

SOUND & COMMUNICATIONS

FOR CONTRACTORS, SYSTEM MANAGERS AND SPECIFIERS MAY 1986

TODAY'S CONTRACTING BUSINESS

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MARK GANDER
JBL INCORPORATED
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An In-Depth Market Report Conducted By Sound & Communications Magazine And The NSCA

Sound Masking Theory and Techniques
Finding the Right Manager for Your Business



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Live Sound Engineer



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Danny Watson
Promise Productions
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"We Can Customize The Sound System For Each Job."

Miles Kapper
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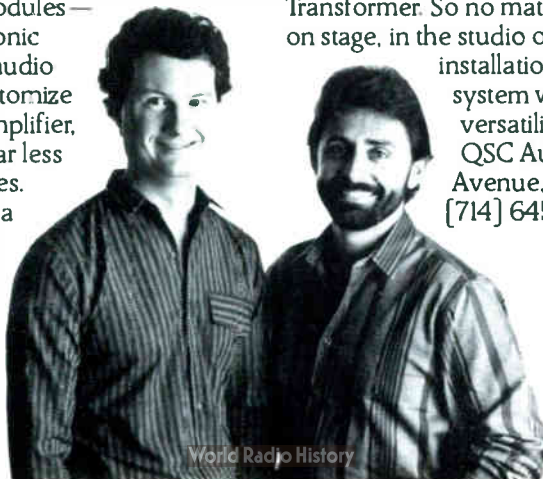
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Vice President/Engineering,
QSC Audio.



Barry Andrews
President,
QSC Audio.

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SOUND & COMMUNICATIONS

May 1986

Volume 32 #5

FEATURES

SOUND MASKING: THEORY & TECHNIQUES

12

In an overview of sound masking market, Jesse Klapholz discusses the acoustics and psychoacoustics of open-plan offices. Al Siliati of Insul-Art Acoustics takes these basic concepts and implements them with hardware and outlines designs for sound masking systems. And Denis Milsom adds a few words from a consultant's point of view.

TODAY'S CONTRACTING BUSINESS

22

Earlier this year, the National Sound and Communications Association and *Sound & Communications* magazine surveyed over 1,300 contractors on the state of their business, the markets they're involved in, their sales statistics, and more. Over 23 percent of the contractors responded. Their answers, summarized in this report, give a new and more clearly focused perspective of the sound and communications contracting business.

HIRING THE RIGHT MANAGER FOR YOUR BUSINESS

34

As many contractors' expertise lies in the engineering, design and installation of sound and communications systems, they often find themselves in need of a general manager. Jeanne and Herb Greenberg of Caliper Management, Inc., management specialists, outline the characteristics and qualities of a good manager.

COLUMNS

IDEAS & OPINIONS

6

Just back from the NSCA Contractors Expo in Las Vegas, Chris Foreman gives a brief report on the highly successful show. He also comments on the changes at *Sound & Communications* magazine. It's *Onward and Upward* for both organizations.

SALES & MARKETING

11

Jeff Schwartz talks to people from the manufacturing, contracting, and trade association sectors of the sound and communications industry about the training and education of sales people. Also, Chris Foreman reviews the book "Strategic Selling."

DEPARTMENTS

NEWSLETTER	8
LETTER & OPINIONS	10
PRODUCTS IN REVIEW	40
A CLOSER LOOK BY GARY D. DAVIS ..	42
FACES AND PLACES	46
REP NEWS	47
CONTRACTOR CLOSE-UP	48
AD INDEX	50
DATAFILE	52
BOOK REVIEW BY TED UZZLE	53
SUPPLIES/SUPPORT/SERVICES	55
DATEBOOK	56
CLASSIFIEDS	58

ON THE COVER

Today's contracting business encompasses over 25 different market segments according to the recent market survey conducted by the NSCA and *Sound & Communications* magazine. For a summary of the full "report" turn to page 22.

combining **SOUND MERCHANDISING & MODERN COMMUNICATIONS**

FOUNDED 1955

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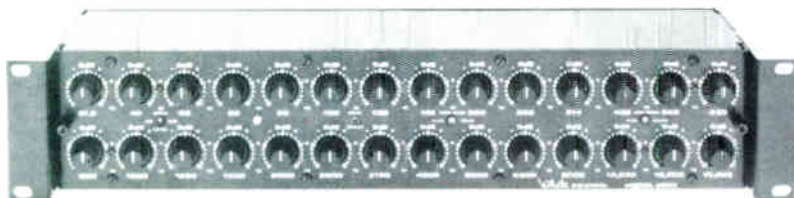


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ONWARD AND UPWARD

by Chris Foreman

As a magazine and as an industry we had a great show in Las Vegas. As of the second day of the convention there were 173 manufacturer booths and over 3,000 attendees. If you didn't come, you missed any number of excellent business and technical seminars including a great keynote address "New Selling Techniques for Today's Buyers" by Jack Berman. A whole group of new products were on display and there were demonstrations and discussions of new computer software for sound and communications contractors.

If you were unable to attend the Contractor's Expo, next month's *Sound & Communications* will be reviewing some of the new products and other highlights from our get together in Las Vegas.

Sound & Communications magazine produced NSCA-TV News, a series of interview and news stories that was "narrowcast" to every hotel room 24-hours-a-day during the show. We presented preliminary results from the *Sound & Communications/NSCA Contracting Survey* (see details in this issue) and I chaired a well-attended panel discussion on "Expanding Our Markets." I also attended the NSCA board meeting where I learned that there are several new videotapes available to members at no charge and that a "contractor owner and manager" handbook is being prepared to deal with subjects ranging from bid and quote forms to training to typical financial ratios for a contractor business.

Next year's NSCA is in New Orleans at the Fairmont Hotel with tentative dates from April 5-8, 1987. Be there. For more information, write the NSCA at 501 West Algonquin Road, Arlington Heights, IL 60005-4411 or call (312) 593-8360.

New Directions

This is my last month as "Editorial Director" of *Sound & Communications*. I have accepted a marketing manager position at Panasonic Industrial (Ramsa) and I feel that the conflict of interest in maintaining both jobs would simply be too great. I will continue to contribute from time to time.

Under the direction of publisher Vinny Testa and with the presently enlarged editorial staff at *Sound & Communications*, I am confident that the magazine will continue to grow. *Sound & Communications* was there 32 years ago when this industry was first coming together and it is here today continuing to serve the informational needs and interests of the sound and communications industry.

Welcome also to Jesse Klapholz, *Sound & Communications'* technical editor. Jesse's reputation as a consultant and technical author has been growing steadily for the last several years and we are very pleased to have him on the *Sound & Communications* staff. And next month, look for our new Technical Council of experts including, consultants, contractors, and academia from various areas of the sound and communications industry. This is just one more example of *Sound & Communications'* commitment to the industry. Nancy Peterson, Jesse Klapholz, Elliott Lubber, Iver Rose and publisher Vinny Testa have my best wishes for their continued success with *Sound & Communications*. With your support as readers and advertisers, I know that success will be there.

NADY 501 VHF WIRELESS. AFFORDABLE, AND EASY TO USE.

The Nady 501 VHF Wireless System is the perfect wireless for most stages, churches and studios. List price is under \$900.



And we designed the 501 with the speaker or entertainer in mind — you don't have to be a sound engineer to set it up and use it.

The 501 VHF is available with a good-looking handheld microphone/transmitter or a bullet-proof lavalier microphone transmitter. A lightweight, portable AC or DC-powered receiver completes the system.

Nady VHF wireless is the choice of today's major musical groups. Nine out of ten (based on *Billboard Magazine's* 1985 Talent Almanac) use our wireless microphone and instrument systems.

There are reasons for this. Nady Wireless is road-proven dependable. With audio quality that measures up to these artists' demanding standards. (Try a side-by-side comparison yourself — Nady Wireless always sounds best.)

Send for the specs on our affordable 501 VHF Wireless System. Or ask your Nady rep for a demonstration. You'll like what you see — and hear.



Nady Systems, Inc.
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415/652-2411



NSCA EXECUTIVE COMMITTEE APPOINTMENTS ANNOUNCED AT EXPO

The National Sound & Communications Association elected a new executive committee and board of directors at the recent NSCA Contractors Convention in Las Vegas. Harold Lander of Signal Communications of Seattle, WA, was elected chairman. Harold George of Indiana Electronics of Granger, IN, is the new NSCA president. Mel Wierenga of Ascom Inc. of Wyoming, MI, was elected vice president. W.G. "Jack" Redd of ICMI of Montgomery, AL, was elected treasurer. Bud Rebedeau remains executive secretary. W.G. "Jerry" Palmer of Audio Systems of Florida Inc. of Winter Park, FL, was elected to the board of directors. According to Rebedeau, dates for the next NSCA Contractors Expo have been changed in order to avoid a conflict with the final day of the Audio Engineering Society's Convention in Europe. It was to have begun March 13, 1987. However, the Contractors Caper will now begin April 5, 1987, with the Contractors Expo taking place April 6, 7, and 8, at the Fairmont Hotel in New Orleans, LA.

YAMAHA ENTERS MICROPHONE MARKET WITH FIVE NEW MODELS AT NSCA EXPO

Yamaha International Corp. has entered the microphone market with its introduction of five models at the NSCA Contractors Expo. Included are three vocal microphones and two instrument microphones. Two of the vocal mics and one of the instrument mics feature the industry's first microphone diaphragms made from Beryllium. According to Bob Davis of Yamaha, "I think you will be seeing many more microphone models from Yamaha in the future."

GTE CORP. AND FUJITSU LIMITED ANNOUNCE INTENT TO FORM JOINT PBX VENTURE

GTE Corp. and Fujitsu report that executives of both companies have signed a memorandum of understanding regarding their intention to form a joint venture for developing and marketing private branch exchanges and related business communications systems for the North American marketplace. The memorandum was signed by Takuma Yamamoto, president of Fujitsu and by Theodore F. Brophy, GTE chairman. Said Yamamoto, "Today's memorandum of understanding signifies Fujitsu's continuing commitment to the American market. Through the formation of this U.S.-based joint venture company, our relationship with GTE will enhance and expand our service commitment to the communications needs of American business." Brophy added, "We believe that the market position of our now separate efforts would be significantly enhanced by combining the respective strengths of GTE and Fujitsu in marketing and developing business communications systems."

MTX SIGNS AGREEMENT TO DISTRIBUTE COM DEV PRODUCTS IN CANADA

Com Dev Inc. has signed an agreement with MTX Telecom Services Inc., providing for MTX's exclusive distribution rights to Com Dev's entire call accounting product line in Canada. As a wholly-owned subsidiary of Canada's fourth largest telephone company, the Manitoba Telephone System, MTX markets a broad range of consulting services and telecommunications products in Canada and the United States. The arrangement contains commitments totalling almost \$1 million over the two year period of the contract. Products covered by the agreement are the 8200 Series™ Telecommunication processor, Ratepro™ solid state call accounting system, Accountant® line scanner, NP 9000® network polling system and STU™ SMDR translator unit. Com Dev manufactures a variety of PBX peripheral products.

ELECTRO-VOICE TO DISTRIBUTE UNIVERSITY SOUND PRODUCTS

Electro-Voice, Inc. has announced that it has undertaken distribution of University Sound Commercial sound loudspeakers and accessories. In addition, University customers will be serviced by the Electro-Voice network of manufacturers representatives. Manufacturing, warehousing, and product service will take place at University Sound in Oklahoma City, OK.

In other news, the completion of the acquisition of Gulton Corporation, the parent company of Electro-Voice, Altec Lansing, and University Sound, by Mark IV company was made effective as of May 14, 1986.

EIKI TO PURCHASE BELL & HOWELL'S U.S. A/V MARKETING & DISTRIBUTION OPERATIONS

Bell & Howell Company has announced that it has reached an agreement under which Eiki International, Inc. will purchase Bell & Howell's U.S. audio visual marketing and distribution operations. According to Donald Frey, chairman and chief executive officer of Bell & Howell, the decision to sell the business was, in part, related to the company's decision to sell the Lincolnwood facility which houses the audio visual division. Koji Sekino, president of Eiki International, said Eiki is committed to maintaining the same quality of product and service provided by Bell & Howell to its customers over the years. Bell & Howell will provide audio visual products to Eiki until November at which time the Lincolnwood manufacturing operation will be discontinued. Eiki also announced that Bell & Howell's Canadian subsidiary will become Eiki's exclusive distributor in Canada. Bell & Howell's other international audio visual operations are not affected by this agreement.

STUDY FORECASTS \$6.35 BILLION IN PABX SALES BY 1990 AND HEAVY COMPETITION

A new study, conducted by Frost & Sullivan, Inc. in New York, forecasts that the PABX market in the U.S. will ring up sales of \$6.35 billion by 1990, growing at an annual rate of 7.5 percent from \$4.4 billion in 1985. (All market forecasts are at the end user level in constant U.S. dollars.) According to the study, "The PABX Market in the U.S.", the divestiture ruling changed the PABX industry structure by putting the Regional Bell Operating companies in direct competition with AT&T. And, the independent telephone companies are also ready to join in the fray. The study predicts there will be a considerable shakeout in the market over the next five years. The study reports: with major PABX manufacturers currently shipping third generation products and smaller start-up ventures are shipping fourth generation products, an interesting dilemma is created. The established manufacturers have developed customer bases into which they want to continue selling. However, this entails a potential risk: introducing a fourth generation PABX might force their customer to replace existing systems, opening up the opportunity for the buyer to continue purchasing from them, or from a new vendor. The start-up vendors, with fourth generation offerings, do not have this dilemma. It is anticipated that the major PABX manufacturers will develop or acquire fourth generation PABX's in the future. But start-ups, lacking a customer base, will have to sell new applications such as low-end voice/data systems, or convince current users of the improved capabilities and features of their PABX. The market will continue to undergo dramatic changes throughout the forecast period. For more information, contact Customer Service, Frost & Sullivan, Inc., 106 Fulton St., New York, NY 10038; (212) 233-1080.

LETTERS & OPINIONS

In its December issue, Sound & Communications published an article on nurse-patient communications ("Monitoring the Nurse—Patient Communications Market") which reported on the influence of the microprocessor on this market. In response to this article Ronald Rosen of New England Sound & Communications, Inc. wrote a guest editorial ("In Defense of the Microprocessor") which appeared in the February issue. Rosen took particular note to comments made by H. Kelsey Page of Crest Electronics who was not "sold" on the benefits of microprocessor based nurse call systems. The following is Page's response to Rosen's editorial.

STILL BELIEVES IN SEEING

I read with interest the Guest Editorial in your February 1986 issue. Mr. Rosen raises several points concerning microprocessor nurse call systems which require an answer.

First, Mr. Rosen indicates that "a

small minority" of healthcare institutions utilize visual rather than two-way voice systems. Such a statement belies Mr. Rosen's asserted expertise in the field as by far the majority of hospitals and nursing homes in the United States have visual calling systems. It is this fact, coupled with market research indicating a high level of facility and patient satisfaction regarding visual systems which most likely influenced North American Phillips to leave the nurse call system market. Its flagship system? Microprocessor-based nurse call. Undoubtedly, this state of the market was also a dominant factor in Square D Company shelving its plan to market a microprocessor product. One need only attend a national trade show to witness the continual inability of major manufacturers to make their microprocessor systems perform even the simplest functions.

Mr. Rosen further states that a microprocessor system "does more—costs less." Such half-truths are the standard fare for the microprocessor salesperson. Although it is true that

the microprocessor can "do more," the cost of such systems far exceeds that of a visual or conventional two-way voice system. In addition to the expensive hardware, a facility must constantly employ what Mr. Rosen terms a "technician." Such technicians, when they can be found, charge an average of \$50 per hour portal to portal. Some savings!

Regarding Mr. Rosen's query as to why "if the microprocessor systems are such a problem someone could explain why the U.S. Government mandates that type of system...in the revised specifications." See the government specifiers of the \$554 toilet seat and the \$700 hammer. They probably have the answer.

H. Kelsey Page
Vice President
Crest Electronics
Dassel, MN

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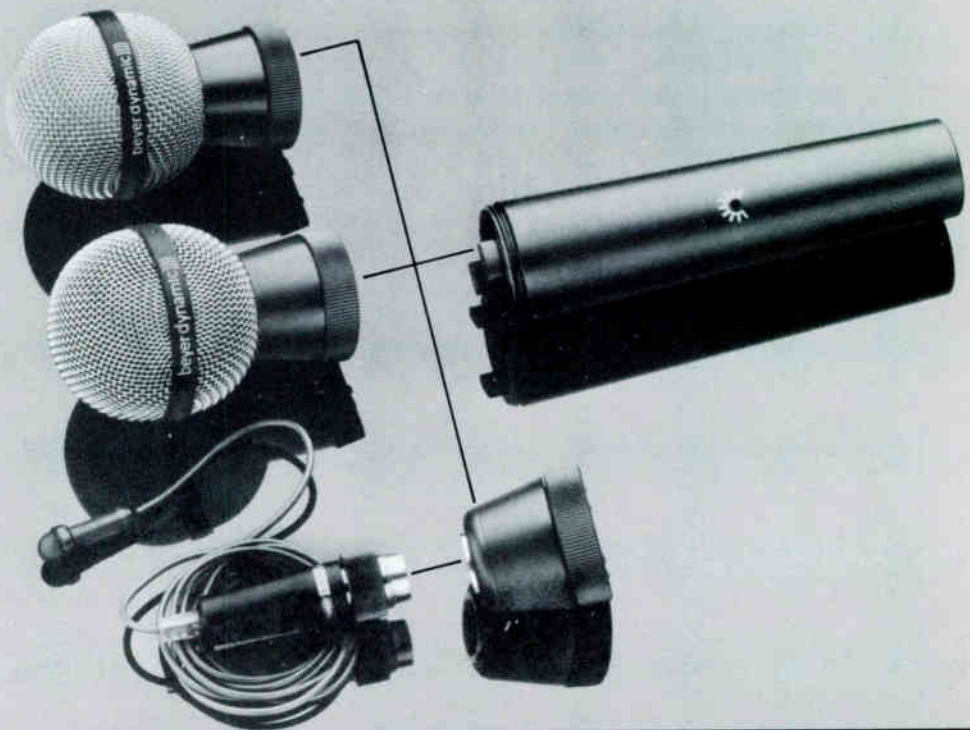
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Effective communication depends on much more than physical mobility. A truly useful wireless system must combine flexibility with sonic accuracy. So each Beyer wireless component has been designed as part of a fully integrated system.

