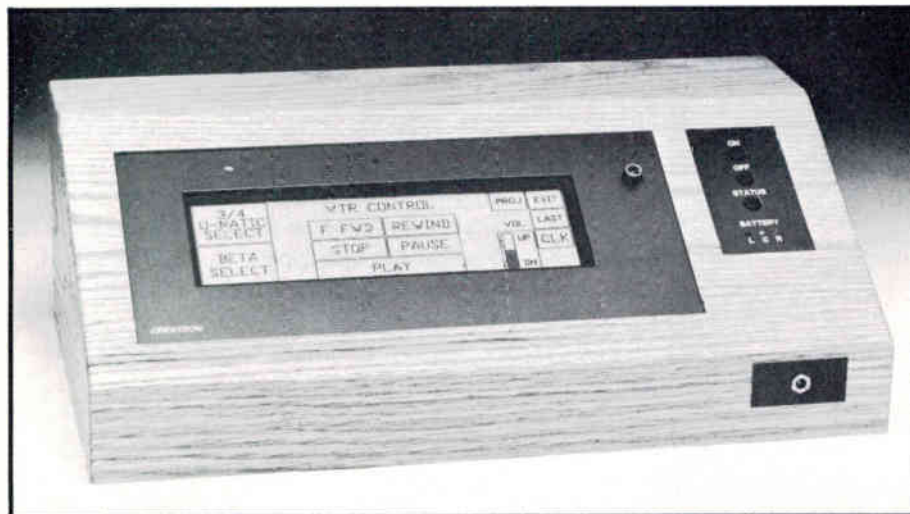
FSR makes its DL-64 digital control system with 64 channels and three bar graphs. A variation on that theme is AMX’s SX-16+, an expandable universal relay controller which can employ hard-wired, soft-wired (four-cable), or wireless by simply plugging in a module. AMX now has an LCD touch panel. York Controls, Richardson, TX sells some 40 to 50 percent of its Controlline Series for media control to boardroom applications, according to Bruce Christianson, vice president of marketing & sales.

Otruba says most users are interested in simple operation. “People complain that panels don’t have adequate instruc-

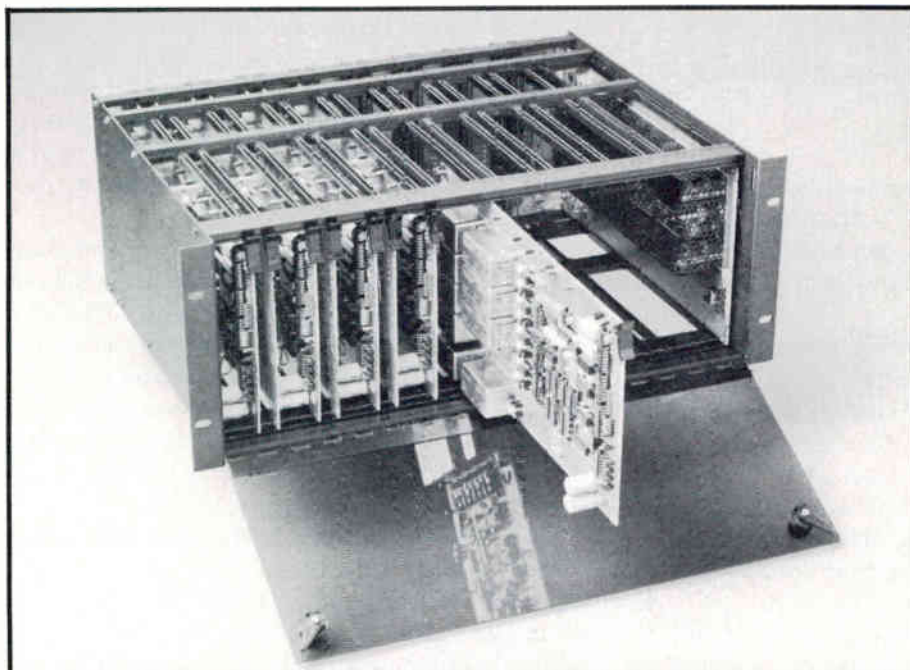
MS by John P. Frantz



FSR's DL-64 Console Conference Control System.



Crestron's Wireless Touch Panel Console, the CTP-200.



IED's Model 4000 Series Automatic Mixer System.

“You can probably save a week of labor [using wireless systems], not to mention the cost of cable.”

Janice Sandri
FSR

customized by combining a 150M mic preamp or a 100L line preamp with a 110C compressor, a 110V voltage controlled amplifier, a 120P programmable gain control, a 132 voltage controlled digital attenuator, or with a fixed gain amplifier, whichever best suits the application. Vice President of Marketing & Sales Tom Roseberry estimated 15 to 25 percent of IED's mixers go into boardrooms.

In fact, sound contractors have found success installing the unit in situations where many people must have their own microphone. A unique function on the mixer is the “filibuster” control, which automatically cuts all other microphones once the meeting's moderator speaks.

Another trend Suttle sees is the inclusion of small 4-inch television monitors in lecturns or panels so that the presenter can monitor the visuals without turning toward a screen. The monitor is also helpful for cueing equipment before the presentation.

LCD touch panels are in the forefront of the current wave of technology, according to Herbert. System updates with older panels require replacing engravings or push buttons. With LCD panels, however, such as Crestron's capacitive touch-sensitive CTP-100, the LCD is simply

reprogrammed. Herbert says new panel technology is cheaper than the older models. "The LCD touch panel is about 30 percent lower in cost than, let's say, a 45-button custom panel," Herbert claims.

The LCD is also featured on Crestron's CTP-200, a wireless control panel. While it's some 50 percent more costly than the CTP-100, it offers the client complete mobility.

Along with microprocessors, teleconferencing will figure prominently in this growing market. For example, Crestron recently completed large teleconferencing control capabilities (through fiber optics) for a corporate client that desired to link its various audio/visual locations.

As in most industries, the high tech revolution is having an effect on the sound and communications installer and boardroom installation. "The VCR and projector manufacturers have made our jobs somewhat easier by going to serial data and infrared control," Suttle says. "We're getting away from the old relay-type business. The systems are simpler, more efficient, and they do more at less cost." ■

**"The industry
has gone to a
much higher
computer base
because the level
of automation
has gone much
higher."**

**George Herbert
Crestron Electronics**

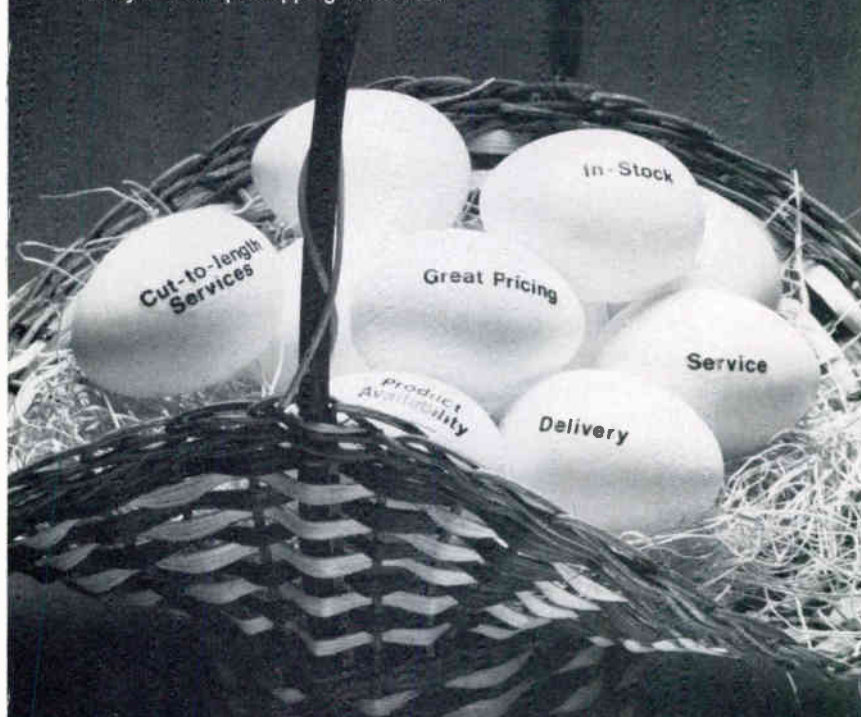
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The TX Series Wireless Transmitters from AMX.