Our S 185 transmitter illustrates Beyer's unconventional but highly practical engineering approach. It accepts both the BM 85 ribbon element and EM 85 electret condenser capsules for hand held use. With the AH 85 adapter, the S 185 becomes a belt pack transmitter for the MCE series of lavalier condensers. Beyer wireless lets you choose from the widest range of applications, with confidence that all your choices have the characteristically warm, transparent Beyer sound.

Audio accuracy is one reason Beyer wireless is the leader in Europe - as it has been since we introduced the first professional wireless system in 1962. For more information on Beyer wireless systems, and on our complete range of mixer/amplifiers, speakers, pagers and switching systems, contact:

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Fisher Berkeley Corporation, manufacturers of EKTACOM products, presents the most advanced hospital communications system — for patients and staff — yet to be developed, the MMC.

SIMPLICITY

Simplicity From the Operator's Viewpoint:

- Calls are displayed in English and identify the origin, type and priority.
- To respond, operator pushes the button adjacent to the display to be answered — any of the five displays may be answered in any sequence.
- Many special functions and features: calling them up requires pressing one button. Menu driven procedures provide ease of operation — no books, no charts, minimal training!
- 24 different types of calls may be received from 'routine' to 'fire': operator may upgrade low priority calls at the touch of a button.
- Single Touch will display location of staff closest to the patient.
- Automatic Hold feature allows operator to answer other calls without inadvertently losing a call by forgetting to press "Hold" button. One Touch Recall — no need to redial.



Fully waterproof shower station

- Large, bright, blue fluorescent display for clearest possible viewing.
- Calls are sorted automatically by priority and age.
- Calls may also be answered automatically in order of priority or direct selected at nurse's discretion.
- Incoming volume control allows operator to hear quiet patients clearly.
- Nurse locator circuits allow data to be updated from the nurse control station.
- Bedside stations can be programmed for Locking, as well as Routine and Emergency. This is important when patients speak a foreign language or cannot talk.

Simplicity From the Installation/Maintenance Viewpoint:

- Four pair of wires loop from room to room, no home runs!

- Smaller conduit, lower cost, easier rehabs.
- The computer continually monitors power supply loading and checks each station 4 times each second to insure proper operation. If a fault does occur, the system even lets you know where the problem lies — automatically!



Patient Emergency Station

- Battery back-up is standard: system fully functions when AC power is off.
- Transient suppressors and noise filters together with "time slot" designs minimize problems from power sources.
- Central Power Supply: no need for auxiliary supplies and conditioners spread around the hospital.
- Stations are interchangeable, e.g. a single bed room can be changed to a dual bed room easily without re-wiring system.
- All stations plug-in to simplify maintenance.
- Entire system operates on 28 volts or less — no high voltage.
- Remote stations mount in standard electrical boxes.

Simplicity From the System Viewpoint:

- Patient stations are 'smart' with over 1000 transistors custom-built into a single, proprietary, integrated circuit: reduces wire and complexity, increases reliability.



Single Patient Bedside Station

- Up to four masters per central computer with optional parallel operation, unit transfer (day-night) or individual swing rooms between nursing units without wiring changes.
- Computer has serial I/O port to communicate with interfaces for future printer, remote diagnostics, host computer or pocket pager features (some interfaces supplied by others).
- Up to 256 beds or 128 stations function from a single central computer.

- Truly waterproof shower stations; full-function psychiatric station; both radio and television entertainment circuits.
- SideCom (Hill-Rom) compatible (optional); two-way talk over pillow speaker.

RELIABILITY

- Entire system built and tested to U.I. 1069 standards.
- Redundant circuits increase reliability.
- Single membrane nurse control station panel . . . spill-proof.
- Field-tested in actual, operating hospitals.
- Conservative, time-tested circuits; maximum voltage 28.
- System programming of information such as room numbers is stored in non-volatile memory.
- Polled station system design providing continuous monitoring of all stations.



Staff Emergency Station

- Automatic Power Failure alarm.
- Four-pair looped wiring layout significantly reduces the number of connections that can fail in the system.

and of course, CLARITY

- First, listen!
- Oval speaker/microphone in room stations with 2 to 5 times the surface area — compared to competing units — maximizes sensitivity and clarity of sound.
- Equalized audio circuits assist hearing-impaired in understanding.
- Digital audio in central four-link switch (up to four masters can operate simultaneously).
- No talk-listen switch required when using handset.
- Automatic volume control compensates for differences in normal speaking.
- Manual control for listen volume allows operator to adjust to the needs of the moment.
- 4" speaker and separate high fidelity electret (condenser) microphone provide outstanding clarity and sensitivity at nurse station.
- Made in the U.S.A.

by Jeffrey Schwartz

AN INDUSTRY-WISE SALES STAFF

In the sound installation industry, selling products and services requires sales personnel who are well-trained in serving the complex needs of today's various applications. Manufacturers and sound contractors alike often employ sales people with engineering degrees in areas such as acoustics and electronic communications. Good salesmanship is also essential, yet it can only come if the sales person understands the needs of his customers.

Situations often arise where the products and services offered are so technical and complex that it is necessary to hire sales people who have experience as an engineer or sound and communications installer.

Keeping up with the sound and communications industry is a natural requirement of people who sell sound and communications systems. Attending trade conventions, such as the National Sound & Communications Association (NSCA) Expo, or the Audio Engineering Society (AES) Convention are good forums for gaining both technical and product information and industry standards. For those who offer services to broadcasters, the National Association of Broadcasters (NAB) convention is also a worthwhile gathering to keeping up-to-date in this constantly changing industry.

Another trade organization that is addressing the need of training for sales people in this market is the

International Communications Industries Association (ICIA). According to preliminary results of a survey of manufacturers conducted by the ICIA, half reported that they provide training in the areas of products, markets, applications, and selling skills. Eighty percent of those manufacturers who do offer training programs conduct them at their main offices rather than regionally.

"We believe that education is the most important thing that a trade association can do for its members," said Bobbie Hunt, ICIA director of information. "People who provide product services insist that contractors are well-trained in products

as well as sales techniques. They generally spend a good amount of money training its sales people."

In July, ICIA will be holding its Institute for Professional Development at Indiana University. The five-day training program offers courses in professional selling in this industry. Courses include Audio Systems Technology—Sales and Design, Communications Systems Design and Sales, and Advanced Professional Selling which is designed to provide hands-on and practical training in A/V selling.

"This is part of our professional development program," said Hunt. "We

have been offering this for many years. It is always held at the University of Indiana, using their staff and our people. It is geared to cover sales and management techniques for sales people, sales managers, and systems designers of A/V equipment in corporate facilities." The ICIA also sponsors a condensed version of this program at its annual convention.

Bruel & Kjaer trains its sales staff in-house by people within the firm. With a sales force of 50 field application engineers, they each attend different seminars for their areas of expertise. "Once a year we have a

(continued on page 51)

Strategic Selling

by Robert B. Miller and Stephen E. Heiman
with Tad Tuleja

Reviewed by
Chris Foreman

Every now and then I come across a book and I have one of those "this book changed my life" experiences. I now know that before "*Strategic Selling*," I had, at best, a gut-level, emotional understanding of the sales process. I knew how to prepare and give a reasonably effective sales presentation. I knew how to do "trial closing." I knew how to listen to my prospective customer and tune my presentation to his/her interests and needs. What I didn't know, however, was how much I had yet to learn about sales. In particular, I didn't have a clue about how to approach

what Miller and Heiman call the "complex sale."

A complex sale, according to the authors, "is one in which several people must give their approval before the sale can take place." Sounds simple? The authors agree. "...it is simple, but the concept has enormous implications nonetheless, both for the business world in general and for your role (as salesperson) in it."

If you're a salesperson, think back to the last sale you lost. Is it possible there was some unidentified influence, lurking in the background, who vetoed the sale on a technicality? Is it possible

that you made a brilliant presentation to someone who wasn't fully authorized to make the purchase? Or perhaps you made a presentation geared to providing a solution for a customer who didn't perceive a real problem? Situations like these are commonplace in the complex sale and, unless your sales efforts are door-to-door or over-the-counter, *every sale you make, or attempt to make, is almost certainly a complex sale.*

Miller and Heiman present a methodical, orderly, logical, and scientific approach to making the com-

(continued on page 50)



THEORY & TECHNIQUES

Sound Masking

by Jesse Klapholz

Electronic architecture is a term most often associated with systems used to improve room acoustics for musical presentations. The term electronic architecture may be applied to sound systems that are used to alter the acoustics of spaces where speech privacy would otherwise be unobtainable. Using the term electronic architecture, in describing sound masking systems, indicates the necessity of understanding the basic acoustical concepts of speech communications.

Implicit in the electronic architecture concept is sound system design. In all sound system design outlines, the most important decision to be made is what type of system will be appropriate—or if one is needed at all. There are times when sound/sound masking systems, even if properly installed, will only exacerbate poor conditions. For example, sound masking has been used in residential housing for privacy between dwellings, or to mask environmental noise, hence more commonly referred to as noise masking. While these, and similar so-called noise masking applications, can be considered as a band-aid for poor construction at best, we will focus our discussion on the underlying principles of sound masking as applied in open-plan office architecture.

Today's Office

Most dictionaries define the office as, "the room or rooms in which the affairs of a business, professional per-

son etc. are carried on." This simplistic definition can be expanded upon easily. Implied in the classic definition, is that the office is a way of bringing people together, serving as a common ground for effective, efficient communication. An office is both a data processor and a means for decision making. Above all, it is a place where people interact. The office can, therefore, be thought of as a forum where people exchange information and make decisions.

Some have said that the ideal office would be built on a beach. Without walls or a ceiling to reflect sounds back into adjoining spaces; sand dunes would separate spaces for privacy. Man could communicate freely with his neighbor and the waves of the ocean would serve as a "perfect" source to mask sound. Although the beach may offer an acoustically ideal office environment, it does not realistically meet other office needs.

Nonetheless, many office scenarios have evolved over the years. In the late 1960s, many corporations began using the concept of the open-plan office. The traditional office layouts, individual rooms separating work space, gave way to the open-office concept in order to meet the increasingly complex communications demands of doing business. The main feature of the open-plan is the ease in which a flow of communications can be set up between workers and departments. In recent years, the open-plan has proven itself



The design of the TVA Chattanooga Office Complex in Chattanooga, TN, incorporates a central solar heating system located in the atrium (left). The offices (inset top) around the perimeter of the "solar atrium" are without walls for the benefit of the solar heating system. This design created a sound problem with noise traveling from office to office across the atrium. As a solution, Oliver Electronics of Atlanta, GA, installed a sound masking system which included 4,000 Soundolier G51-8 eight-inch loudspeakers mounted to Soundolier 51-8 cold-rolled steel baffles. The system uses four Soundolier MG1500 sound generators, four Rauland Borg CC-8-300 amplifiers, and two Rauland Borg C-8-150 amplifiers. Also included are Shallico attenuators.

in an increase of worker efficiency.

Besides the efficiency factor, the open-plan saves money in construction and remodelling costs. For example, HVAC (heating, ventilating, and cooling) systems are simplified, corridors are minimized, and fewer walls are built. The open-plan lends itself to change readily to keep up with organizational growth. Since remodeling takes place more often than one would expect, sound systems for open offices should be designed around the whole space and not specific design application.

As mentioned previously, the office is a forum for exchange of information. Just as in a computer, the office processes large quantities of information. However, the office is more complex than the computer—it uses people with psychological needs which must be satisfied.

To work effectively, most people need a sense of privacy, especially in their conversations. They also feel a need for “personal” space. These requirements of a work place cannot be met by a cosmetic approach alone. The success of an open-plan office is the product of a true systems approach to planning the total work environment. A team of management, systems

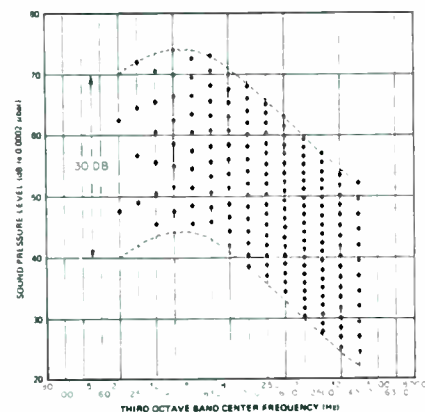


Figure 1: Speech Signal shown as dot field.

analysts, architects, interior designers, and electro-acousticians must all work together to develop each environmental component into a coherent working system.

Office Ergonomics

Four of the basic elements of the office environment to be examined independently and eventually weighed as part of the whole environment include: HVAC, illumination, fur-

nishings, and acoustics.

As sound contractors we are obviously concerned with the acoustical performance of a work space and how we can improve it through the use of sound systems. A sensitivity and understanding of how the acoustical characteristics relate to the two- and three-dimensional parameters are paramount in the viability of sound masking systems.

Speech Acoustics

Speech intelligibility studies started back in the late 1800s as support research for the new telephone industry. Most of the early work, in principle, was performed at Bell Labs. The most cited work in this area is N.R. French and J.C. Steinberg's paper, "Factors Governing the Intelligibility of Speech Sounds," which quantified the acoustical parameters of speech and how they related to the understanding of the spoken word.

While there are differing opinions as to the importance given to the various aspects of speech intelligibility, most agree on these salient points:

- 1) The intelligible part of speech energy covers the frequency range from about 200 Hz to 6 kHz.
- 2) Most of the energy in speech is below 800 Hz; most of the contribution to intelligibility above 800 Hz.
- 3) Speech has a dynamic range of about 30 dB.
- 4) Any frequency band that is in the voice range contributes to intelligibility that is proportional (a) to the fraction of its 30 dB dynamic range which is greater than the masking noise (or threshold of hearing), (b) to the bandwidth, and (c) to the importance function of that band. The importance function is at a maximum in the 2 kHz band.

These factors are depicted in **Figure 1**, where the useful speech signal is shown as a dot field. Each dot represents a possible .5 percent contribution to the articulation index. The dot field shows graphically the relative importance of each one-third-octave band and its contribution to intelligibility.

Noise Criteria or NC curves can readily be used in conjunction with the dot field technique. Once the dynamic range of the dot field has been established, the NC curve of the ambient noise can then be superimposed on it and the dots in each one-third-

octave band counted predicting the Articulation Index (AI). It is also possible to “weight” the dot field envelope by taking into account the absorption of speech energy by the architectural boundaries as shown in **Figure 2**. The NC curves can be copied onto a transparency and superimposed on the appropriately scaled and weighted dot field.

However, a word of caution with using this method; while rather straightforward in its implementation, it can easily yield erroneous informa-

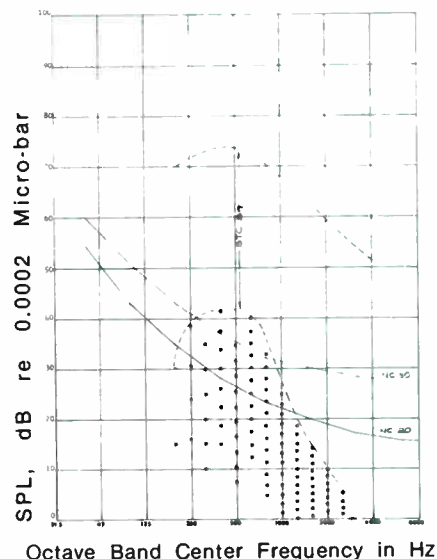


Figure 2: “Weighting” the dot field envelope by taking into account the absorption of speech energy by the architectural boundaries.

tion. One must assume: that the NC curves have been reliably plotted, based on actual measurements, on a spatial average of the space (often HVAC noise is not uniform, or even on constantly, in practice); and that the spectrum and maximum voice energy levels have been accounted for. Also, this technique is based strictly on S/N criteria.

But what is signal and what is noise? In the classical sense, as used by French & Steinberg and later K.D. Kryter, signal was taken to mean *wanted* sound, and noise *unwanted* sound. Lochner and Burger, experimenting with the S/N concept, redefined “signal” to be “early” energy which the ear integrates as useful energy, and defined noise as “late” energy which masks the signal. In this S/N concept, we are moving into the reverberation contribution to intelligibility.