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STATE OF THE MARKET IN

VOICE-ONLY INTERCOMS

Press a button. Speak. Be heard. Listen. Communicate. Perhaps feel a little safer.

That's what intercoms are all about and that's why they're as vital as ever in the scheme of things. Whether it be for residential or commercial purposes, the need for talk/talk-back products exists and the demand for them seems to be growing. Some had predicted otherwise.

"With deregulation of the telephone market, people became more aware of the phone," explained Peter McLean, vice president of the Ring Group of North America. "They began to think the phone could do it all, but then they remembered 'hey, there's something else out there.' "

Intercoms have become more sophisticated and technologically refined over the years and now offer more flexibility than ever. "The term squawk box doesn't apply anymore," McLean added.

Ring is doing a great deal of business with schools these days. Its newest product, the MCS-250, is a small 12-station enunciator/intercom system. Unfortunately, its primary application in schools at present is for security purposes.

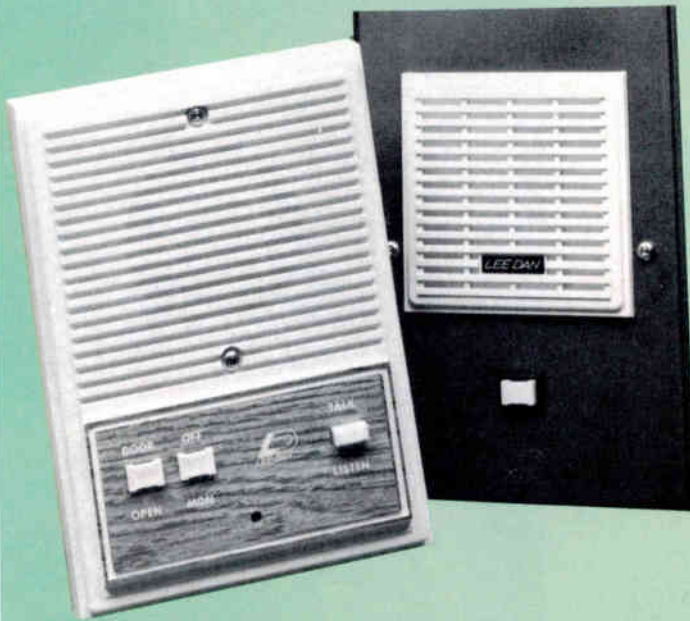
"There are many more good kids than bad kids," McLean believes, "but no matter where you travel throughout the country, there

are problems in schools. Teachers' groups are looking for something that offers them more security, even if the average teacher does not think he or she is in great danger."

Security is not the only application, however. Intercom systems are still used in schools to page students to the chemistry lab, or to lead everyone in the pledge of allegiance.

There are fewer students now than there were during the "baby boom," and that is having an impact on intercom sales. "The ups and downs of the population means we end up redoing older schools that have systems that are 12, 14, 15 years old and are worn out. Schools are not the most gentle people," McLean said. In new construction, the price you get depends on the vagaries of the school district. "With the MCS-250, the cost varies between \$100 and \$300 a station depending on features," Ring's VP said. "How much of a system you actually put in has a lot to do with budgets." There's sometimes a very big difference between what a school needs and what that school can afford. "Sometimes that's the difference between a \$5,000 and a \$15,000 system."

Intercoms are playing a bigger role in new home construction, according to Harry Quanz, Aiphone Intercom



Lee Dan's Enterlok 2-Station Door Answering Intercom.

By Greg Prince

Systems' advertising and marketing director. Company surveys show only about 4 percent of American homes have an internal communications systems now, compared to a 90 percent rate in Japan, but Quanz estimates practically all new homes in the United States will come equipped with intercoms.

"Half of our leads this year have been generated by builders for new construction," Quanz said. "When you're building new, the walls are open and that makes installation easier and that leads to a definite increase."

Airphone has been concentrating on home security "and how an intercom can aid in that," Quanz explained. "You get more access control, two-way communications, door release capability and contact at the door. It's been a slow progression to get it into the home, but it began to be deemed important about two or three years ago." Among Aiphone's products for the home is the C123L with doorbell answerer.

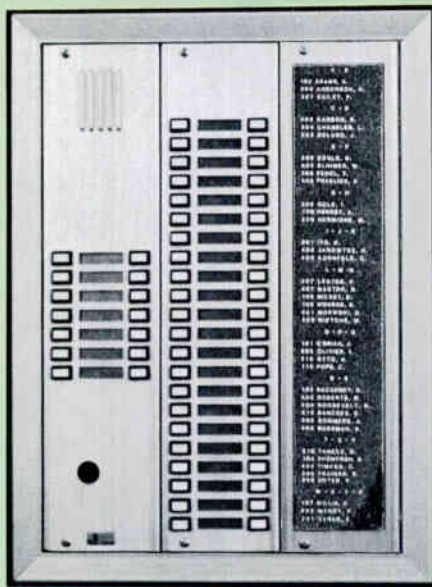
Another possible market for intercom manufacturers can be found where cars are parked. "One state in particular, Pennsylvania, passed a law that says you can not build a public parking garage without some sort of internal communications system," Quanz explained. "There should also be a law like that



The Sentex Infinity Access Control System.



The Ring Group's MCS 250 Annunciator Communications System.



The Series 3000 Modular Entrance Panel from Jeron.

soon in Illinois. We've already done a couple of systems in Chicago."

Apartment houses and other multiple-dwelling units have not been forgotten in the intercom equation. Systems have moved beyond the usual buzzer operations. "There's a lot going on in the big cities, particularly New York, Chicago, San Francisco," said John Charczuk, vice president of sales for Jeron Electronic Systems, Inc. "New construction is flat but because of security concerns, 65 percent of our business is in retrofitting. When they are building, major builders are putting them in."

Siedle Intercom/USA offers modular mailboxes for communications between lobby and apartment. "We feel we have a high-design product, not something generic," president Earl Zausmer said. "Our market is for [upscale] buildings. We like to compare it to a new Mercedes versus an old Volkswagen."

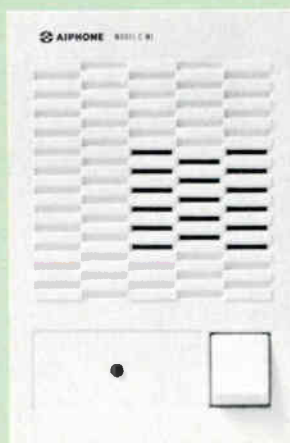
Siedle has modified its installation to the point where only one person is necessary to put in a system, leading to "a large labor savings," Zausmer said. "An electric arm can tell you while you're putting it in if one intercom is miswired, so you can fix it right there and then without having to go through a hundred apartments before knowing something's wrong."

Cornell Electronics Products features systems for apartment houses that have doormen. "More and more buildings are in a guarded condition," said Pauline Haack, sales manager. The company's dorm-style 7000 system is popular on military bases for personnel housing.

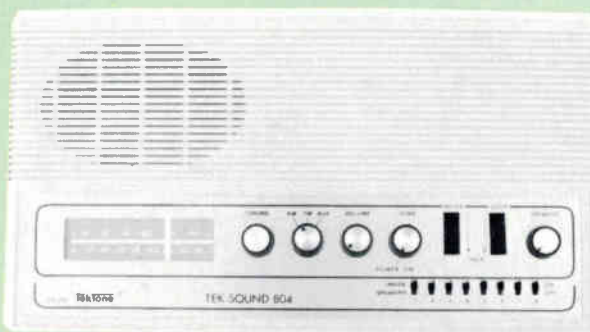
Other players in the multiple-dwelling game include Florence Corporation, which is in the process of introducing a townhouse system, and Sentex Systems, Inc., which offers an electronic directory for gated housing developments. "That's a lot easier than having to use a large letter kit every time somebody moves out or moves in," said Andy Greenthal, Sentex sales manager.

Inside the house, Lee Dan Communications has a monitoring system that's ideal for taking care of an infant or an invalid. "With the common wiring system, you can put the baby to sleep," explained Vice President David Goldberg, "and go to another room. By pushing the monitor button, you can hear throughout up to 15 rooms in the house without fooling around with any more talk switches." When not in use, Goldberg said music can be programmed through the system.

Industrial applications still play an important role. TOA Electronics, Inc., estimates



Aiphone's Model C-123LP and C-ML Access Control Intercoms.



Tektone's Series EK-804 Radio Intercom.



Siedle's Access Control Intercom.

about 80 percent of its intercom business comes from the commercial field, said Albert Burns, national sales manager of intercoms. "You'll see them in the heavy duty stations for factories, where there are high-dust and hazardous areas," Burns said. "The key is flexibility and not tying up phone lines. There are very high usage rates, for example, in brokerage houses where you just can't take the time to put somebody on hold. With an intercom, you can press a button at the same time and have an answer for the client in a heartbeat."

"After the October 19 stock market crash, you didn't see anybody taking out intercoms," Ring's McLean added. "Intercoms mean efficiency."

Tektone Sound & Signal's sales marketing director Tom Hendricks pointed out "there have been surveys made showing the amount of time on an intercom format for a conversation is less than if it is on a telephone. You're less likely to gab about Joe Blow's girlfriend on a loud-speaker."

The intercom business is "very healthy" in Hendricks' eyes. "We have had a modest 20 percent increase in sales over this time a year ago," he said. "Ma Bell just doesn't give you the same flexibility on a handset." Tektone is also involved in the



TOA's EXES-6000 Internal Communications System.

residential market with systems for garden apartments, and some that combine home entertainment with communications. "If you receive a call from the front station, you hear chimes through the entire system," Hendricks explained. "The rest of the time, you can have an AM-FM radio throughout."

The diversity of applications proves to industry veterans that intercoms are alive and well, contrary to previous reports. "An intercom is not just a box," said McLean. "It's a solution. I've been in this business since 1967 and I'd say the outlook is very favorable. I've heard the intercom, because of the spread of the telephone, is dying. It's not." ■

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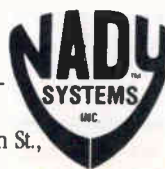
And the Nady 1200 Series Wireless sets the industry standard for full-feature, top-end wireless performance.

Wireless manufacturers make many confusing claims regarding system specifications. Take our suggestion: listen to a Nady 101/201 or a Nady 1200 side-by-side with any other wireless on the market – regardless of the claimed specs – and you'll be impressed with the extra 15 dB dynamic range you get with Nady Wireless.

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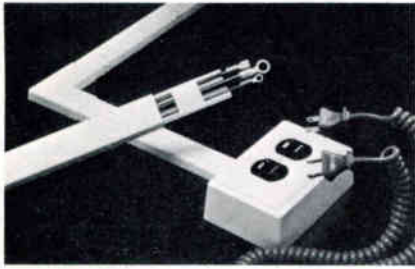


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Nady IR-300 Large-Area Infrared Systems. Unique modular design for easy, efficient installation in any size facility. You don't have to run AC to power the emitters. And you can add to the system as needed in the future. Choice of user-friendly receivers. Best of all, you can have a Nady IR-300 infrared package for one-third to one-half less than the competition gets for the same area coverage.

Circle 239 on Reader Response Card



Panduit Introduces Raceway System

Panduit Corporation announces a new low-profile plastic raceway system for power wiring up to 300V. The system includes raceway, fittings and junction boxes, and may be installed in offices, hospitals and other facilities.

The MOD-POWER raceway meets NEC specifications for non-metallic surface raceway and will hold up to (10) 14 AWG or (5) 10 AWG wires. The snap-on cover fits securely but can be removed for wire revisions or service.

Available fittings include couplings, inside and outside corners, right angles and tees. The complete system

is available in two popular colors — NEMA electrical ivory and light ivory.

Circle 5 on Reader Response Card



Simpson Announces Test Instruments

Simpson has added three new test instruments to its professional product line, the Model 444 Micro-Ohmeter, the Model 560 Menu-Driven Multimeter and the Model 714 Universal Frequency Counter.

The 444 Micro-Ohmeter is designed for low resistance measurement applications where high accuracy and repeatability of results is required, for

example: testing contact resistance, conductive coating inspection, earth bond and ground resistance testing. This model features a 20,000 count, 4½-digit LCD display and clearly marked front panel switches.

Simpson's Menu-Driven Multimeter offers a combination of features that are accessible through front-panel menu-driven programming. Some of these are: autoranging; data logging capability on any selected range with 2,150 measurement memory; 500kHz frequency counter and Dual LCD format with 5-digit, 52-segment measurement and a 4-line menu/programming display.

The 714 Universal Frequency Counter is designed for testing applications ranging from digital and control circuits to high-end radio and telecommunications systems. Some of the features include: 3 input ranges, 1 ppm time base stability and aging, selectable time base, X1 and X10 attenuation and 150 kHz low-pass filter.

Circle 1 on Reader Response Card

(continued on page 60)

THE VITAL LINK



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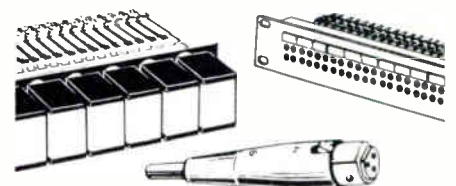
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PRODUCTS IN REVIEW



Rane Introduces New Flex Series

Rane is introducing a new line of Modular Signal Processors called the Flex Series.