(continued on page 32)

BACKBOX:

Choice of seven.

SPEAKER:

Choice of eleven.

BAFFLE:

Choice of nine.

TRANSFORMER:

Choice of five.



With 3450 standard assemblies, Quam gives you custom-designed flexibility with off-the-shelf delivery.

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

You specify it the way you want, and you receive it when you

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Our broad commercial sound accessories line is a change from the days when Quam concentrated exclusively on speakers. And we'll continue to change, adding innovative, high-quality products that help make you more profitable.

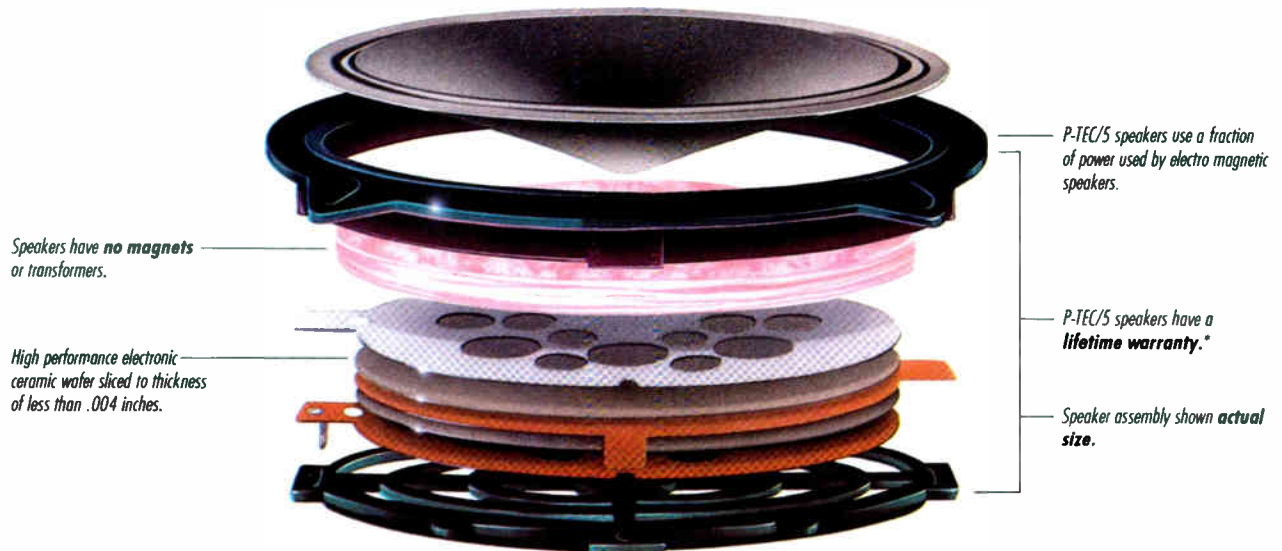
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Now it's possible to utilize piezo technology for sound systems. Previously used only for high frequencies, piezo technology has entered the voice paging range as the result of a technological breakthrough by Motorola researchers.

A patented process slices a unique high performance electronic ceramic to a thinness of .0038 inches. A unique baffle design was created by our Harris engineers to house the speaker assembly.

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A totally unique new line of lightweight voice paging loudspeakers called P-TEC/5.

P-TEC/5 speakers outperform, use less power, have no magnets or transformers, are moisture resistant and have an unprecedented lifetime warranty.* P-TEC/5 loudspeakers use only a fraction of the power to create the same sound level as existing electromagnetic speakers. A smaller amplifier is needed to drive paging for the same size building—so cost efficiencies are



multiplied throughout a paging system. Less electricity is used and the units are easier to maintain.

Installation is easier too.

Weighing less than 6 ounces,

P-TEC/5 speakers install without cutting, drilling or the need for special grids. Two insert wires built into the baffle simply puncture the ceiling tile by gently pushing against the face of the baffle.

Retaining clips then create their own counter tension which holds the speaker in place. After removing the clips, a gentle tug will pull the baffle back out without damaging the tile—so it can be relocated easily if necessary.

Harris/Dracon engineers have been pioneering new product development for the telecommunications industry for almost 30 years. Our line of voice paging products encompasses the wide and diversified needs

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For more information, contact any major telecommunications or sound distributor.

We're HARRIS CORPORATION Dracon Division in Camarillo, CA. 805/987-9511. Telex 182327.



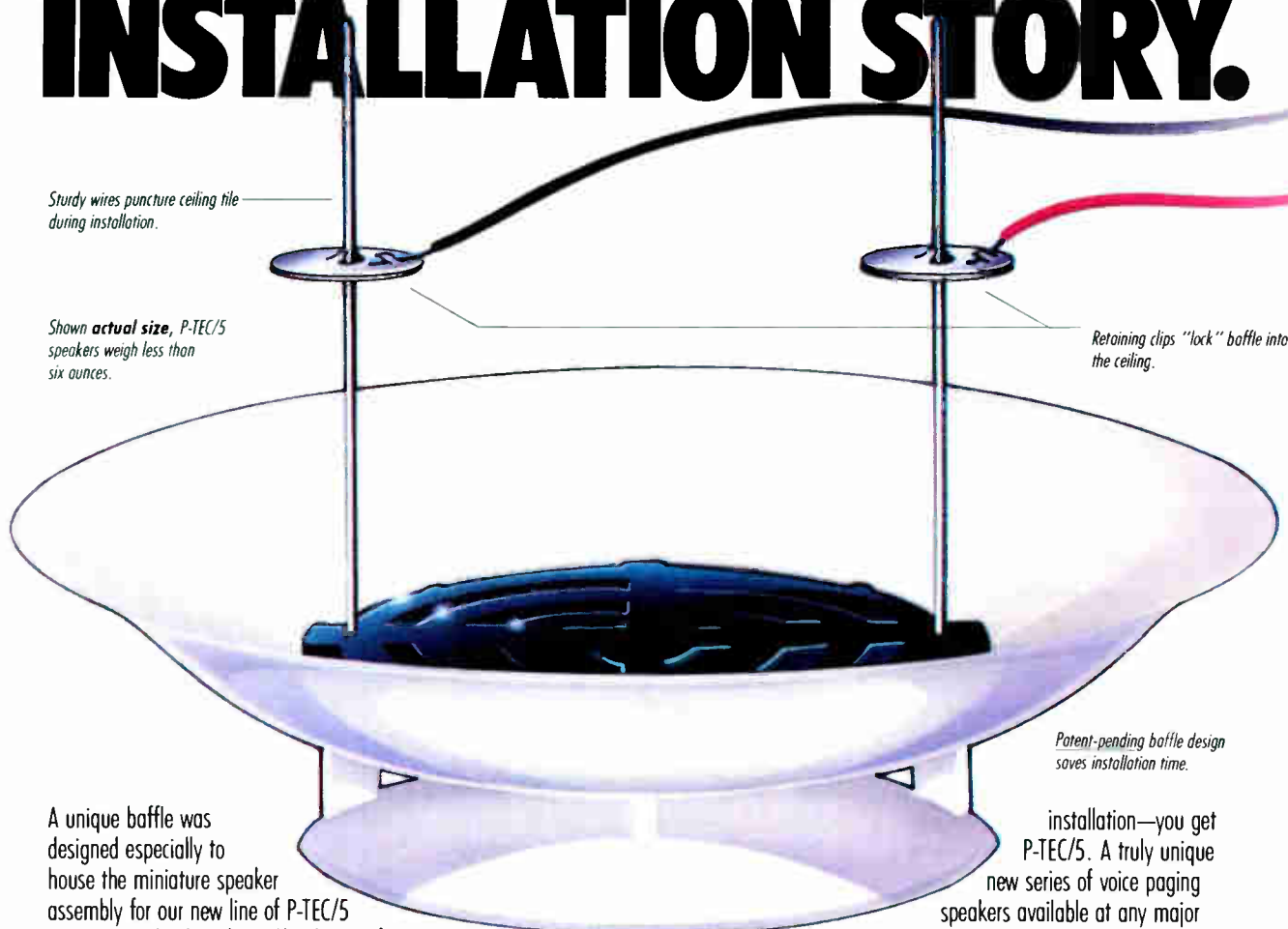
*after 1 year, warranty does not cover labor or shipping.

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OUR NAME IS
HARRIS
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TOGETHER HARRIS AND MOTOROLA RE-INVENTED THE LOUDSPEAKER.

Because of an agreement between HARRIS CORPORATION Dracon Division and Motorola, Inc., piezo patented technology for voice paging applications is only available through Harris/Dracon in the U.S., Canada and Mexico. The exclusive baffle design is a trademark of the Dracon Division. Motorola® is a registered trademark of Motorola, Inc.

OUR P-TEC/5™ INSTALLATION STORY.



Sturdy wires puncture ceiling tile during installation.

Shown **actual size**, P-TEC/5 speakers weigh less than six ounces.

Retaining clips "lock" baffle into the ceiling.

Potent-pending baffle design saves installation time.

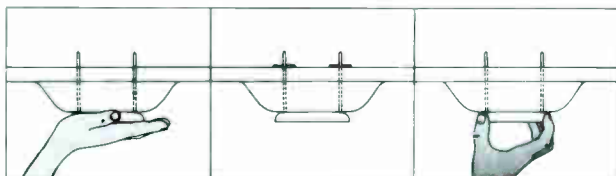
A unique baffle was designed especially to house the miniature speaker assembly for our new line of P-TEC/5 voice paging loudspeakers. The design of this baffle revolutionizes the installation of your loudspeaker network. It is so simple and so easy to install—it makes you wonder why loudspeaker installation was ever done any other way.

A gentle push on the face of the baffle causes the two installation poles to

This unique installation process not only saves time and materials, it makes mistakes a thing of the past. (The tiny puncture holes are so small, no one will notice.)

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installation—you get P-TEC/5. A truly unique new series of voice paging speakers available at any major telecommunications or sound distributor. We're HARRIS CORPORATION Dracon Division in Camarillo, CA. 805/987-9511. Telex 182327.



Insert wires puncture ceiling tile. Retaining clips "lock" speaker into ceiling.

Remove clips, pull downward to release.

puncture the ceiling tile while the retaining clips create a counter tension that "locks" the baffle into the ceiling. To relocate, simply remove the retaining clips and tug firmly in a downward motion and the baffle releases itself.

loudspeakers use a fraction of the power to create the same sound level as existing electromagnetic speakers.

When you combine breakthrough technology with low cost, mistake-proof

P-TEC/5 speakers outperform, use less power, have no magnets or transformers, are moisture resistant and have an unprecedented lifetime warranty.* P-TEC/5



*after 1 year, warranty does not cover labor or shipping.

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A CONTRACTOR'S MARKET

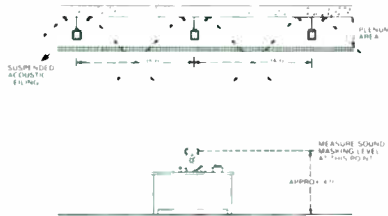
Sound Masking

by Alfred D. Siliati
Insul-Art Acoustics Corp.

We refer to sound masking as a new/old industry, as it has been around for well over 10 years. Yet, only the last few years have brought this industry to national attention. This is a strong growth industry and sound contractors can capitalize on the potential by concentrating their effort towards specification and end user work. Alarm and security contractors in recent years have branched out and extended their product lines to now present a "sound and communication package." This is certainly the trend and will be beneficial to both the contractor and the end user. The contractor will be able to offer the end user a complete package, which may vary from video security to sound masking. Economically it makes sense to the end user to include masking at the same time the other equipment is being installed. The wires are "pulled" at the same time and quite often the masking

Figure 1A

DIFFUSION OF MASKING SOUND



system can be interfaced with the paging system, fire alarm system, or telephone system, which offers the client greater flexibility. The sound masking industry is an untapped and lucrative market for the contractor.

What Is Sound Masking?

Sound masking in itself is the product of a noise generator which general-

ly provides a digitally produced output. A high quality noise generator will incorporate a pseudo-random shift register, with a minimum repeat time of 90 minutes. The minimum 90 minute repeat time will ensure that the random sound will remain random. It is important that the sound is not distinguished as a recognizable pattern as it will defeat the intent of the sound masking principle. The output sound will be either white noise (which is the basis of the spectrum when a mineral fiber ceiling tile is used) or pink noise (which is the basis of the spectrum when a glass fiber ceiling tile is used). This capability is possible through the use of selectable filters within the noise generator. Shaping the sound to a specific curve to accommodate the ceiling will provide the environment with background sound that is: (1) unobtrusive (pleasant to the ear) (2) uniform (3) random. Shaping of the spectrum is accomplished by factory tuning or by field tuning utilizing either an octave band or one-third octave band equalizer.

The shaped sound is then amplified and dispersed through a network of speakers placed in the plenum. Quantity and placement of speakers is another critical aspect as it will directly affect the uniformity of the background masking sound. Duct work, lighting fixtures, and other obstructions must be taken into account when calculating the speaker placement. Speaker quality and uniformity is also important when selecting a system.

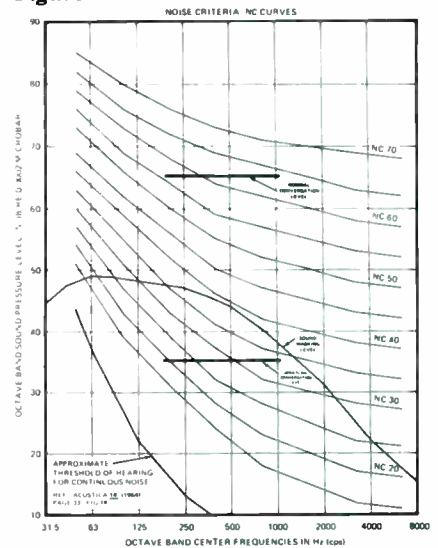
Masking sound must be unobtrusive, as the basic principle of sound masking is to introduce a uniform background sound, which will increase speech privacy without adding to the

existing intrusive noise within the environment.

Why Does Sound Masking Work?

The concept of background sound masking is rather simple. The basic laws of physics dictate that if an existing sound is overridden by another sound, the existing sound becomes less apparent. If this basic concept is examined closer and the frequencies found in human speech and other intrusive sounds common to the modern office are determined, the specific frequencies needed to "mask" can be established to create a spectrum shape that effectively masks unwanted sounds and speech intelligibility without introducing additional noise and distractions. The critical noise range (CNR) for speech intelligibility is 1,000 to 4,000 Hz.

Figure 2A



The level of sound masking introduced should be set to just exceed the conversation level that reached the unintended listener. However, it should be noted that masking in itself is not a "cure all" but rather part of the acoustical envelope. The acoustical envelope consists of four supports:

Acoustical Ceiling: The ceiling is the most important acoustical element in open planning because it is common to all personnel and business equipment for sound absorption and reflection. Materials that provide minimum high frequency (speech intelligibility range) energy reflection and high sound absorption coefficients in the speech intelligibility range, 1,000 Hz and above, are considered for open plan offices.

Acoustical Screens/Dividers: The work station enclosures should be efficient
(continued on page 28)



For years, the loudspeaker voice paging marketplace was treated like an unsophisticated after-thought to internal communication systems. At Harris/Dracon we began changing that approach when we introduced the industry's first multi-featured, expandable, factory prewired system in 1976.

Since then we've been able to develop a voice paging line that serves all market segment needs—from 6 watts up to unlimited power systems. Each designed with a singular purpose: to keep installation and engineering to a minimum while offering easy future expansion.

Here's how.

The modular engineering approach to our systems means that you don't have to shop for components. Each has been designed to work together and engineered to be totally compatible with telephone technology. We offer both voice coil and 70V systems and have systems that mix both. The built in features of our systems include a separate voice and music preamp with multiple interfacing capability. Slide-in addable features enable the system user to have two-way conversations through their loudspeaker network, zone selection paging and a music source for background music.

This approach makes expansion simple. It makes adding more sophisticated features simple. And it makes the installation technician's job simple.

With our full line of telephone associated loudspeaker paging systems you can have performance quality, very low distortion, limited lifetime warranty, speakers with volume control and tapable 70V speakers. (Plus all our speakers have two-way operation which means inventory efficiencies for you and makes office re-organization inexpensive for your customers.)

Our latest technological advance is a special ceiling baffle* design that revolutionizes the installation of the loudspeaker network. Our new lightweight P-TEC/5 line also offers the new piezo speaker—a breakthrough technology made possible by Motorola engineers and exclusive to Harris/Dracon for voice paging application in the U.S., Canada and Mexico.

Now you have a source for paging systems that's complete and competitive from a company with almost 30 years experience in telecommunications. We're HARRIS CORPORATION Dracon Division in Camarillo, CA. 805/987-9511. Telex 182327. Available at any major telecommunications or sound distributor.

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*Patent pending.

Lack of speech privacy in new offices is a growing problem that can be eased by the use of an electroacoustic masking sound system. Today's modern office designs utilize innovative features to lower construction costs and increase flexibility of the office layout. These include lightweight partitioning extending only to a continuous suspended ceiling, demountable partition systems, partial-height workstation screens, and variable air volume HVAC systems that throttle air flow during most of the day, thus significantly reducing the normal ambient noise at diffusers.