In response to the progress being made on standardizing the increasingly popular half-rack format, each Flex Series module can be mounted vertically or horizontally using a minimum of 19-inch rack space. Flex modules do not require an expensive mainframe to operate, and will connect directly to professional equipment via three-pin, 1/4-inch and din connectors.

The company is also beginning production of the first commercially available 8th-order Linkwitz-Riley active crossover, Model Fac 28, also part of the Flex Series line.

Circle 2 on Reader Response Card



Audio Technica Phantom Power Unit

The AT8506 Power Supply box, being introduced by Audio Technica, is a four-channel, line-operated unit which produces 48V DC to microphones requiring phantom power.

Operating from 100-120 AC, 50-60 Hz, the AT8506 provides a constant voltage source despite heavily loaded or shorted inputs. Each channel can

provide up to 14mA. Other standard features include internally protected regulator IC to prevent overheating or damage, and locking XLR-type connectors with silver-plated beryllium copper contacts.

The AT8506 weighs less than 2½ lbs., has a 6-foot line cord with grounded plug, power switch and LED power indicator. The unit is also compatible with the Audio-Technica MODU-COM two-way communications system.

Circle 3 on Reader Response Card



Winsted's New Rack Mount Cabinets

Winsted Corporation has intro-

duced three new models of shallow depth Rack Mount Cabinets, designed to accommodate security monitors, camera control units and other compact electronics.

Available with 10½", 14" or 19¼" of rack space, the cabinets are designed to EIA standards. Side panels lift off easily for convenient maintenance of electronics, and stationary shelf and Plexiglas doors are optional.

The cabinets are finished in shadow gray and natural putty baked enamel and may also be combined with Winsted's existing System/85 Consoles for a wider variety of configurations.

Circle 4 on Reader Response Card

Digital Sound Announces VoiceServer

Digital Sound Corporation has introduced the VoiceServer 3110, a voice processor which was designed specific-

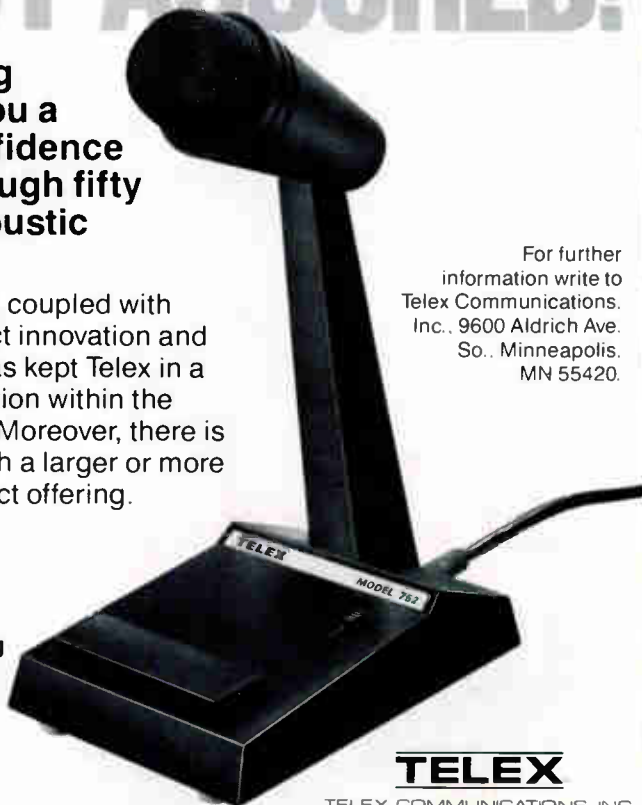
(continued on page 58)

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TELEX
TELEX COMMUNICATIONS, INC.

Circle 251 on Reader Response Card

PRODUCTS IN REVIEW

a closer look

by gary d. davis



360 Systems Quadfile Digital Playback System

360 Systems has introduced a smaller 4-channel version of their popular Permanent Playback digital audio message system. The Quadfile

is an economical, compact package that permits up to 4 independent messages of up to 90 seconds each at 10kHz bandwidth (60 seconds at 15 kHz bandwidth) to be digitally recorded and then played back on cue by

remote relay closure or local control.

The half-rack wide by 5.25-inch high unit is already being used to make paging or emergency announcements in leading theme parks, museums, TV production houses, transit terminals, industrial sites, and exhibits. Where longer messages are required, channels can be logically linked to produce one continuous message. Since channels can be activated and played back independently, applications include sequential or simultaneous paging in several languages, as well as independent messages to different areas.

360 Systems says their Quadfile offers the user a high degree of reliability, exceptional sound quality, and virtually no maintenance (as contrasted to traditional tape cartridge messages).

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For a brochure on Permanent Playback, contact:

David Geoghegan
360 Systems
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Phone (818) 342-3127

Comments:

A few years ago at an AES convention Bob Easton, who had previously built synthesizers, showed me an early Permanent Playback system that he had developed at 360 Systems. Today, 360's 16-channel units are widely used in theme parks for automated playback of sound effects, voice tracks, and even musical excerpts. The Quadfile is simply an extension of that line, making the technology available in a smaller, more economical package of four channels.

Like its big brother, the Quadfile's bandwidth is selectable for -3 dB at 10 or 15 kHz, with a tradeoff of 90 or 60 seconds maximum time per channel. All channels must be set to the same bandwidth/time length, but beyond that, they operate independently. Dynamic range is better than 70 dB, and THD + noise at 1 kHz is less than 0.3 percent.

At the time I first encountered one, I was fascinated by the audio quality and by the technology that went into creating a tapeless messaging system. By today's standards, the technology is not unusual: analog-to-digital (A-D) conversion of audio and non-volatile storage of the digital data in Erasable Programmable Read Only Memory (EPROM), for subsequent playback via digital-to-analog conversion (D-A) and a conventional line amplifier output. Close a switch, and the channel spits out its digitized message. The A-D conversion and storage on the EPROM is done by a special Audio Editor/EPROM programmer unit which 360 will sell, though many users (especially those who may use the Quadfile in a stable messaging situation) prefer to send master tapes to 360 and have them program the chips.

The unit can restart a message without completing playback (retrig-

(continued on page 58)

Do not confuse the DADCO paging systems with standard "beepers"! Our pocket paging systems are specifically designed for on-site coverage. They are easily installed in any premises and provide accurate and immediate information to individual paging receivers within an area of up to 1 mile in radius. In addition to the standard tone annunciation, our pagers can provide alpha-numeric display of messages and/or speech communication. Paging encoders are available to provide various combinations of pre-programmed, operator defined, or automatic message generation.

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Dear Dr. Wokka,

I have recently purchased a pair of old Western Electric 639-16BX-WYF composite full-range loudspeaker systems (circa 1935), field coils and all. They sound infinitely better than my new _____'s speakers, recently purchased for \$28,600.00 from a "friend in the business" (know what I mean?) at "very near dealer cost." The image on the W.E.'s is as deep as the Asian continent and they are simply unparalleled. I'm powering them with a matched pair of the now extinct Marantz model 0.5A Cyclonova Mercury Arc Tube Amplifiers. My friend _____, who is of course the famous audiophile editor of _____ magazine says the system sounds great because it is very old. I know this is the truth, but could you please elaborate on this.