The degree of speech privacy enjoyed by a worker is controlled equally by the sound barrier separation provided by partitions, screens or distance and the background or ambient sound level at the listener's position. It is not difficult to realize, therefore, that as barriers between office become less substantial and normal air conditioning system noises diminish, lack of speech privacy as well as the annoyance or distraction of other office noises (computer printers, copy machines, typewriters, etc.) become a serious problem.

FROM A CONSULTANT'S POINT OF VIEW

by Denis R. Milsom

Shen Milsom & Associates, Inc.

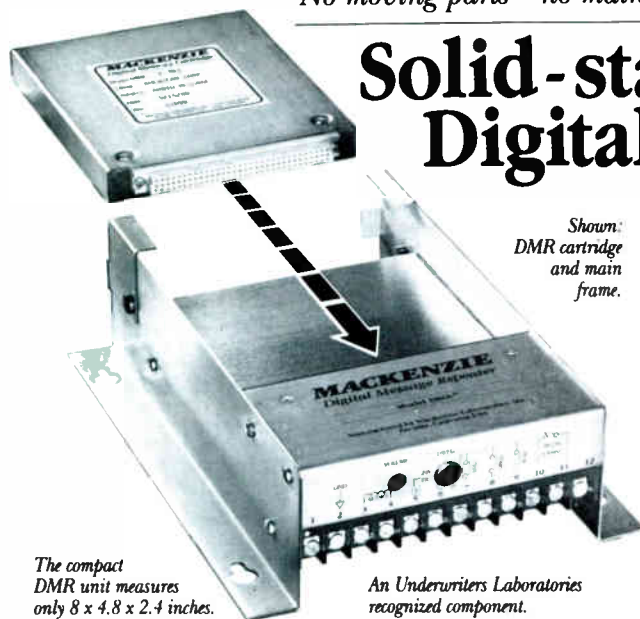
There are methods that can be used to improve the sound separation between workers, such as using full-height partitions that extend through the ceiling to the underside of the floor above and constructing the partitions of extra layers of gypsum board, but these changes add considerable cost to the project and negate some of the office design features. Extending the partitions through the ceiling prevents sound transmission from office to office via the ceiling plenum and blocks the flow of return air for the HVAC system and requires additional return ductwork. Having the partitions penetrate the ceiling also reduces office flexibility. And using full height partitions in lieu of partial height screens is certainly a major design change.

Sound masking offers a method of improving privacy by raising the ambient sound level by means of a relatively inexpensive loudspeaker system totally concealed above the suspended acoustical ceiling. The system is designed to broadcast a continuous, uniform, unobtrusive, air-rushing sound, similar to HVAC system noise, that covers the entire speech frequency range. The loudness of the system is limited to a comfortable level to which office workers quickly become acclimated and soon forget that the system exists.

Background music can be added to the system but, by itself, music is unsatisfactory masking sound as people can hear enough conversation through lulls in the music to understand what is said. The masking sound system can also function for paging although equalization of the paging announcements is necessary to compensate for the severe voice-range attenuation through an acoustical ceiling.

Sound masking systems were created for the normal commercial office environment although they have been used in other applications, i.e. small
(continued on page 57)

No moving parts—no maintenance required



Shown:
DMR cartridge
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The compact
DMR unit measures
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| <input type="checkbox"/> Fireman's return | <input type="checkbox"/> Sound effects |
| <input type="checkbox"/> "Code Blue" | <input type="checkbox"/> Dark rides |
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TODAY'S CONTRACTING BUSINESS

by **Sound & Communications**
and the
National Sound & Communications Association

Sound & Communications magazine and the National Sound and Communications Association recently surveyed over 1,300 sound and communications systems contractors. More than 23 percent of those surveyed responded. Their answers, summarized in this report, give us a new and more clearly focused perspective on the sound and communications contracting business.

Perhaps the most important conclusions we gained from the survey were that sound and communications contractors are overwhelmingly small businesses and that the contracting business covers a very wide and diverse set of markets. Until this survey, we guessed at these facts; now we have strong, numeric evidence.

The survey questionnaire was divided into: Business, Markets, Installed System Jobs, Equipment Brands, Organizations and Publications, and Comments. The information was processed by Charles Dietz Associates, who also did our 1985 Economic Report Survey.

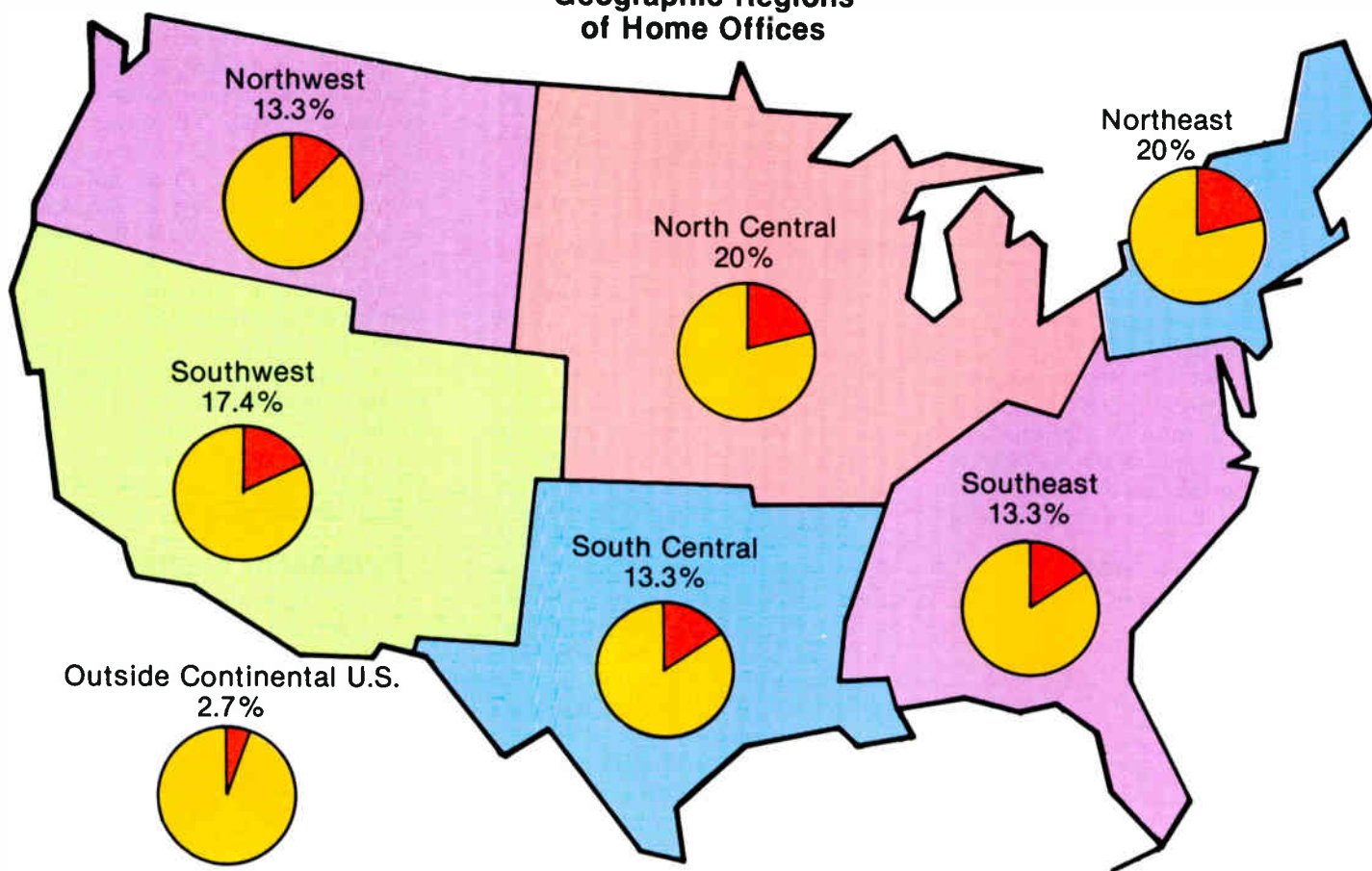
PART 1: BUSINESS

In Part 1, we asked four questions: In what geographic region is your home office located? How many total offices do you have? How many permanent (full or part time) employees do you have? In what gross income category is your business?

To the first question, 40 percent of those responding located their home office in either the Northeast United States or the North Central United States. More than 17 percent had their home office in the Southwest United States and 13.3 percent had their office in either the Southeast United States or the South Central United States. Over 13 percent were located in the Northwest and Mountain states. Only 2.7 percent were from outside the continental United States.

Two conclusions can be drawn from these numbers. First, the density of sound and communications contractors seems to follow the

Geographic Regions of Home Offices



population density throughout the United States. Second, our survey contained a geographically representative sample of the industry.

In the second question, we found that most contractors have just one office. Yet, a sizeable number are two-office businesses and some are multi-office businesses with, in many cases, offices in different cities. The average number of offices per contractor is about 1.4.

The third and fourth questions clearly set the size of the typical sound and communications contractor. In their answers to the third question, almost 53 percent said they had fewer than 10 permanent employees and almost 90 percent said they had fewer than 25 permanent employees. In their answers to the fourth question, approximately 39 percent reported total gross income (total of all branches) to be between \$1,000,000 and \$5,000,000. Yet 56 percent reported gross income below \$1,000,000; 37 percent reported gross income below \$500,000 and a surprising

13.3 percent reported gross income below \$100,000. Less than 6 percent reported gross income over \$5,000,000.

PART 2: MARKETS

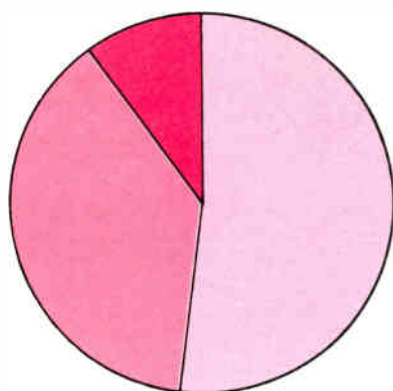
In Part 2, we asked contractors to tell us what markets they served and which were the most important to them. We suggested 28 different market categories and left a space for "other." For the most important markets served, we asked the contractors to indicate what services they provide.




The mere inclusion of 28 market categories is an indication of the diversity of this industry. What is more surprising is that most contractors checked a dozen or more of those categories. This seems to indicate that individual contractors are unlikely to specialize in any one market area and that the typical contractor's marketing efforts are nearly as diverse as the industry is as a whole.

From the large number of responses, here are some highlights. Over 93 percent of those re-

sponding said they are engaged in the sale of installed commercial sound reinforcement systems. Forty-nine percent said that they sell installed entertainment sound reinforcement systems. Sixty-eight percent sell and install business intercom, 55 percent sell and install nurse call and 66 percent sell and install factory paging systems. Sixty-five percent sell and install business (background/foreground) music systems although only about 25 percent provide music libraries or other programming services. Twenty-eight percent of those surveyed sell and install key phone systems. Just over 5 percent serve the recording studio market with systems and installation and approximately 8 percent serve the broadcast station market with systems and installation. A sizable 32 percent engage in the sale and installation

Gross Income



	1-9	52.6%
	10-24	36.8%
	over 25	10.4%

of video systems (excluding security systems). Approximately 41 percent sell and install security and fire alarm systems and a similar number sell and install sound masking systems.

When asked which three of the 28 market segments were most important to them, contractors responded with these answers. Over 49 percent of those surveyed reported that the sales and installation of commercial sound reinforcement systems makes up at least 50 percent of their yearly gross sales and they chose this market segment as being "most important" to them. No other market segment came close in the "most important" category, although "other wired intercom" and "background/foreground music systems" deserve honorable mention.

In second place, however, four

Almost all contractors surveyed consider themselves "full service" businesses.

market segments, security and fire alarm, sound reinforcement, background/foreground music and nurse call received nearly equal votes. Respondents in those areas said that between 24 percent and 31 percent of their yearly gross came from one of the four categories. As their third most important market segment, contractors picked eight different choices with almost equal frequency. Sound reinforcement, business intercom, nurse call, factory paging, other wired intercom, business music, key phone systems or security and fire alarm made up between 10 and 18 percent of these contractors sales.

In each of their three most important market segments, most contractors reported that they provide equipment, design and install systems and provide repair and maintenance. In other words, almost all contractors surveyed consider themselves "full service" businesses.

We also asked contractors to report on which market segments would be most important to them in 1986 and in 1987 and beyond. As answers to both questions, contractors continued to pick installed commercial sound systems as their most important market. However, the nurse call and security and fire alarm segments got an increased vote for 1986 and for 1987 and beyond, passing up the other wired intercom and background/foreground music systems categories.

As an important side question, we asked contractors to name the three market segments they thought were "most neglected" by contractors in general. Broadcast station systems came in first as "most neglected" followed by teleconferencing. Third place in the "most neglected" category goes to a group of market segments including recording studio systems, security and fire alarm, nurse call, background/foreground music systems and video systems. Note that some of the markets previously selected as

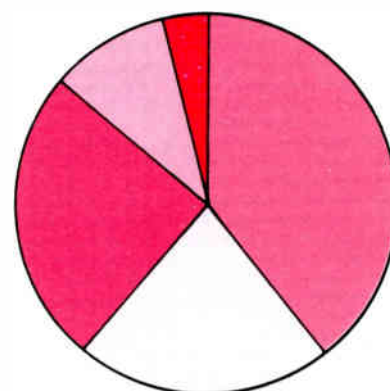
"most important" are also in the running for "most neglected" and draw your own conclusions!






PART 3: INSTALLED SYSTEMS

In Part 3, we asked contractors to report on the average dollar size of systems they install. The answer was a surprisingly low \$9,930. This puts the average sales size for sound and communications contractors in the same ballpark as the average sale for a new car dealer.

Large system sales do exist, of course, and when asked for the dollar size of the largest system sold during 1985, the contractors responded answers that averaged to \$156,000. Remembering that 37 percent of contractors reported gross income below \$500,000, it seems likely that these larger jobs are primarily going to a

Permanent Employees



	over \$5 million	5.4%
	\$1 million-\$5 million	38.6%
	\$500,000-\$1 million	18.7%
	\$100,000-\$500,000	24.0%
	below \$100,000	13.3%

relatively small number of larger contractors.

In addition, we asked contractors to give us the typical number of days from purchase order to completed system on a typical job. The average answer was 91.9 days or approximately three months.

PART 4: EQUIPMENT BRANDS

If you're a manufacturer looking for new dealers and you keep hearing "I can't support another line!" from contractors, they probably mean it. The average number of lines contractors are authorized to sell is just under 24. The days of buying everything from one or two suppliers seem to be over and gone.

More Ceiling Speaker For Your Money

In a day when the average consumer has a high tech sound system in their car as well as in their home, most industrial sound system companies seem to have forgotten how to make a ceiling speaker that's dependable and sounds good, yet still affordable.

For people who don't think that's very sensible, EAW introduces the RCF L12/CX2.

RCF is one of the largest professional loudspeaker manufacturers in the world, selling more pro speakers in Europe last year than anyone else.

This success is due to the simple fact that RCF has been making high performance loudspeakers that are built right and priced right for over 30 years.

One reason RCF can make such superior loudspeakers is that RCF recently completed one of the world's most advanced speaker production facilities, complete with automated fabrication machinery and high tech computer aided design facilities.

All of this experience in craftsmanship, engineering and high technology is clearly evident in the L12/CX2 high output coaxial speaker system.

The L12CX2's high frequency driver's mylar film diaphragm and space age magnetic damping fluid cooled voice coil provide exceptionally smooth response to beyond 15,000 Hz while virtually eliminating costly field failures. (After you've installed a speaker in the ceiling you don't want to have to go back to fix it.)

The L12CX2's true coaxial design



EAW / RCF L12/CX2 300mm (12-in) Coax Ceiling Speaker

enables wider coverage through the entire operating band than any competitive system. And with greater than 120 dB SPL at 1 meter maximum output, the L12/CX2 is clearly in a class by itself.

And when you listen to the L12CX2 you get the feeling that you just hung a studio monitor in the ceiling, only it gets much louder than most monitor systems.

But the most interesting thing about the EAW/RCF L12CX2 is its price. The retail price for this clearly superior performance is less than \$180.

So instead of spending more money for less performance, contact EAW for the location of your nearest dealer, and get more ceiling speaker for your money.



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(617) 620-1478

Circle 242 on Reader Response Card

We also asked the contractors to list the brands which accounted for the largest proportion of their sales. When a brand was a contractor's largest selling line, we gave it three votes. When it was second we gave it two votes. When it was third, we gave it one vote. On that basis, the top brand was TOA followed by Dukane in second place and by Soundolier in third. Bogen placed fourth followed by Electro-Voice in fifth place. Rauland-Borg placed sixth, Aiphone placed seventh and Shure Brothers came in eighth.

PART 5: ORGANIZATIONS and PUBLICATIONS

The NSCA (National Sound and Communications Association) clearly ranks first in the minds of the sound and communications contractors we surveyed.

The second most important association to sound and communications contractors is the AES (Audio Engineering Society). Third place in the association awards goes to the IBMA (recently renamed International BUSINESS Music Association),

fourth place to NATA (North American Telecommunications Association), and fifth place goes to the ASA (Acoustical Society of America).

When asked to rate publications in order of importance, we are pleased to say the contractors we surveyed rated our own *Sound & Communications* first, followed by *Sound and Video Contractor*, *Pro Sound News* and the *AES Journal*. Following these audio market publications was a fifth place surprise, the tabloid newspaper *Communications Week*. In sixth place was *Mix Magazine* followed by *Recording Engineer/Producer*, *Teleconnect Magazine*, *db*, *Electronic News*, and *Broadcast Engineer*.

PART 6: COMMENTS

While less quantifiable than the statistical questions answered above, the comments we received from contractors are none-the-less interesting. Here are some samples.

From a Northeast Contractor: "Would like to see industry effort to lobby for legislation for life safety systems in

schools, hotels, large office complexes, etc."

Another Northeast Contractor: "Reps are very lax...The majority do not call on us. They take everything for granted after they take on a line."

A North Central Contractor: "Installer and technician training materials are almost non-existent. We would like to see something similar to electrical trade apprentice programs."

A Southwest Interconnect: "Times are hard. Telco-backed interconnects (sell because of who they are)...many of them lost money doing it. Small interconnects sell at such low margins that they cannot stay in business. Customers, particularly larger ones, bypass dealers and go direct to distributors."

A Southwest Contractor: "We find an alarming number of customers extreme dissatisfied with the quality of design, installation and performance of systems for which they paid handsomely. Our industry suffers for the lack of expertise and integrity."

A Northeast Contractor: "This is still a part-time cottage industry. We still service fast food, store chains...schools and churches."

A Southeast Contractor: "It is my hope that work being done to achieve a section 17 is successful. Too many sound installations are completed by the electrical contractors on the argument that it's just another form of wiring."

A North Central Contractor: "Sound contractors still seem to neglect customer service...and small customers, and concentrate only on large, new business."

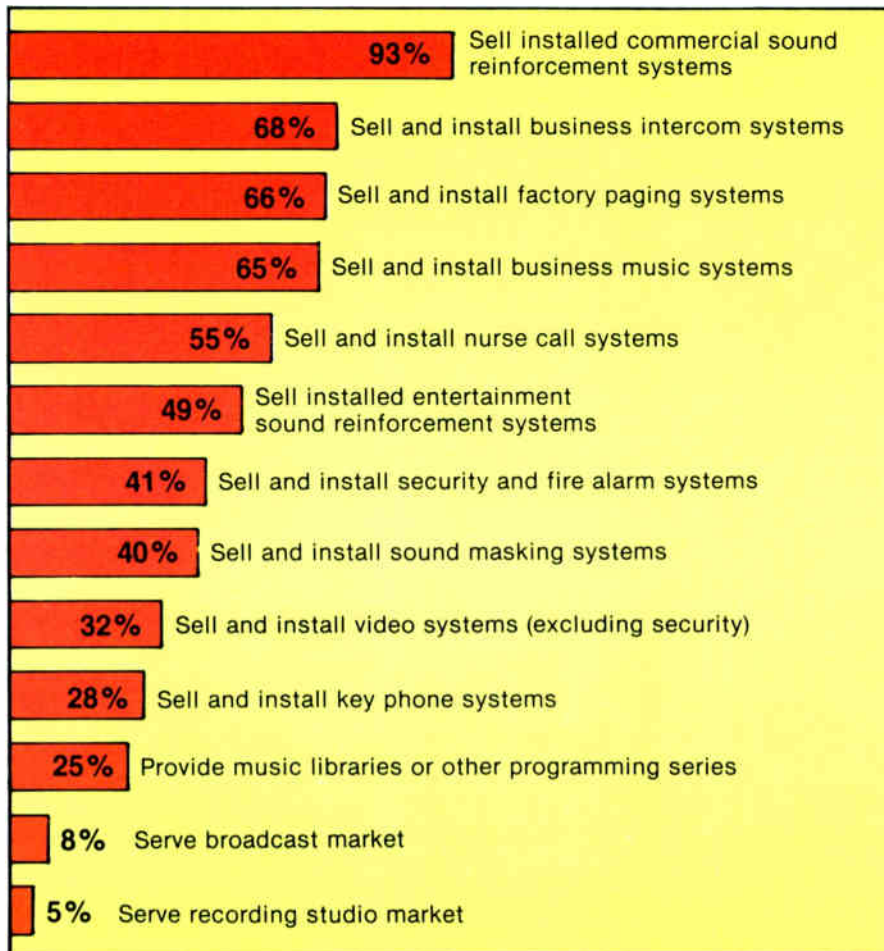
Another North Central Contractor: "If manufacturers would stop selling to music stores our jobs would be much better."

Yet Another North Central Contractor: "Our industry continues to be plagued by low-margin operators, arrogant audio consultants, manufacturers who are only interested in numbers...and continued lack of professionalism (in all sectors)."

EDITOR'S COMMENT:

The numbers and the contractors' comments say it all. This was an important study. There are new pieces to the puzzle of "what is our industry" here and other pieces have been reshaped to fit better. I hope that you have benefited from this information and I hope that *Sound & Communications* will make periodic updates to it. Thanks to all of you who participated.

Top Markets





AT THE STARTING LINE YOU CAN'T TELL SEATTLE SLEW FROM MR. ED.

Until the horses bolt from the gate, you can't tell a champion from an also-ran.

Likewise, equalizers "line up" evenly when covering the same "flat" terrain. It isn't until you demand "peak" performance that you can measure what an equalizer is truly made of.

JBL/UREI's 5547 Graphic Equalizer and 5549 Room Equalizer are made of the most advanced electronics ever packaged in an equalizing system. Their proprietary hybrid circuits deliver unprecedented low noise. Discrete active filter circuits provide the highest dynamic range ever achieved under real world operating conditions.

More headroom and less

noise is also a function of the 5547 and 5549's unique, headroom circuit. A special LED display and two gain structure controls allow you new precision in optimizing headroom and signal-to-noise ratio.

The 5547 Graphic Equalizer is the ultimate tool for creative equalization, offering both "Boost" and "Cut," while the 5549 is the ideal corrective

"Cut Only" Room Equalizer.

While both equalizers are at home in the studio, each is built extra-rugged for reliable road-ability. And perhaps best of all, the 5547 and 5549's ultra-efficient hybrid technology gives you breakthrough performance at a breakthrough price.

Compare the JBL/UREI 5547 Graphic Equalizer and 5549 Room Equalizer to anything on any "track". Because when "peak" performance is paramount, the 5547 and 5549 simply leave other equalizers standing in the gate.



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JBL UREI
ELECTRONIC
PRODUCTS

Available in Canada through Gould Marketing

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World Radio History

MASKING MARKET

(continued from page 18)



The Soundolier M 980 masking loudspeaker system has the back box enclosed within the speaker. The M 980 can be hung horizontally with the baffle facing up or down, and vertically with the baffle on its side.

cient sound absorbers in reducing the immediate source of sound by the elimination of hard parallel opposing vertical surfaces around individuals or

The Editors of Sound & Communications...are

always looking for qualified contributors who wish to write for the publication on a freelance basis.

If you are involved in the Sound & Communications industries, and would like to write for the magazine bearing their name, please write to the editor at the below address and outline your experience and particular interests.

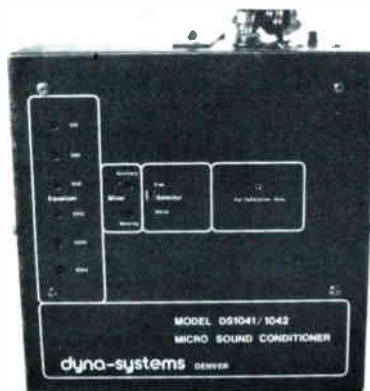
Thousands may share your interests, and we're willing to share them with our readers.

The Editor

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business machines. Also, they could be efficient barriers in the attenuation of the transmission of sound between adjacent work stations and between work stations and business equipment. The screen should be closed from side to side and top to floor. Its height should be at least 60 feet and of a length compatible to the work station layout, guaranteeing complete interruption of the line-of-sight between work station occupant and an adjacent noise source.

Floor: The floor should be resilient so that foot-fall, shuffle, and chair movement noise is eliminated. Also the floor should be sound absorbent in the high frequencies from 1,000 Hz. A carpet of minimum three-sixteenths-inch pile height, 30-ounce face weight, on jute in a glued-down application satisfies the acoustical criteria for floors. Personal comfort might demand a higher pile height and more face weight, which would proportionately improve the sound absorption characteristics of the carpet.



Dyna-Systems' Micro Sound Conditioner DS1042 is a masking source that has a 70 V output and will drive up to 10 slave units. It is a centralized masking system which can be hung in the ceiling plenum. Dyna-Systems also manufactures masking generators, time-varying mixers, equalizers, and loudspeaker assemblies.

Sound Masking: The introduction of an unobtrusive and uniform background sound system is imperative for maintaining acceptable speech privacy between work stations, and reduction of business machine and communication signal noise directivity. The background sound that the system provides is electronically produced and specifically tuned to the space to efficiently mask speech intelligibility and business machine noise. In addition, the level masking sound is adjusted to complement the business activity noise

level, thereby effecting a background sound which is barely noticeable. As seen (see diffusion of masking sound drawing) from the graph, the level of sound from the system is shown as plotted against the noise criterion (NC) curves.



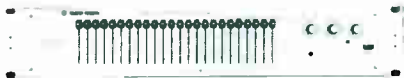
Quam-Nichols manufactures a line of loudspeakers for sound masking installations which are combined with various combinations of back boxes and transformers to offer over 80 different systems.

Where is it used and which equipment should be used?

Sound masking can be used in virtually any environment where speech privacy and freedom from noise distraction is required. The most common use of sound masking is in conjunction with the open-plan office concept in which acoustical dividers are assembled into work station type configurations. These configurations resemble a small "traditional" type office, but allow great flexibility with a feeling of openness. Other environments include the closed office, libraries, and even for security purposes within duct work at top secret government agencies.

Environments where sound masking should *not* be employed include conference rooms, where sound masking should be placed around the perimeter; and any environment where the existing ambient noise level is above 50 dBa.

Sound masking is generally available



Klark-Teknik's new DN305B Noise Masking Generator/Equalizer includes 24 cut-only (15 dB) filter spaced at one-third-octave ISO frequencies from 63 Hz to 1.25 kHz. Adjustable HF and LF filters which provide 12 dB/octave roll-off and a 20 dB make-up gain control are included on the front panel.

in two formats: self-contained type system; and centralized-type system.

The self-contained type system is generally used on smaller areas (10,000 square feet or less) where cost for the upfront equipment cannot be justified and control of zone volume levels is not required. It is recommended that the self-contained unit be



The MAM Audio Modulator from Blonder-Tongue provides an unmodulated visual and a modulated aural RF carrier output on any single VHF, Midband, or Superband channel.

equipped for auxiliary paging in the event the client desires page in the future. The difference in cost of equipment is minimal but can be a substantial difference in labor and equipment if page is to be furnished at a later date.

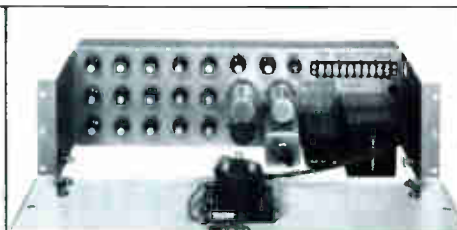
The other categories of centralized-type systems can be divided into med-



From the Insul-Art line of sound masking products is the model C320 one-third-octave graphic equalizer and the Model C310 amplifier, which make up the Centrallite System.

ium-sized projects and large projects.

On medium-sized projects (up to 40,000 square feet) it is recommended to utilize a modular/centralized system which consists of an amplifier/page inputs, noise source and octave equalizer to spectrum tune the noise source and speakers which can range in size from



The Verrex Sonomask SM-4B Masking Noise Generator has an illuminated ANSI standard VU meter panel and a monitoring switch for the output or an external signal on the front. All other controls are concealed behind the panel.

four- to eight-inches. A unit of this nature will power approximately 10,000 square feet and is rack mountable.

On large projects a centralized type system which consists of power amplifiers with page inputs with octave band equalizer, one-third octave band equalizer/noise source, speakers which can range in size from four to eight inches. A system of this nature is extremely versatile and will allow for precise spectrum tuning of the noise source as well as the page inputs. Other auxiliary equipment such as zone controls and monitor panels may be used to complement this system.

ONE SOUNDSPHERE DOES 1,300 SEAT GYM!



The gymnasium of Our Lady Queen of Heaven has a single Soundsphere #2715 in the room center. With the bleachers pulled into position for basketball games, the space holds approximately 1,300 people. When the contractor, Howard Trotter of Sylvan Sound, visited the site months after installation, someone asked what had been the largest group of people in the gym for an event. The response was that after special decoration, the space had been used for a Midnight Mass which was attended by more than 2,500 people. The one #2715 Soundsphere delivered quality music and crisp voice announcements for the entire congregation. The same speaker also plays popular and rock music for the heavy sound at student sock hops.

Howard Trotter has recently installed Soundspheres in many school gyms and auditoriums. He reports very favorable comments from the staffs of Westlake, LA High School, DeRidder, LA High School and St. Philip of Neri Church in Kinder, LA. Howard has used Soundsphere dual reflectored speakers #2212 and #2715 in numerous installations where one Soundsphere can effectively operate as a single source. Mr. Trotter is also very enthusiastic about the ease of installation of all Soundsphere loudspeakers.

Write or call direct for further information.

SOUNDSPHERE

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Presenting the system you helped us design: The Bose® 102™ Commercial Sound System.

Full bandwidth frequency response and high SPL output capability

Factory-assembled system: enclosure, driver, transformer and level switch

Designed to meet U.L. standard #1480

5-year transferrable warranty

High-efficiency, wide-dispersion 4½" helical voice coil Bose full-range driver

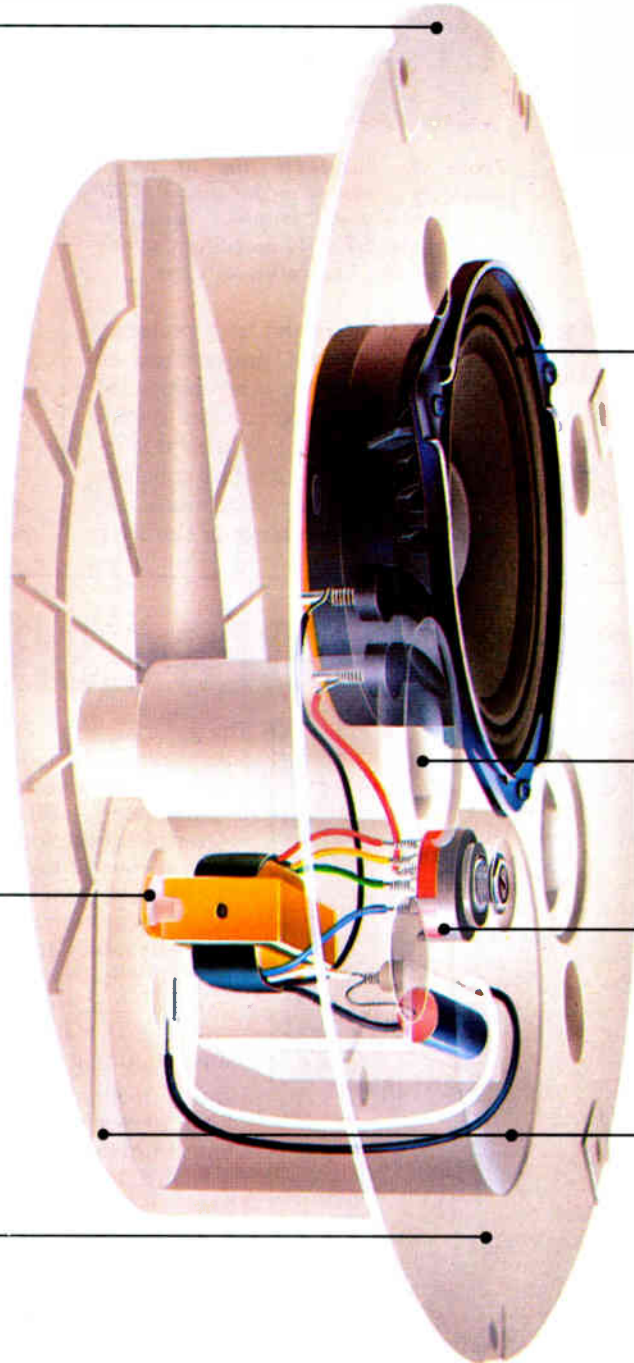
Dual-port, bass-reflex design for efficient bass reproduction

Prewired 5-position level switch

Front and rear wiring access plates

Factory-installed transformer

Requires only 3½" wall or ceiling depth and retrofits into existing cans



The design of the Bose 102 Commercial Sound System began with our question: "What do you want in an installed sound system?"

In short, you wanted a system with full bandwidth response, high SPL capability, wide dispersion and high reliability. Furthermore, you wanted that system to be flexible, easy to install and competitively priced.

For the past year we worked with more than 25 sound contractors and acoustical consultants, reviewing prototypes and blueprints, and refining the system. Now, thanks to you, it's right.



102 Flush-Mount Speaker with optional 102 Snap-on Grille.

The 102 System offers you two compatible loudspeaker configurations, the 102 Flush-Mount Speaker (above and left), and the 102 Surface-Mount Speaker (below). Both are available in 8 watt and 25 watt models with 70 or 100 volt transformers, plus an 8 ohm non-transformer model for small systems.