Cris T. Howitzer
Media, PA

Dear Mr. Howitzer,

Let me set a few things straight here. First of all, in my opinion, your friend, Mr. _____, is a sham, a fraud, and ne'er-do-well know-nothing. I happen to know that he has a *Liberal Arts* degree in Music and English and wouldn't know a wave equation if it smacked him in his goggle-eyed, opinionated, ugly, *audiophile* face. Liberal Arts! His opinions are worthless, believe me. However, he has stumbled upon a well-known fact of the Best Audio Equipment. That is, *Old Things Always Sound Better*. Let me explain.

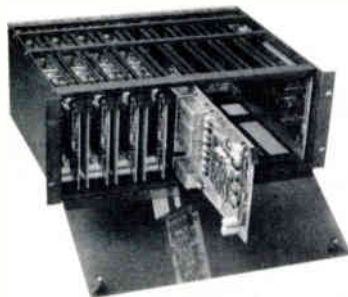
In the old days (1940's plus or minus 10 years), *Great Men of Audio Science* walked proudly on the face of the earth. They breathed a different air than we breath today and made god-like decisions about the equations and measurements that govern all the

behavior of loudspeakers today. The problem is, most of them are not around today to enforce the Great Laws, and people like Billy Blintz and his abomination, the ceramic magnet, have gotten away with the wholesale murder of the audio industry. *So much has been lost*. Your Western Electric 639-16BX-WYF's are a prime example. First of all, the vacuum-alloyed Alnico magnets are supremely stabilized by the 42 Henry choke coil wound around it and the 950 watt D.C. power supply supplying it. The coil is made entirely of a molecularly-aligned, completely pure copper/gold/silver alloy which, by the way, today's cyclotron engineers would pay dearly for. The magnet circuit is pure iron and uranium alloy, no longer manufactured due to the stray neutron emission. Feel a glow when the speakers are on? It's those fabulous neutromagnets just doing their job. And the cones...ah, how much we've lost!! The cones are felted from selectively oriented black walnut, English wool, puffin feathers, and the pulp of the Daphne Tree (found only near Mt. Fujiyama), then bonded with an isocrylophetalic/phenolic resin and coated with a diester demulsified lacquer. The process took three weeks, even in 1940. The cones have a stiffness-to-weight ratio which exceeds that of pure Beryllium at the time of manufacture and they double their stiffness every ten years by a scientifically-derived aging process while sealed in the lacquer for life. *Don't touch the cones!* Most people "tap" on speaker cones to see how they "sound." This is such uninformed idiocy, it literally makes me foam at the mouth and spit. Have you ever walked into a "Hi-Fi" (I use the term loosely here) shop and seen everyone in the store "tapping" the cones? How about music stores? Even with today's Blintz-ized speakers, a *drastic* change occurs when they are "tapped." Local changes in structure, caused by fingernail dents and local changes in material properties caused by "things" on people's fingers (mayonnaise, pizza oil, diet soda... my god, I can't go on think-

(continued on page 58)

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The AES Heyser Scholarship Fund



The Richard C. Heyser Scholarship Loan Fund has been set up to honor Dick Heyser, a highly gifted, loved and respected engineer, with a lasting memorial. The scholarship loan will financially assist promising graduate engineering students in the field who, otherwise, could not continue with their studies.

In March of 1987 Dick died, just a few months before he would have assumed the office of AES President. He not only was active in AES but he contributed greatly to the audio field through his Time Delay Spectrometry discoveries. He gave of himself on a personal level as well. Carolyn Davis, Co-Founder of Synergetic Audio Concepts, said of the fund, "Dick, himself, gave so much to all those with whom he came in contact, especially those just starting out; we feel Dick would have been pleased to know he is being remembered in this way."

In conjunction with this memorial, a major update of The PHD Program[†] will be dedicated to Dick Heyser and all the proceeds will go to the Richard C. Heyser Scholarship Loan Fund.

You may obtain a program for a donation of \$300.00 or more; prior owners may upgrade for a donation of \$50.00 or more. Make your check payable to the Richard C. Heyser Scholarship Loan Fund. Send to the Richard C. Heyser Scholarship Loan Fund, c/o *Sound and Communications*, 25 Willowdale Avenue, Port Washington, NY 11050.

[†] Trademark of Ambassador College.



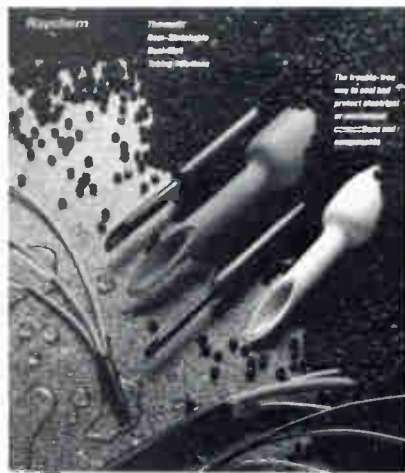
Winsted Catalog Now Available

The Winsted Corporation has released its 1988 video furniture catalog. The 100-page, full color catalog features a variety of new products that include Rack Mount Cabinets in compact and standard depths, Locking

Plexiglas Cabinet Doors, and Sloping Cabinets for the System/85 Series.

The catalog also provides a look at the complete selection of Winsted video cabinets, modular consoles, tape storage systems, and accessories.

Circle 6 on Reader Response Card



Raychem Tubing Brochure

Raychem Corporation has released

a new brochure and separate guide on its new line of Thermofit dual-wall, heat shrinking tubings.

The brochure's problem and solution format illustrates how the tubings work to seal, insulate and protect electrical or mechanical connections and components. The guide also describes basic properties and typical applications of the Thermofit tubings and contains information on applicable specifications and ratings on flammability, operating temperatures and shrink ratios.

Circle 7 on Reader Response Card

J.W. Davis Company Revised Catalog and Manual

J.W. Davis and Company has introduced a revised and enlarged version of the J.W. Davis Company Catalog and Reference Manual. The catalog includes several new features such as updated and expanded technical notes, reference tables and formulas, and an alphanumeric index.

Circle 8 on Reader Response Card

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FACES AND PLACES

Steve Wall Named General Manager

Comcast Sound Communications, Inc. has announced the promotion of Steve Wall to general manager of their Orlando, FL office. Wall joined Comcast's Orlando office in 1982 as a technician, and was named marketing executive in 1984. In his new post as general manager, he will be responsible for the marketing, administration, and engineering functions of Comcast's background music, commercial

sound, and electronics business in Orlando.

Soundtracs Announces New Marketing Manager

Soundtracs plc, Surrey, England has appointed Phil Guy to the position of marketing manager. Guy will be responsible for "increasing the company's profile in respect of new products" according to the company. Guy has over 9 years of experience in the

international pro audio industry.

Cabrera Joins Micro-Coax

Jorge L. Cabrera has been named manager of Micro-Coax's new RF Connector Products line. He will oversee the design, manufacture, and marketing of the new product line.

With more than 15 years of experience in the RF connector field, Cabrera was previously engineering manager at Solitron Devices, Inc.

REP NEWS

Jeron Electronic Systems held its annual meeting and awards presentation for sales representatives in mid-May during the National Sound and Communications Expo '88. John Charczuk, vice president of sales, presented award plaques for outstanding sales achievement. Reps cited for the award included: Gerry Horne, of R.G. Associates, Gus Gustafson Sr., of Gustafson Sales, Henry Phillips, of Henry Phillips Company, John Wilkin, of John S. Wilkin and Associates, Joe Wilson, of Central Marketing, and Phil Walter, of A.S.R. Enterprises, Ltd.

Wheelock, Inc., of Long Branch, New Jersey, has expanded sales coverage to upstate New York and four southeastern states with the recent appointments of rep firms, William H. Posthill Co., Inc., and Rohr, Wanger, Roberts, Inc.

William H. Posthill Co., Inc. has a staff of seven sales representatives, who are William H. Posthill, William M. Ryan, William H. Strong, Bradford A. Posthill, Marie Hartwell, and Forest S. Rittgers. James Rohr, John Wanger, William Roberts, and Donald Grossman of Rohr, Wanger, Roberts, Inc. will represent Wheelock in South Carolina, Alabama, and eastern Tennessee.

Soundtracs PLC has announced a joint venture with Samson Technologies Inc. for national sales and marketing of Soundtracs mixing consoles. Dealer training and promotion will continue to take place throughout the

second half of the year.

At a recent RAMSA national sales meeting on the West Coast, David Henderson, Manager of Pro Audio Associates, won the RAMSA/Panasonic's Eastern Regional Representa-

tive of the Year Award for outstanding personal effort and cooperation in 1987. The award was presented by David "DJ" Bierut, Eastern Regional Sales Manager, and Steve Woolley, National Sales and Marketing Manager.

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THEORY & APPLICATION

(continued from page 16)

process will quickly reveal to the technician the extent of the sound system need. For example, rooms with no off-system intelligibility for large audience areas can be extremely problematic, possibly requiring double sound sources and time-delay circuitry, contributing to the difficulty of design.

Room Acoustics Metric

John Bradley, of the National Research Council of Canada, has developed a useful metric for viewing speech intelligibility in large rooms as

a function of signal-to-noise ratio and reverberation time. This metric is embodied in the following chart (See Figure 8).

Simply by measuring the excess level produced by a voice tape above the background noise level (both A-weighted), and by knowing the general range of reverberation time present, a quick estimate of speech intelligibility can be made. If this value is rather low (below .4 AI), the room is therefore more difficult to deal with.

Summary

A simple set of tools will assist in the process of informal room evaluation, and the tools I would suggest are as

follows (See Figure 9).

In addition, an inexpensive test system can be made far more accurate via calibration, and this can be accomplished by a short visit to an audio testing firm. This calibration can establish values for normal and raised voice levels, tape recorder voice tape levels and increments of change, sound level meter calibration, as well as powered speaker level and calibration. The most beneficial result of informal testing is a more intuitive view toward the design process and toward the problems experienced (and resolved) by the audio system designer/technician. ■



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R-431 Graphic Equalizer (top) R-830 Graphic Equalizer (bottom)

Circle 240 on Reader Response Card

CONSULTANT'S COMMENTS

(continued from page 18)

Failure to respond to the requirements of the technician can result in an attitude problem. A tech, as well as his foreman or field supervisor, can easily get the impression that the main office has other priorities. Depending on the personality of the tech, he'll either get the idea that not caring about the project is an acceptable attitude, or he'll become a martyr, the only one in the company who can get the job done. Neither attitude will lead to a successful completion of the job. The simple courtesies of returning phone calls and answering questions without making the asker feel foolish (remember that the only foolish questions are those that are not asked), gives the impression that you are behind them all the way. A simple site visit with a few "attaboys" and an occasional round of beers (or whatever is appropriate) after work will do wonders. And while everyone knows that sooner or later there will be a crunch that requires extra work from the techs in the field, despite overtime, fifty to seventy hour weeks should never be the norm. Tired workers who haven't seen their families or friends recently just don't work as efficiently. Finally, working late to get the system nearly perfect before the consultant arrives is one thing. Working late to finish before an unrealistic deadline because some important equipment arrived at the last minute is quite another.

Just after the Project Management Organization session, panelist Tom Knauss, a project manager with Pierce

Phelps of Philadelphia, PA was asked by another contractor how to account for project management in a budget. Tom's response was that any project, regardless of magnitude, should have a separate line item in its budget for the time that the project manager will be *managing* — time that is all too frequently not well tracked and recorded. While it is certainly difficult to know how much time will be required, an amount of time must be estimated and a corresponding cost must be included in the final price bid. Do not delude yourself into thinking that this money is not being spent simply because it is not accounted for — it is being spent, and it is being deducted directly out of your profit margin.

Project management is the same thing as profit management, so this will not be the last time the topic is discussed. I would be interested to hear if there are any particular areas of project management that sound contractors are specifically interested in exploring. Please let me know by contacting me directly or in care of this magazine.

The rumors concerning the disappearance of Marc Beningson are greatly exaggerated. After a number of months of rest, relaxation, and extensive travel, he is back in Norwalk establishing his own consulting practice. Consultant's Comments will once again appear as a regular feature. ■

PALACE THEATER

(continued from page 36)

needs. The changes arose because of the introduction of some new products since the specification was written, such as the Yamaha PM1800 mixing console and the Atlas/Soundolier AC power sequential switch system. The under-balcony speakers originally specified became obsolete in the time between design and construction phases and were replaced with JBL components in custom enclosures designed by Jaffe Acoustics' Chuck McGregor.

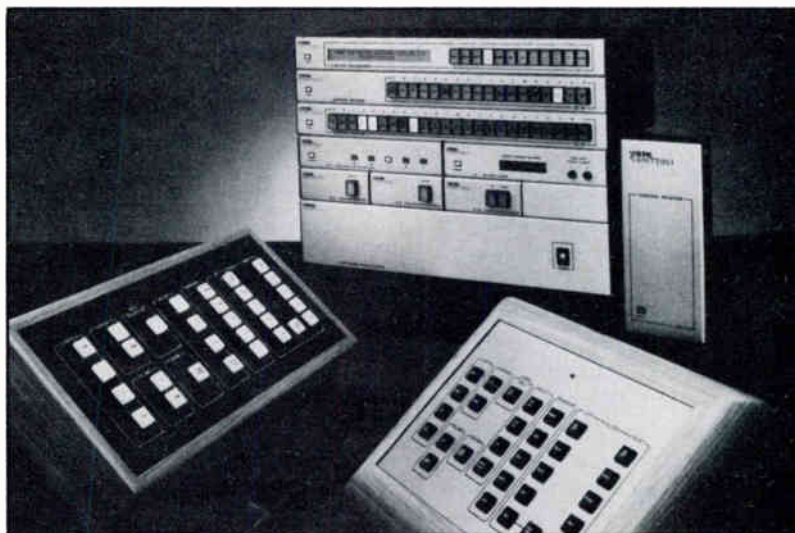
Jaffe Acoustics and Byers Engineering worked together to coordinate audio system electrical requirements. Those requirements were enforced during the construction phase by Sound/Com, working with the electrical contractors Doan Electric Company, and with Jaffe Acoustics.

All sound system design proposals were reviewed by van Dijk, Johnson and Roger Morgan to insure that architectural and theatrical design intents were met.