102 Surface-Mount Speaker.

The 102 Surface-Mount Speaker has the same performance characteristics as the 102 Flush-Mount Speaker and includes the factory-installed line transformer and level switch, but is housed in a contemporary surface-mount enclosure with a black metal grille. Optional brackets give you a variety of mounting options.

Our systems approach saves you time and money.

Since the components in the 102 System are compatible, you no longer have to pore over endless data sheets looking for system components. Simply choose the correct number of 102 Flush-Mount and Surface-Mount speakers for your application.



102 System Controller.

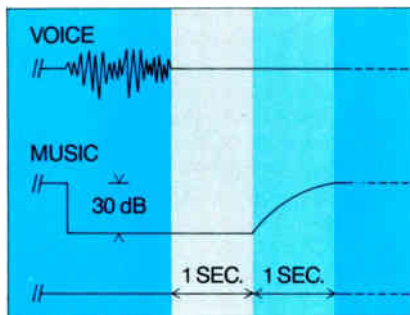
The 102 System Controller provides two independent channels of full bandwidth equalization for music, allowing stereo or two-zone mono operation.

The full-bandwidth channels feature balanced, differential inputs with sensitivity switches that can be set at 100 mv or 1 volt. The 102 System Controller comes with a two-year transferrable warranty.

Exclusive Opti-Voice™ System.

The 102 System Controller's Opti-Voice™ circuitry automatically reduces the volume of the music during voice-over operation, then gradually restores the music level after the voice message has ended.

Opti-Voice™ circuitry also provides custom band-limiting equalization for maximum voice intelligibility and minimal microphone proximity effect and handling noise. A compressor compensates for varying input levels by raising soft voice signals and lowering loud voice signals. As a result, each voice broadcast over the system will sound consistently smooth and intelligible.



Timing Diagram for Opti-Voice™ System.

Automatic voice channel gain feature.

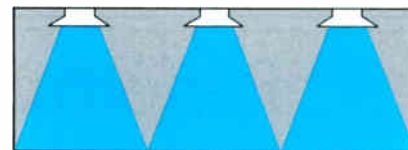
A recessed adjustment screw on the rear panel of the 102 System Controller controls the voice-channel gain. When a 3:1 compression ratio is reached, the LED flashes, allowing you to quickly set the proper voice-channel gain—regardless of the strength of the input signal.



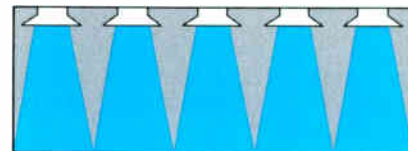
Rear panel control for voice-channel gain.

Broader dispersion.

The broader dispersion of the Bose 4 1/2" driver over conventional 8" drivers means you can specify fewer units per system. This results in lower cost for your customer and less labor for you.



102™ LOUDSPEAKER SYSTEM



8" COAXIAL SPEAKER

Comparison of 102 system and 8" coaxial speaker dispersion characteristics at 2 kHz.

Recommended applications:

- Restaurants/lounges/nightclubs
- Hotels
- Airport/train and bus terminals
- Conference rooms
- Hospitals and schools
- Commercial buildings and offices
- Outdoor and environmental applications
- Recreational facilities
- Entertainment and sporting complexes

Regardless of the application, you'll find the new Bose 102 Commercial Sound System provides a significant improvement in installed sound system performance. However, that's not surprising, considering that you were an integral part of its design.

For more information on the 102 Commercial Sound System, call the Professional Products Division at Bose Corporation:

- USA: (617) 879-7330
- Canada: (416) 881-2331
- Europe: 2993-66661
- Japan: 3-499-0901
- Australia: 2-684-1022

Bose Corporation, The Mountain, Framingham, MA 01701

BOSE
Better sound through research.

MASKING THEORY

(continued from page 14)

V.M.E. Peutz, in the early 1970s, empirically arrived at a new way of expressing articulation loss of consonants (ALcons) as a function of source-to-listener distance, reverberation, and room volume. Besides the reverberation factor that Peutz and others were using, T. Houtgast and H.J.M. Steeneken's work took into account signal level, noise level, echo delay time, and echo delay intensity. Their work shows a transfer function, or frequency response, of a speech waveform as it travels from a source to listener position in a room. The

amount by which a waveform is changed through the transmission process is the MTF (modulation transfer function).

So far, we can summarize by saying that there are four basic methods of predicting intelligibility, they are: the AI, S/N, ALcons, and MTF methods. While these are widely recognized techniques used to predict intelligibility from the basic room parameters, there are some underlying arguments as to their accuracy. However, they all will provide some rule-of-thumb in our design work—some being more complex to implement than others.

All the methods above are used for

predicting intelligibility from calculated or measured room parameters. If one has the opportunity to measure intelligibility directly, in an objective manner, the assumptions made in prediction methods may be eliminated. Therefore, a masking system may be specified, installed, and tuned with greater confidence of its performance. Until recently, this could only be done by the classic "word list" method. Now there are available two commercial units that will objectively measure intelligibility, they are: the Techron TEF system, using Peutz's Alcons method; and Bruel & Kjaer's RASTI system, based on the MTF method.

Over the years, specifying consultants and manufacturers have developed computer programs for predicting acoustical privacy in open-plan offices using one of the four techniques. These programs allow the consultant to analyze an office plan in a matter of minutes that would otherwise be impractical to undertake due to the computational complexity. The other alternatives would be either in-situ measurements, full-scale mock ups, or scaled-down modeling—all of which would be time consuming and cost prohibitive.

One example of an acoustical privacy prediction program is OPLAN, developed at Bolt Beranek and Newman of Cambridge, MA. The OPLAN program predicts acoustical privacy by analyzing the following information:

- 1) the envelope of speech loudness contours
- 2) each transmission path of speech sounds
- 3) the attenuation of each transmission path as a result of absorption, defraction, and/or deflection
- 4) multi-order reflection and diffraction paths
- 5) the anticipated NC curve at the listener position

All of the calculations are performed in each of the five octave bands from 250 Hz to 4 kHz based upon the AI method. Using such a program, a specifier can work with his client and determine if a sound masking system is needed, and if so how much masking will be necessary.

Psychoacoustic Effects of Noise

What is noise from a psychoacoustic point of view? *Unwanted sound*, whatever its nature, is noise. *Wanted*

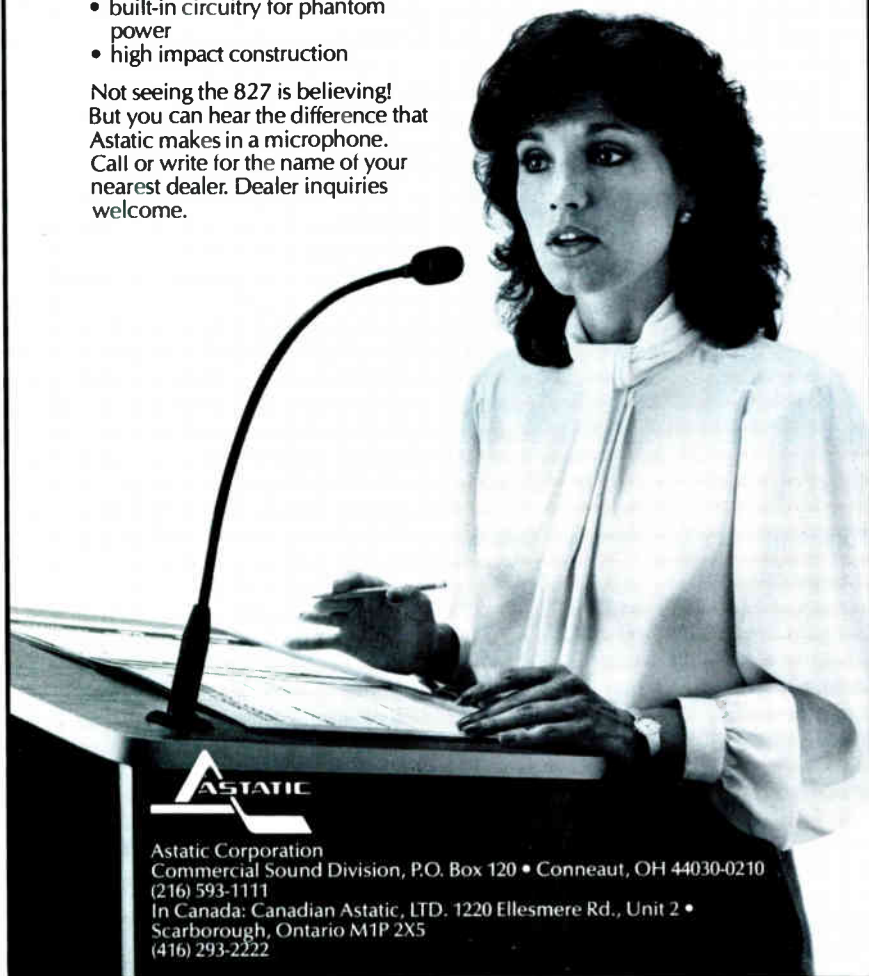
Performance you'll appreciate, sight unseen.

Astatic's 827 electret condenser microphone offers a low profile while providing high quality sound reproduction. These ultra thin 13" or 17" gooseneck mics stay well hidden; ideal for applications where close miking is required to produce additional system gain.

Among the "out-of-sight" features of the 827 are:

- controlled low frequency roll-off
- cardioid pattern
- permanently charged diaphragm
- built-in circuitry for phantom power
- high impact construction
- long lasting black finish
- miniature windscreen provided
- TWO YEAR WARRANTY

Not seeing the 827 is believing! But you can hear the difference that Astatic makes in a microphone. Call or write for the name of your nearest dealer. Dealer inquiries welcome.



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World Radio History

sound, whatever its nature, communicates information. When the "signal-to-noise" ratio becomes sufficiently large, we detect the signal and the information becomes available to us. Thus, the distinction between "noise" and "communication" is completely subjective, a matter of our own desires or needs at the moment.

Like any physical stimulus, moderation is essential. Besides the hearing loss aspects of noise are its psychological and physiological impact. In general, noise can be an annoyance. Annoyance, as a subjective response to noise, is capable of affecting health in terms of emotional and/or social well being. High noise levels can effect the cardiovascular system, metabolic functioning, digestive system, and respiratory functions. Moderate noise levels are capable of inducing physiological stress. The term "stress" implies a change in conditions affecting an organism which requires effort to maintain essential functions at a desired level.

"I would not work in an environment of 50 dB," said Dr. Mort Altshuler of Hahnemann University. Dr. Altshuler has conducted much research concerning noise levels, both ambient, and noise intentionally presented to the office worker for masking purposes. His findings agree with many that noise is detrimental, when people are subjected to it in excess. The word *excess* is one which has fine limits and just a few dB one way or another can lead to the failure of an environmental system.

Of the three levels of hearing, the basic level is one that we call the primitive level of hearing. This basic need connects us to our environment and is one that we are not usually aware of. If we disconnect ourselves from our environment, we find increased stress levels which are:

- 1) bad for our health in a world which is already filled with stress,
- 2) serves as a medium for increased mistakes and errors,
- 3) makes us less efficient.

The impact of noise upon the office worker is clear, and its capability to improve an environment or to destroy its effectiveness are of equal potential. Nonetheless, noise levels, when used to simulate a natural background, can be effective in giving the office worker a sense of acoustical privacy. Also, when used within its limits it can help in the intentional interference with

speech intelligibility.

Sound Masking Systems

Once the physical environmental design has been specified, and the acoustical parameters have been ascertained, the requirements of a sound masking system can be established. The sound masking system is, in simplistic terms, a background music system with the loudspeakers in an orientation such that:

- 1) no information bearing elements will be transmitted to the occupants of the space,
- 2) the space is completely covered with no "hot" or "cold" spots,

- 3) no one should be aware that a system is on,
- 4) no one should be able to identify a source location.

Several techniques have been used to improve the performance of sound masking systems. Two-channel systems are used by some to increase the amount of incoherence in the noise field. The tilting of loudspeakers is one technique that helps in the minimizing of source identification. Others use a time-of-day control of the noise level to coincide with the peaks and lulls in general office activity.

(continued on page 47)



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Hiring the Manager for Business

by Jeanne and Herb Greenberg

Caliper Management, Inc.

The word “manager” is quite elusive. As Peter Drucker, the dean of modern management, points out, the word “manager” is untranslatable into any other language. There is no exact counterpart in German, French, Spanish, Italian, or Russian; yet the words used in these languages are as imprecise as “manager” is in English.

To identify the personality characteristics necessary for success in management, we must first agree on a definition. At first, this might seem difficult because many different executives succeed with what appears to be completely distinct styles and approaches.

Among extremely effective executives we have worked with, there are flamboyant extroverts as well as those who are painfully shy. While some stick to the straight and narrow, others give eccentricity a new meaning. Some are self-centered, while others are generous to a fault. For every manager who suffers over decisions, there is one who seems to make decisions with great ease and aplomb. Some have broad interests, while others know nothing except their own area of expertise. In other words, for every Lee Iacocca, there are equally successful managers who would not attract attention.

Leadership, as George MacGregor Burns points out, is one of the most

observed and least understood phenomena on earth.

Still, when we delve below the surface, we believe there are certain consistencies to be found among successful managers.

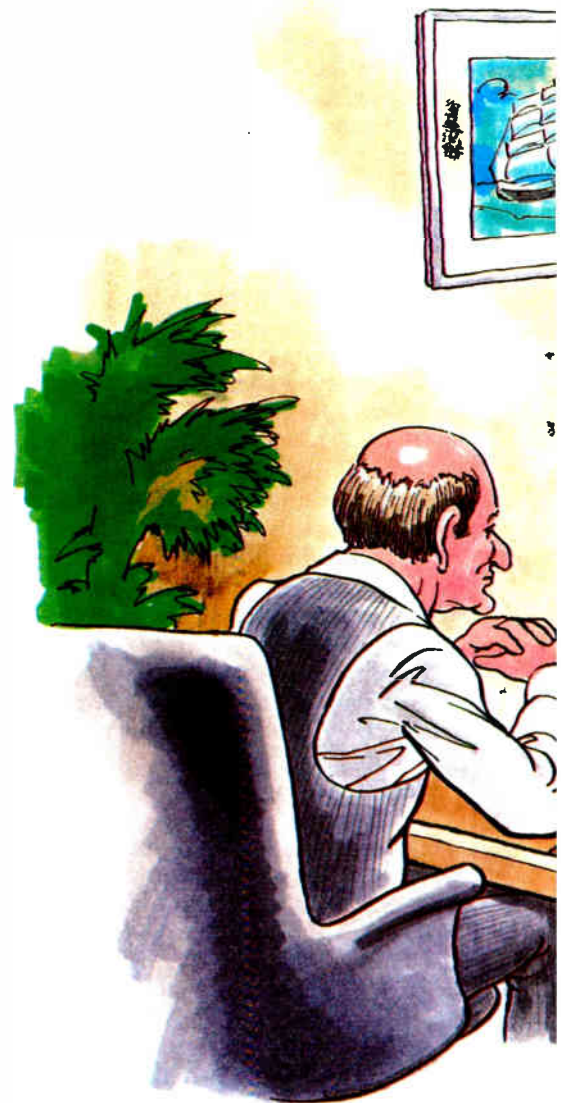
To be effective, managers have to sense opportunities, formulate new possibilities, build coalitions with peers, and convince those in positions of higher authority that their proposed innovations will help achieve corporate goals.

We can thus define the work of a manager as planning, organizing, integrating, and measuring.