Key sound system locations include the sound equipment or "rack room" located on the mezzanine level at stage left. All house sound amplification is located in racks along with the patch bay, crossovers, under-balcony speaker displays, intercom station, CCTV monitors, and custom control panels. Also located in this room are the "sound clean" power panel and power conditioner. There are two house mix positions located on center line, at the

third cross aisle box and at the standee rail. Both house mix positions have access to all stage, intercom, and return lines. The forward house mix position is located beneath the floor plenum area along with AC "clean power" outlets. The light control room has several intercom plug boxes, full paging facilities, 12 audio tie lines, and video lines allowing the stage manager to run the show from this location. The stage layout includes stage and monitor mix plug boxes mounted on the proscenium wall at either side of the stage, and on the back stage wall as well. The orchestra pit has plug boxes, with stage and tie lines, at both

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World Radio History

left and right locations.

The Gala Opening of the Palace was scheduled for April 30, 1988, with a special preview scheduled for April 28. Electrical and acoustical verification tests, and systems acceptance tests were scheduled to run the week before opening night. The electrical verification test included an analysis of the systems' freedom from audible clicks, pops, oscillations, rf interference, and other undesirable noises. Loudspeakers were checked for buzzes and rattling noises, reverberation time measurements were recorded for evaluation at a later date, noise measurements were taken, and the overall system was measured for noise voltage gain and frequency response.

Jaffe Acoustics' McGregor was pleased to report that the completed inspection resulted in a "punch list" with only two items. The first was a mislabelled panel, the second was a loading problem on auxiliary receptacle panel transformers. With these minor exceptions, the system was found to be properly installed and working according to specification.

The special preview concert provided an excellent opportunity to fine tune and evaluate the sound system's performance. A comedian was to open the show, followed by the evening's feature attraction, a jazz vocal group. The comedian's routine was successfully delivered and vocally intelligible. However, the jazz group's vocals were entirely unintelligible in the balcony. It was determined that sound radiating from the stage monitors was reflecting off the stage back wall and interfering with the house sound. This was due to a lack of absorptive panels (deleted due to budgetary constraints) for the back stage wall, and a velour traveler that had not yet been installed. For the Gala Opening, the stage monitors were carefully angled to reduce reflections into the house, and the traveler was installed, providing adequate absorption. Additional fine tuning involved setting the gain structure to the house mix console, reducing minor noise from the house stacks and center array to virtual inaudibility.

Having tested, tuned, and tweaked the sound system before the Gala Opening, the Palace Theater sound system successfully met the performance needs of the evening's stars Burt Bacharach and Dionne Warwick. ■

PRODUCTS IN REVIEW

(continued from page 49)

ally for central office and large corporate voice applications. The 3110 was designed to comply with Bellcore's Network Equipment Building Standards (NEBS).

The VoiceServer utilizes Digital Sound's UNIVOX operating system that features dual Intel 80386 system controllers and Texas Instruments' TNS 320C25 digital signal processors. This system provides voice processing, including voice compression, speech recognition and text-to-speech. With disc drive capacity of eight 760 MB disks, the 3110 can provide up to 900 hours of voice storage.

The VoiceServer can also be used for a variety of voice applications other than voice messaging, including audiotex and interactive voice response. The 3110 will be available in November, 1988.

Circle 9 on Reader Response Card

CLOSER LOOK

(continued from page 51)

ger), and can be actuated by continuous or momentary contact closure. The trigger input is transient protected and debounced (manual start/stop buttons are also provided on the front panel). The signal output is adjustable from -10 to +10 dBv, with a 10 ohm source impedance. An audio monitor (test) jack is provided on the panel for each output. The internal clock is adjustable +1 octave referenced to a 10 kHz center frequency (for retuning in custom applications), and an external crystal reference is available as well. Circuit card audio connectors are via gold plated Molex type connectors, and memory is socketed in double-wiping beryllium copper AMP sockets.

One intriguing application would be, for example, paging simultaneous emergency instructions in multiple languages to a United Nations-type audience via translation headphones. Another would be paging simultaneous emergency instructions in a single language to different areas of a hotel or factory, each custom-tailored to the area (e.g., "leave now via the door at the end of the hall" and "leave now via the fire escape outside the south window" — you get the idea).

I asked David Geoghegan (pronounced "Gay-gan") at 360 whether the 15 kHz bandwidth made much difference in a paging application. He said that even with narrower bandwidth playback systems, the better the quality that goes in, the better the result. Certainly for musical or special effects playback (as in theme parks), the wide bandwidth mode is a plus. Overall, it would seem that 360 has built the unit to be reliable, flexible and very simple to use. Given its features, pedigree, and performance, we feel the Quadfile deserves your Closer Look.

About the Author:

Gary Davis is president of Gary Davis & Associates, Topanga, CA. The firm has provided technical writing, advertising, consulting, public relations, and marketing research to the pro audio industry since 1974. Mr. Davis authored, designed, and illustrated the *Yamaha Sound Reinforcement Handbook*, along with his associate, Ralph Jones.

Circle 10 on Reader Response Card

DEAR DR. WOKKA

(continued from page 52)

ing about this) causes such a change that the speaker's sound becomes radically different from its original (though pedestrian) sound. Speaker "tapping" is one of the most hideous and nauseating habits in our society. Even I, (I hate to admit this, but must show that my Great Wisdom does not obscure my humanity) have lost control over witnessing this act: On Columbus Day, 1978 in Crazy Eddie's on Aramingo Avenue in Philadelphia, I performed 27 bold citizens' arrests when mass speaker "tapping" nearly drove me to madness in the hi-fi department. I had to be subdued by the local SWAT team. Following this incident, I retreated — shocked and disillusioned — into exile to a bombed-out Atlantic City slum where I learned that absolutely *none* of my citizens' arrests were valid. I still cry over this memory. (My colleagues at the Medical College later found me begging for quarters outside Harrah's while they attended a Musical Therapy convention and nursed me back to health and also to my obvious present state of wisdom). What I'm leading up to is that *Great Men of Audio Science do* *(continued on page 60)*

DATEBOOK

DATE	EVENT/COMMENT	LOCATION	CONTACT
July 9-14	ICIA International Communication Industries Association	Indianapolis, IN	Debbie Hafer (703) 273-7200
July 23-26	IAAM	Nashville, TN	(312) 661-1700
Aug. 11-13	ICIA video, audio-visual computer seminars	Westchester, NY	Debbie Hafer (703) 273-7200
Aug. 16-18	(AFCEA) Armed Forces Communications & Electronic Association	Philadelphia, PA	Brad Hoelscher (215) 354-2802
Aug. 23-25	ISC	New York, NY	
Sept. 1-3	ICIA video, audio-visual computer seminars	Toronto, ON	Debbie Hafer (703) 273-7200
Oct. 3-4	Kentuckiana Sound Seminar	Indianapolis, IN	Andy Baker & Assoc. (317) 253-9667
Oct. 6-8	ICIA video, audio-visual computer seminars	Atlanta, GA	Debbie Hafer (703) 273-7200
Oct. 12-15	IBMA	Fort Lauderdale, FL	(216) 833-4164
Oct. 19-21	Network 90's Telecommunications Conference & Expo sponsored by USTA & USTSA	San Francisco, CA	Paul Roguski (202) 835-3158
Oct. 22-25	NECA	New Orleans, LA	(301) 657-3110
Nov. 3-6	AES	Los Angeles, CA	(212) 661-8528
Nov. 14-18	ASA	Honolulu, Hawaii	
Nov.	NCAC	Honolulu, Hawaii	(201) 379-1100
Nov. 18-20	LDI Lighting Dimensions International	Dallas, TX	Patricia MacKay (212) 677-5997
Nov. 29-Dec. 1	Unicom II Expo & Conference Sponsored by NATA	Dallas, TX	Kay Hynson (703) 273-7200
Jan. 15-18 '89	PTC Pacific Telecommunications Council	Honolulu, Hawaii	Richard Barber (808) 941-3789
Feb. 2-4	INFOCOMM sponsored by ICIA & AECT	Dallas, TX	Kay Hynson (703) 273-7200

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DEAR DR. WOKKA

(continued from page 58)

not tap on loudspeaker cones! In the old days, this was an enforceable misdemeanor, when WE were considered valuable to the society. Enough emotion — back to science.