Planning

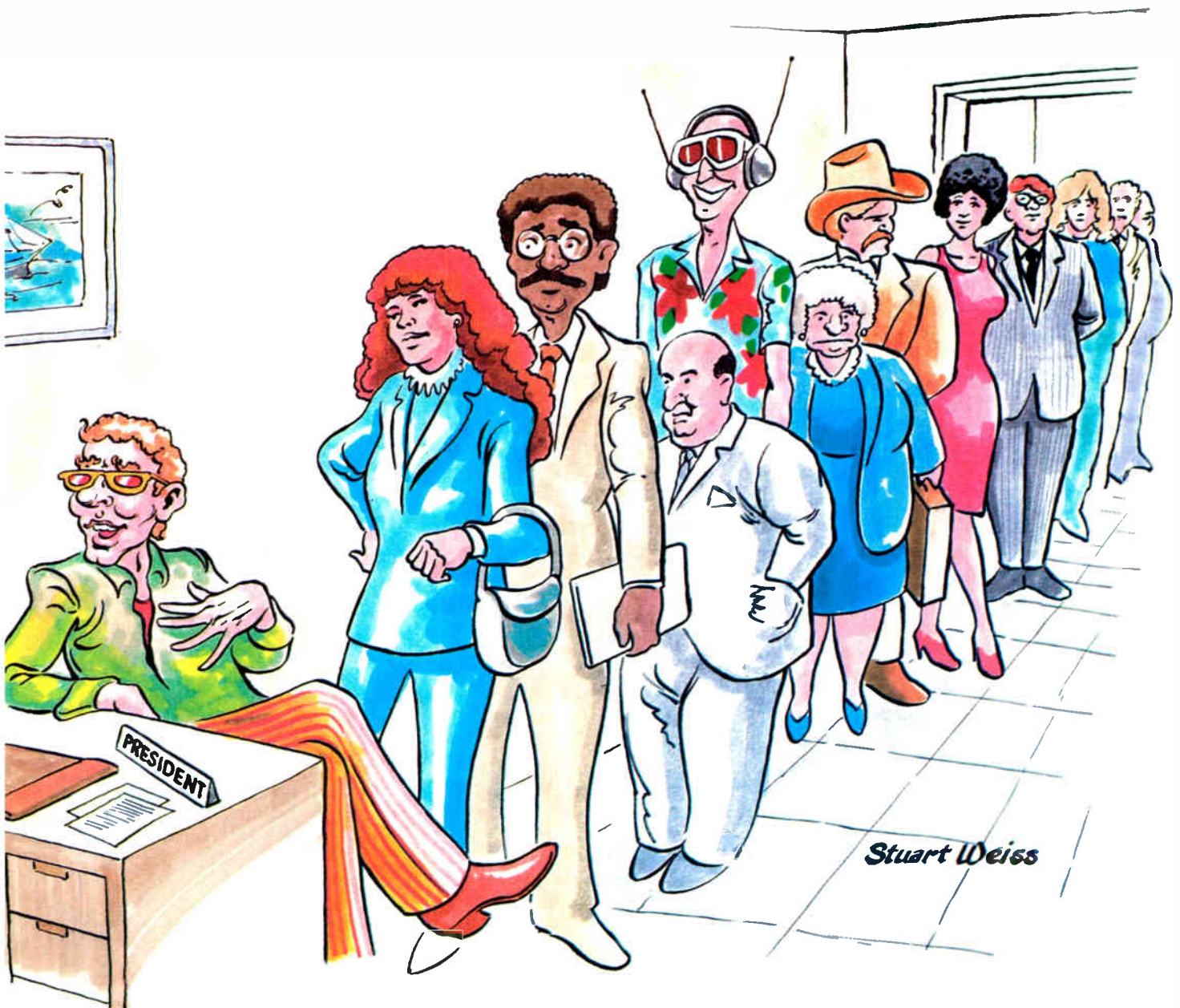
To set objectives a manager must have access to appropriate information about the company’s standing, competitive ideas, and trends in the marketplace. An effective manager must be able to synthesize and analyze this information in a manner that balances the business’s immediate needs with those of the future.

Of course, such an individual must be a competent decision maker, possessing a strong sense of personal responsibility and the willingness to make quick, appropriate decisions. Such decisions must be thoughtful and based on knowledge of all available data and possible consequences. On the other hand, an effective manager must



Right Your

A growing body of evidence shows that how a manager is perceived influences the work attitude of employees more than any other single factor in the workplace.



Stuart Weiss

be willing to take the risk of occasionally being wrong in order to act with the speed and decisiveness which many situations require.

The overly cautious individual is likely to be so fearful of being wrong that he or she would prefer not to act at all rather than take a risk. The ideal decision maker, on the other hand, combines thoughtfulness and responsibility with the courage to act, even to risk, with the intelligence and flexibility to make generally sound judgements and learn from mistakes.

Organizing

After objectives are set, a manager has to be able to organize the resources within his or her purview. This, again, takes analytic skills in order to effectively classify the work, divide it into manageable activities, and select employees most ideally suited to completing the tasks at hand.

Once objectives are set and resources organized, a manager must motivate and communicate. This is where leadership comes into play. Forty years ago, Bertrand Russell called power the fundamental concept in social science "in the same sense in which energy is a fundamental concept in physics."

Leadership is the ability which enables an individual to get other people to do willingly what they have the ability to do, but might not spontaneously do on their own.

Leadership implies that an individual has a special effect on others which commands their respect, admiration or affection, and causes them to follow that individual. In other words, leadership consists of getting a positive response from others and utilizing that response to bring about a desired attitude or course of action. This implies a certain amount of assertiveness in the sense that the leader projects some part of his or her personality or will on others. It does not mean aggression, force, or coercion. Whether the leader influences by personal example, persuasion, or empathic feedback, he or she wins others over by influencing their willingness to act rather than by forcing their compliance. An effective leader strives to become aware of the abilities of subordinates or associates, so as to guide them only toward goals which they realistically are capable of attaining.

Delegation skills are often what separate good managers from better ones. The capable delegator is an in-

dividual who, while he or she may personally be as well or better able to do a certain job, realizes that keeping the work would be an inefficient use of time, and possibly interfere with the development and best utilization of others. There are two types of individuals who strongly resist delegating: (1) the highly impulsive, driven individual who personally wants the gratification of completing a job, so is unwilling to provide that opportunity for gratification to others; and (2) the

Check List for a Good Manager

<i>Ability to gather information and analyze it in reference to the company's present and future needs</i>	✓
<i>Ability to make decisions and take risks</i>	✓
<i>Consistent and fair</i>	✓
<i>Commands respect from others</i>	✓
<i>Good communication skills</i>	✓
<i>Can delegate and motivate</i>	✓
<i>Encourages growth in self and in employees</i>	✓
<i>Measures and accesses performance</i>	✓
<i>A leader!</i>	✓

dividual who, while he or she may personally be as well or better able to do a certain job, realizes that keeping the work would be an inefficient use of time, and possibly interfere with the development and best utilization of others. There are two types of individuals who strongly resist delegating: (1) the highly impulsive, driven individual who personally wants the gratification of completing a job, so is unwilling to provide that opportunity for gratification to others; and (2) the

overly cautious perfectionistic individual who fears that no one will do the job with the same amount of care and responsibility. Good ability to delegate combines the willingness to allow others to do a job with the capacity to accurately assess their ability to do so.

Integrating

In order to make a team out of the people that are responsible for various jobs, a manager must be able to communicate clearly, concisely and convincingly. A manager must have the

ability and desire to convey his ideas, knowledge and skills to others. He or she must be able to listen as well as talk, and have enough empathy to sense whether messages are being understood. This involves possessing the necessary verbal skills for effective dialogue, and the ability to get the recipient to really participate in order to obtain feedback on how effectively the learning process is progressing. Still, even though communication is a two-way process, it must be under the leader's guidance and direction. To communicate effectively, a leader must be able to combine assertiveness and empathy appropriately, and display personal behavior that will elicit a willing and positive response from subordinates.

Measuring

Once objectives are set, work organized, and goals communicated, the fourth basic element in the work of a manager is measurement. The manager establishes yardsticks against which performance can be analyzed, interpreted, and appraised. Such measurements must be approached with consistency in order to be fair. Those whom one is managing will find their responsibilities acceptable if they have the security of a clear authoritative structure. It is management's task to set clearly understood objectives, and establish standards by which to meet those goals.

Finally, a manager must develop people, including him or herself. The ability to learn and grow requires considerably more than the possession of intelligence. It needs the combination of native intelligence with sufficient empathy and flexibility to permit an individual to use his or her intelligence to acquire new ideas and formulate new methods. In many cases, even people with well above average intelligence lack the capacity to grow because they use their intelligence to rigidly defend and justify their preconceptions rather than to genuinely seek or accept new approaches. On the other hand, many individuals with only average intelligence have the potential for growth because their openness, flexibility, and empathy permit them to make full use of the abilities they do have to acquire new knowledge and skills. Thus, for an individual to have good growth potential, he or she should combine natural intelligence with the openness and

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flexibility to seek and acquire new ideas and integrate and utilize them in day-to-day life and work.

In essence, while managers approach their work with varying styles and approaches, we have found there to be basic characteristics needed to effectively manage regardless of the situation.

To be effective, a manager must be able to analyze situations, be willing to make decisions and take risks, be able to communicate effectively, be capable of commanding respect from others, be able to delegate and motivate, be consistent and fair, and be willing to encourage growth in others as well as oneself.

A growing body of evidence shows that how a manager is perceived influences the work attitude of employees more than any other single factor in the workplace. A manager's style is constantly communicated, often subtly, setting the tone for the management of the entire organization.

To be most effective, "Know thyself." Rather than trying to fit into a prescribed mold, the best managers we have worked with are those who thoroughly understand their inherent strengths and their limitations. To put

it succinctly, the winners of the world are those who know how to play to their strengths.

The best managers are those who build a team by doing what they do best and hiring others whose strengths complement their limitations.

As a rule, the managers who try to do everything themselves probably will do nothing very well.

If you are seeking to hire someone for a management position, we suggest keeping in mind that no one individual can be everything in all situations. If an individual has a marketing orientation, with keen people skills, then don't try to mold him or her into a classic administrative role. Instead, make the best use of their outgoing, sales-oriented capabilities by complementing them with a second in

command who is adept at the more detailed aspects of administrative work.

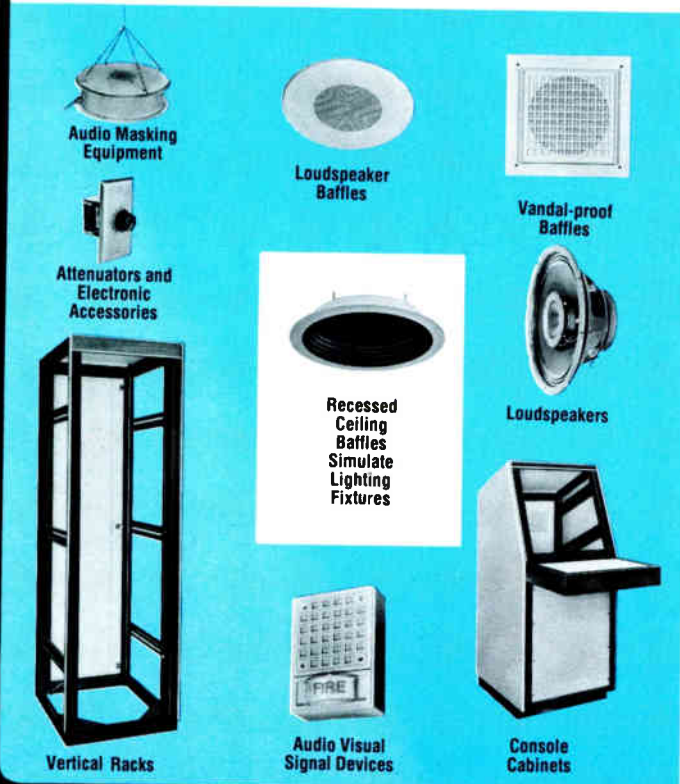
In the final analysis, there is no single profile that is ideal. We recommend assessing the innate capabilities of each manager in order to maximize the contribution they can make to your firm. As a rule, the managers who try to do everything themselves probably will do nothing very well.

Allow us to close with an analogy. In sports we have known that the moment a new record is set every athlete throughout the world acquires a new dimension of accomplishment. For years no one could run the mile in less than four minutes. Suddenly Roger Bannister broke through the old record, and soon runners from every neighborhood athletic club were approaching the mark, while another generation of leaders began to break new barriers.

In human affairs, the distance between the leaders and the average remains constant. If leadership performance is high, the average will increase. With this in mind, the easiest way to raise the performance of an entire company is to raise the effectiveness of its management.

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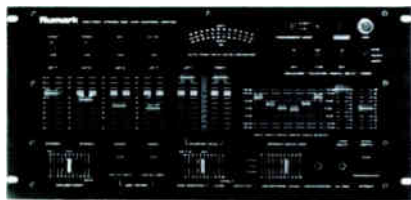
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PRODUCTS IN REVIEW

NUMARK MIXER FEATURES DIGITAL ECHO

Numark Electronics has introduced the DM1700T Mixer with digital echo. Using high-density, 8-bit microprocessor technology, the DM 1700T enables disc jockeys to store up to 480 milliseconds of program material from mic, phono, or line inputs, according to Numark. Once the material is written into the DM 1700T's memory, the disc jockey can play it back repeatedly at delay times of 120 to 240 milliseconds, creating a wide variety of special effects.



For added flexibility, the DM1700T features two slide controls for tailoring playbacks of delay source material. The unit also has built-in reverberation. Other features include a front panel processor, in/out switch, delay defeat switch, reverb switch, six-band graphic equalizer, low-cut filter switches, and dual peak level meters.

The DM1700T's source inputs include two phono, two line, and two mic jacks. The suggested list price is \$399.

Circle 1 on Reader Response Card

GENTEX INTRODUCES 90 dB PIEZO SIGNALING DEVICE

Gentex Corporation has introduced a remote piezo signaling device rated 90 dB at 10 feet, according to the manufacturer.

The new GX-90 signaling device is designed to be used in place of electromechanical horns and Gentex said, at 90 dB, is approximately 5 dB louder than most electromechanical devices. The GX-90 is polarized for use with supervised systems in installations such as hotels, dormitories, hospitals, apartments, and other projects where an alarm signal is required.

Two models are available. The GX-90-2 at 12 VDC draws 12 mA. The GX-90-4 at 24 VDC draws 15 mA in alarm. Plastic faceplates are

available in beige or fire-alarm red for flush mounting in single-gang switch boxes.

The new signaling device is U.L. listed and warranted for one year from date of purchase.

Circle 2 on Reader Response Card



ASHLY OFFERS TWO NEW POWER AMPLIFIERS

Ashly Audio has introduced two new power amplifiers, the FET-200 with 225 watts RMS per channel and the FET-500 with 675 watts RMS per channel. Both units feature balanced inputs, tamper-proof rear panel level controls, selector switches for mono and bridging operations, quiet forced air cooling, and three-color LED output level meters. The MOSFET output devices are said to contribute to sound quality and reliability.

Circle 3 on Reader Response Card



UHER OFFERS 16-HOUR OPEN -REEL RECORDER

Uher of America has introduced the Uher 6000 Report Universal open-reel tape recorder. The Uher 6000 features speeds of 3 3/4, 1 7/8, 15/16, and 15/32 ips. The slowest speed allows up to 16 hours of continuous recording with a five-inch tape reel, making the recorder useful for long-term monitoring, court reporting, and surveillance applications. The Uher 6000 can be programmed to begin recording when

activated acoustically.

The Uher 6000 features full logic control, acoustic level sensitivity control, electronic tape tension control, switchable automatic level control, and mark and find cueing on both rewind and fast forward. The Uher 6000's four-motor design minimizes wow and flutter. Function controls are solenoid operated and noise is controlled with a DNR reducer.

The Uher 6000 also features a built-in switchable loudspeaker, a mechanical tape counter, an AV input jack for use with sync sound, and a tape-end switch that shuts the recorder off when the tape ends or breaks.

With optional equipment, the Uher 6000 can be used for time code recording. The manufacturer's suggested retail price for the Uher 6000 Report Universal is \$1,749.

Circle 4 on Reader Response Card



NEC UPDATES ELECTRA KEY TELEPHONE SYSTEM

NEC Telephones, Inc. has introduced several new features for its Electra-16/48 key telephone system. The enhanced system is available in two packages.

The basic feature package, which uses the current line of station equipment, features increased system speed dial, tandem conference, and equal access accommodation. System speed dial now can store up to 80 numbers. Also, tandem conference permits an internal caller to establish a conference call with two outside parties. These two external parties can continue their conversation even after the call originator drops out. And finally, equal access accommodation makes it possible for toll-restricted stations to be allowed or denied access to non-primary common carriers.

The advanced feature package offers all of the elements of the basic feature package, several additional features,

and a new executive terminal.

The new station has a 16-digit LCD that displays date, time, message, and feature access confirmation. Each of the DSS buttons have BLF LEDs that provide station status for the programmed station. For increased speed dialing capability, the terminal's dual-purpose function keys can be programmed for direct station selection/feature access and station speed dial. The advanced package also offers station hunting, delayed ringing, private lines, and privacy release features to all station users.

The microprocessor-controlled Electra-16/48 can expand up to 48 phones with the addition of compact modules.

Circle 5 on Reader Response Card

dbx INTRODUCES LOW-COST, EASY-TO-USE NOISE GATE

dbx has introduced the 463X OverEasy® Noise Gate Expander. The 463X is designed for the recordist/mixer, instrumentalist, ENG technician, sound contractor, and others who need to eliminate unwanted noise between notes or sounds.

The dbx 463X is a single-channel noise gate. It is stereo-strappable with the dbx 163X Compressor/Limiter, and the two may be used as a stereo compressor or stereo noise gate, depending on which unit is switched to slave.

The 463X noise gate has a single-slider for setting the amount and severity of gating. A single knob sets the threshold point. Both slider and knob allow the user to change gating characteristics and the sound of the program by ear.

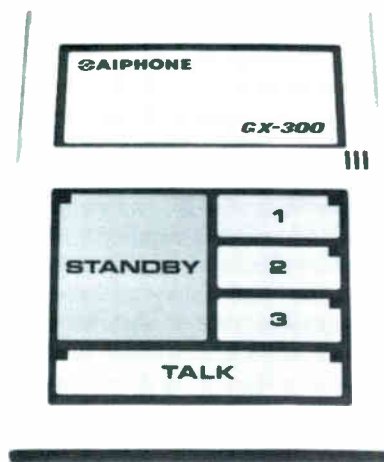
Illuminated indicators display the status of the noise gate.

Circle 6 on Reader Response Card

AIPHONE DEBUTS DRIVE-THRU INTERCOM

Aiphone Corporation has introduced a new drive-through intercom system designed primarily for fast-food restaurants.