If you would like to know, you can tell if your Western Electrics have been “tapped” by sending them to our lab. This is well worth the \$2,500.00 charge. If they have been “tapped,” we can “de-tap” them, a laborious and expensive procedure for a fee we won’t mention here. Believe me, it’s worth it, and you’ll have a Dr. Wokka certification stating that your speakers are “Genuine Originals.”

In conclusion, *Old Loudspeakers are best*, a fact that your “artsy” uninformed, unscientific editor friend has somehow stumbled upon. In the Old Days, *Great Men of Audio Science* walked the earth and produced audio gear according to the *Great Laws*. Today, we have abominations. I hope to finally lead a crusade back down the yellow brick road of Good Sound, by continuing to provide Wisdom via Good Works.

¹ This and certain other names have been deleted, so as not to dull the scholarly and altruistic sheen of this column with commercial trademarks and personal liability problems. Ed. ■

SUPPORT • SUPPLIES SERVICES

(continued from page 48)



Aiphone Intercom System Demo Kit

The Aiphone Corporation has in-

troduced a hands-on demonstration kit for the company’s M Series Video intercom system.

The kit includes an Aiphone MC-D door station camera, MC-U video monitor, IC-1AD master station, PS-24N power supply, and MC video stand. A standard 110-volt outlet is all that is required to power the kit.

Circle 11 on Reader Response Card



Rapco’s Cable Doctor and The Connection

Rapco Cable & Lighting has announced the release of a new cable tester, the CD-100 Cable Doctor. The CD-100 allows hands-free testing of balanced, low impedance and high impedance cables for shorts, opens and proper phase. Connectors on the box are male and female XLR, stereo and mono ¼” jacks, and RCA phono jacks. The Cable Doctor is encased in a tough die cast aluminum box for extensive “road use.”

Also available from Rapco is the AB-100 connection box, dubbed “The Connection.” The design of the AB-100 allows both channels to operate independently or together by utilizing two foot switches. LED indicator lights alert the player to which channel is in operation.

Circle 12 on Reader Response Card

Microtran’s Interconnect Transformers

Miniature 375V hipot telephone interconnect coupling transformers designed to meet European/International standards, such as VDE, BSI, Australian Telcom and FCC Part 68, have been introduced by the Microtran Company.

Designed to connect voice/data modem terminals to the telephone lines, these units are believed to be the smallest commercially-available transformers able to meet the creepage and clearance requirements of international standards.

Circle 13 on Reader Response Card

CLASSIFIEDS

AUDIO SYSTEMS ENGINEER

Holmes & Narver Inc. is seeking an engineer with technical knowledge of audio systems design. Experience with intercom and public address systems integration along with noise control engineering desirable. Job requires project organizational abilities and interaction with client. BSEE or equivalent is required. One year of design experience and professional registration is a plus.

Qualified applicants should forward their resume and salary history, including salary requirements, in confidence to: Donna Neese

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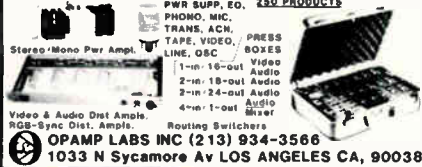
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TECHNICALLY SPEAKING

The Business of Technology

Everybody knows that digital is here. Everybody agrees that we are on the threshold of establishing communications at the speed of light. Most of the products we use are provided by a few major companies. These companies are mostly engineering- and technology-light, compared to other industries in the aerospace, solid-state, computer, and bio-medical sectors.

Most of the technologies we see developing today are extensions of the information base established during audio's golden years. Microphones, amplifiers and loudspeakers are not radically different in basic principles from those developed during the years between 1925 and 1975. New materials, devices and manufacturing processes are, for the most part, the focus of current development and reflect the capability of in-house engineering.

Small entrepreneurial engineering-based companies are all around us with revolutionary ideas. Some of these ideas make it to the marketplace with limited success; some of these "idea-factories" are bought by large manufacturers. Still others flourish. But it takes more than ingenuity and capital — it takes a pipeline.

At one point there were two prime sources of technology, support, manufacturing and distribution: Western Electric and RCA. As these companies became less interested in audio, smaller companies became involved. Those fortunate enough to be in a position to carry on the efforts of Western Electric and RCA have now formed the core of our industry.

During the end of this decade, and into the 1990s, there will be a return to a small group of super-companies. These super-powers will buy technology from allied industries, grow through company acquisition, and position themselves to "invent new wheels." Our industry, which has been surviving on a technology plateau for some time now, is being forced by society, business and culture to grow beyond what our present structure will allow. To be able to succeed as the service industry that we are — providing the means to intelligently communicate — the super-power concept will most effectively spur the necessary growth and increase in new technology, research and education for the sound and communications industry. Of course, opportunities will always exist for the individual entrepreneur or small company. But they may find larger companies offer greater opportunities, granting access to marketing and distribution systems, and providing funds for research and production.

Manufacturers will have to computerize every step of their operations to remain competitive, and this will reflect in their products. Joining the mainstream of high-tech manufacturing, companies will incorporate computer technology at the design, engineering, product, manufacturing, systems, administrative and sales levels. Contractors too will be more involved with this "super-power" concept. Contractors will also have to be more competitive than ever before, and be able to grow to the next plateau of technology. The level of technology that we are developing now is one that will make the evolution of the transistor seem trivial.

When the all-in-one manufacturer is the common denominator, the sound and communications sector will have achieved equal stature with its high-tech brethren in the electronics industries. The technology now being developed for DSP and ISDN will be part of all undergraduate engineering curricula — along with acoustics and electroacoustics. The science and art of electroacoustics will evolve with computer technology, just as music technology — and music itself — is growing up with computers.

Jesse Klapholz
Technical Editor



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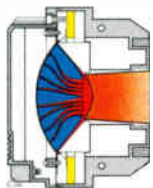
Circle 221 on Reader Response Card

It Takes More Than A Little Neodymium To Change The Face Of Driver Technology.



Hailed as the catalyst for a new generation of high performance compression drivers, the rare earth compound neodymium showed up in our R&D lab shortly after it was first formulated. But its extremely high cost and sensitivity to heat had to be overcome before neodymium could live up to its full potential.

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This new design, a phasing plug with annular apertures of constant path length, uniformly directs sound through to the throat providing in-phase combining of sound waves for extended high frequency performance. This new technology is combined with our patented diamond surround titanium diaphragm, incorporating a new embossed dome, to reduce the possibility of distortion or damage at high SPL.



2450J

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Yes, it took more than a little neodymium to change the face of driver technology. But we're confident you will find the breakthrough results were certainly well worth the wait and the effort.



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