The GX-300 Drive-Thru uses military grade components which maximize the system's life, Aiphone said. "The GX-Series is made to



withstand the fast paced environment of a fast food restaurant and even survive the American teenager—the typical employee and customer of drive-thru business," said Hiko Shinoda, president of Aiphone.

The GX-Series system includes a stainless-steel-encased inside master

station (GX-300), a weatherproof outside speaker-substation (AMB-758U), and a power supply (PS-24C).

The master station, with press-to-talk operation, is shock-mounted and moisture-resistant.

In addition to audible indicators, the master station features light indicators that tell when a vehicle is approaching, which audio channel is in use, if the talk switch is on, and if the system is in operation. Separate controls allow the user to regulate the volume of receiving and transmitting audio and of the vehicle alert tone, which may sound once or more than once, depending on how it is set.

The outside speaker-substation is vandal-and-moisture resistant and flush-mounted to prevent damage.

Circle 7 on Reader Response Card

NADY INTRODUCES TELEPHONE HEADSET

Nady has introduced the EasyTalk (continued on page 43)

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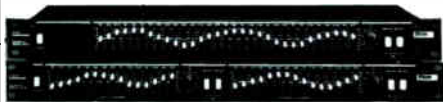


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a closer look

by gary d. davis



DOD R-430 and R-431 Graphic Equalizers

The DOD R-430 is a 15-band, independent dual-channel, two-third-octave graphic equalizer. The DOD R-431 is a 31-band, single-channel, one-third-octave graphic equalizer. These two otherwise similar EQ's are of identical size (a 1.75-inch rack space), with the same features and performance.

These units are intended for recording, sound reinforcement, or other professional applications. The frequency bands are centered on ISO frequencies, with 12 dB of boost or cut, and "0 dB" detents on the filter sliders. In addition, there is a switchable low-cut filter. Dust covers behind the front panel keep the actual slide controls and switches clean inside. LEDs indicate switch modes, as well as input level (which is adjustable). The power switch is located on the front panel.

There are two inputs and two outputs (two each per channel on the R-430); one a balanced one-quarter-inch T/R/S phone jack, the other an unbalanced phono jack. XLR connectors are available as an option. The maximum input level is +18 dBm into 600 ohms or higher (balanced or unbalanced). The electronics include Bi-FET op-amps that are claimed to have high slew rates and low noise, and low noise potentiometers are used throughout. Electronic switching is utilized to eliminate switching transients. Durability and field service are enhanced by a steel chassis with plug-in, mil-spec, fiberglass circuit boards and socket-mounted ICs. An optional security cover is available.

Comments: These DOD graphic equalizers appear to have the basic features one would need in professional applications. The R-431 is a typical one-third-octave EQ, and, as such, should be useful for "ringing out" stage monitors, contouring concert sound reinforcement or studio

monitor systems, and pin-point-corrective EQ in some music recording or broadcast production applications. The R-430, which trades-off half as many EQ bands (15 instead of 31) for twice as many channels (two instead of one) raises some questions. I have never worked with a two-third-octave EQ, and I wonder how readily people will adapt to it? I suppose that it is possible to use a one-third-octave spectrum analyzer in order to guide the adjustment of a two-third-octave equalizer, but I suspect that this item is intended more for general "sound shaping" and effects, and less for feedback suppression. Feedback tends to occur at very narrow nodes anyway, so the one-third-octave (or even one-sixth or one-twelfth octave) EQ is better suited to anti-howl tactics.

Certainly these units pack a lot of function into a very small package, which can make a big difference in a portable sound system or a crowded effects rack. On the other hand, one has to be ready to make very cautious adjustments of a slider which squeezes a 24 dB adjustment range into about an inch-and-a-half of vertical space, which is why I would not recommend these for on-stage use by guitar or keyboard players in live performances.

The standard one-quarter-inch T/R/S phone jack for balanced in and out, with the XLR left as an option, is probably a good way to keep the cost down without impairing flexibility. And these are touted as low cost units. I wonder, however, if +18 dBm output drive capability is adequate for professional sound reinforcement applications? After all, if just 6 dB of boost is applied (not the available 12 dB maximum), then an input signal peaking at +18 dBu will be 6 dB into clipping at the output, whereas an EQ with +24 dBm output capability would not be clipping. Moreover, the graphic EQ is generally one of the last (or the last) item in the signal processing chain prior to feeding the power amps (unless bi- or tri-amped, in which case the dividing network would follow the EQ). If multiple

amps are driven from one EQ channel, then the +18 dBm output may be overloaded — or at least the available headroom may suffer considerably. Then again, in many applications this will not be a problem, and the cost advantage can be enjoyed. The bottom line with any EQ is: "How good does it sound?" and "Is it quiet?" Since I do not perform hands-on testing in preparing this column, I suggest you give the DOD R-430 and R-431 your own *closer look*.

Circle 9 on Reader Response Card



New QSC MX-1500 Amplifier

QSC Audio Products MX-1500 is a new, low-profile, high-efficiency professional power amplifier. Designed to drive high-performance loudspeaker systems, the MX-1500 is said to deliver 750 watts per channel into a 2 ohm load.

The MX-1500 is dual monaural, allowing each channel to operate as an independent amplifier (sharing the AC cord and AC power switch). According to QSC, the high efficiency output circuit is complementary and uses case grounded output transistors yielding a 25 percent improvement in thermal transfer. Also, the multiple voltage output circuit switches to higher voltage when required by audio levels, thus further reducing thermal losses by an average of 50 percent in comparison to conventional designs.

The MX-1500 features the QSC patented Output Averaging™ Circuit, which protects the amplifier from indefinite short-circuits. The MX-1500 also features protection for loudspeakers—individual channel Load Grounding™ output relays provide fault protection. Delayed turn-on for transient protection and turn-off muting for pop suppression are also provided.

Other features include: power/protect red/green bi-LED, clip LED on each channel, active balanced one-

(continued on page 49)

(continued from page 41)

telephone headset. The EasyTalk comes with a full headband, in model TH-15H, or with an over-the-ear holder in model TH-15E. Both headsets are lightweight and have a foam-padded speaker. They also both feature a noise-cancelling microphone on an adjustable boom.



The TH-15 headset amplifier operates on phone-line voltage and features surge protection to guard against sudden, harsh audio output. The TH-15 amplifier mounts with double-sided tape on the telephone body and connects to the telephone with a standard modular jack.

Other EasyTalk features are adjustable volume, a headset/handset switch and a mute switch. The EasyTalk's design allows quick, reliable end-user installation. Nady's suggested retail price for the EasyTalk telephone headset is \$49.95.

Circle 8 on Reader Response Card

BSS INTRODUCES FREQUENCY DIVIDER AND LIMITER

Brooke Siren Systems has introduced the FDS360 Integrated Frequency Divider and Limiter System.

The FDS360 can operate as either a two-way stereo or three-way or four-way mono crossover. The front panel includes separate level and mute controls for each of the four sections, and an LED display indicating signal present, limiter threshold, and over limit conditions.

The new unit also features two facilities for correcting signal misalignment due to speaker placement. For adjusting signal phase in the critical

crossover region, a 0 to 180 degree phase control and a polarity reverse switch provide a method of reducing the notch filter effects of signal misalignment between bands. For true time correction, a rear panel barrier strip provides patching points into each of the four sections. This allows the insertion of a frequency independent delayed signal into each section from a suitable digital delay.

Each section includes an integral mid-filter limiter for amplifier and speaker protection. The attack and release times for the limiter are determined by the appropriate plug-in frequency card and, as such, are optimized for each section. Limiter threshold can be adjusted in one-half dB steps via the precision switch network on the rear panel. No external test equipment is necessary.

The FDS360 uses the Linkwitz-Riley 24 dB/octave filters, with frequencies specified by the customer at the time of order.

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Dress up your presentation...

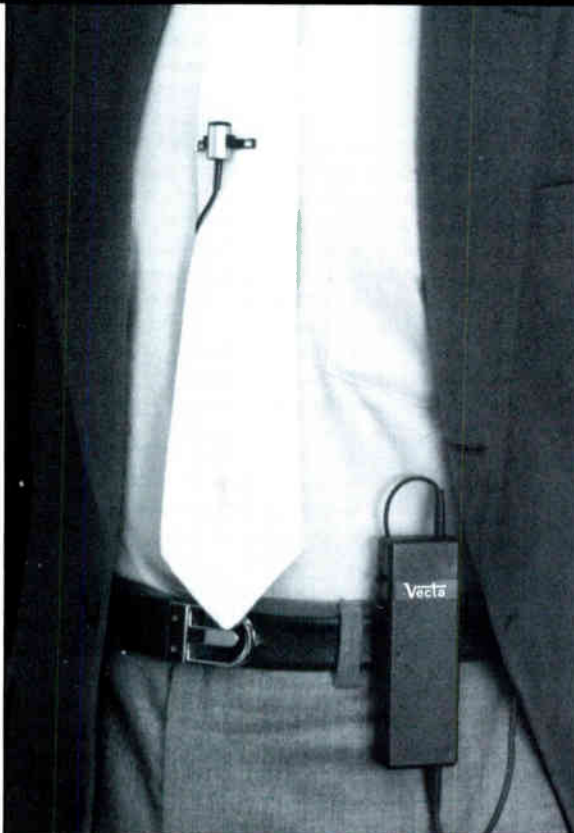
Vecta

Wireless Microphone System

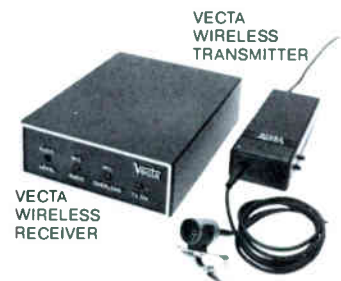
...the perfect accessory.

FEATURING:

- Attractive price
- Easy to use
- Clean, crisp sound
- Wide dynamic range
- Extra-quiet—special noise-reduction circuitry
- Clean high-band VHF frequency
- Long battery life (up to 10 hours on one 9-V alkaline battery)
- Mic and battery on/off switches
- Solid, rugged construction
- Made in USA



Vecta is a new name from the leading manufacturer of quality wireless systems since 1962.



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TEQ™ A TRANSVERSAL EQUALIZER BY IRPI

A lot went into



Transversal Filter Equalizers are the building blocks to better equalization

By including our TEQ Model DG-4017 Equalizer in your system, you avoid compromising your sound with the sound processing. The TEQ equalizer provides transparent sound at all frequencies and all boost/cut settings. It virtually eliminates unnecessary ringing and transient coloration of signals.

Most $\frac{1}{3}$ octave tuned filter sets respond correctly at their control frequencies but at other frequencies filter interaction creates frequency response ripples. As little as one dB ripple in frequency response can produce audible coloration. Due to its unique design, the TEQ transversal equalizer provides response control *without the ripple associated with tuned filters!*

“... the first genuine step forward in equalizers since ... the original $\frac{1}{3}$ octave units ...” *Don Davis—Syn-Aud-Con Newsletter*

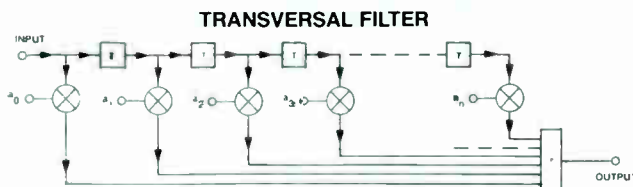


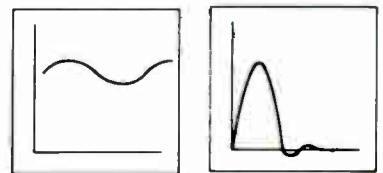
Diagram 1

The input signal is delayed by a chain of N stages, each stage delaying the signal by amount T . Each stage output is multiplied by a weighting factor a_n and summed together for the final output. The frequency response of the filter is determined by the relative values of the weighting factors, a_n .

The TEQ equalizer produces frequency responses with a single filter. Its transient response is the weighted response of a single tapped delay chain. (See diagram 1)

The response synthesized from the tapped delay chain provides smoother, more even equalization curves (See diagram 2). The resulting frequency response ripple is settable to less than 0.1 dB over 100% of a 20 dB adjustment range!

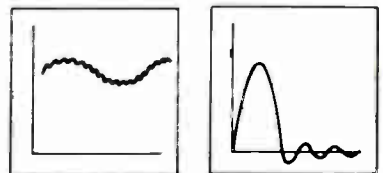
TRANSVERSAL-TEQ™



FREQUENCY

IMPULSE

CONVENTIONAL



FREQUENCY

IMPULSE

Diagram 2

this "overnight success"

controls allows surprisingly easy acoustic equalization. Indeed, a cut or a boost can be produced easily at any frequency between adjacent controls, thus giving quasi-parametric capability. Furthermore, space-saving control knobs make our DG-4017 more compact, and easier to install.

AFFORDABLE
STATE-OF-THE-ART
TECHNOLOGY

Precise control with fewer knobs

Over the critical mid-frequency range, control points are $\frac{1}{3}$ octave apart. At low and high frequencies, we use 1 octave controls—plus a high pass filter at the low end and a shelving filter at the high end for additional tuning ease. The result is 15 tuning points for optimum control, instead of the usual 27.

The predictable interaction between adjacent band

Exciting new technology with a competitive price tag

The model DG-4017 represents a revolutionary advance in equalizer technology that is rapidly becoming the standard of excellence for the industry. Yet this state-of-the-art equalizer is priced competitively with the leading $\frac{1}{3}$ octave graphic and parametric equalizers.



1 OCTAVE
LOW END

$\frac{1}{3}$ OCTAVE
MID-BAND

1 OCTAVE
HIGH END

Circle 209 on Reader Response Card



Adventurous acoustical designers are gaining international recognition with the TEQ

From Expo '86 in Vancouver, where the focus is on advanced technology, over 40 TEQ units have been installed, to a 10,000 seat church in Lakeland, Florida where 6 TEQ units are in use, adventurous acoustical designers have found the Model DG-4017 to be the optimum tool in advanced equalization. Our first accolades came from Don Davis. It was followed by Farrel Becker's *Sound and Communication Lab Report* in which he stated, "Industrial Research Products' DG-4017 Transversal Equalizer is a significant development in the field of equalization. It is a high quality equalizer with a combination of features sufficient for almost any job. It may be used as a boost and cut, boost only or cut only equalizer with no penalty paid in ripple and excess phase shift. I know of no other equalizer that can make that claim." Find out more about the affordable equalizer that delivers transparent sound every time. Call or write:

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FACES AND PLACES

Audio-Technica Names Hebrock Engineering Manager

Audio-Technica has promoted Steven J. Hebrock to the newly-created position of engineering manager. Hebrock, who was previously Audio-Technica's design engineer, will assume responsibility for engineering project coordination, direction of the quality assurance program, and the procurement and allocation of engineering equipment.

Before joining Audio-Technica in 1984, Hebrock was a quality assurance engineer for Altec Lansing. Previous positions include an assistant professorship at the School of Music of the University of Colorado at Denver, where he taught sound recording techniques.

He also established the Caribou Ranch Studio Workshop program in Nederland, CO. The program offered intensive two-week sessions in recording techniques. A graduate of the State University of New York at Fredonia, Hebrock holds degrees in music composition and sound recording.



STEVEN J. HEBROCK



FRANK GLASS

ADC Telecommunications Names Glass Southwest Manager

ADC Telecommunications Inc. has announced the appointment of Frank Glass as manager of ADC's southwest district.

As district manager, Glass is responsible for the sale of ADC products to all Bell accounts and to private network accounts in the southwest district of Kansas, Missouri, Oklahoma, Arkansas, and Texas. Glass holds sole account responsibility for AT&T Communications in ADC's southwest district.

Prior to joining ADC Telecommunications, Glass was with Alltel Supply in Dallas. During 12 years at

Alltel, Glass held several positions of increasing responsibility, culminating in the position of regional manager of sales and operations in Alltel's southwest region.

Sharp Hires Two New District Sales Managers

Sharp Electronics Professional Products Division has hired two district sales managers. Working from Sharp's Atlanta office, Henry Kazmierski, Jr. will manage sales in the company's southeastern district. Handling sales in Sharp's midwestern district, Tom McKevitt will operate from the company's Chicago office.

McKevitt was previously an account manager at New Orient Media, Dundee, IL, and a sales representative with Midwest Visual Equipment Co., Chicago.

Kazmierski has worked in sales with Telex Communications and Audio-ronics. He also served as a representative for 3M's Visual Products Division.

Kazmierski and McKevitt join James W. Hulfish, Jr. and Joseph E. Cordts who last month were appointed western and eastern district sales managers, respectively. Sharp is in the process of hiring additional district sales managers.



RUSSELL DIERTHERT



DAVID LOCKE

EDS Slates Board Candidates

The Electronic Industry Show Corporation has slated Russell Diethert, president of LTD Technologies Inc., Itasca, IL, and David Locke, president of Bear Marketing Inc., Richfield, OH, for election to its board of directors; and Oliver Goold, president of GBL/Goold Electronics Corp., Elk

Grove Village, IL, for re-election to the board.

The new candidates, Diethert and Locke, will represent the manufacturers' representative function on the Electronic Distribution Show board. Diethert is the senior vice president, finance, of the Electronic Representatives' Association (ERA). Locke is the ERA's senior vice president, activities. Goold, re-elected as a distribution spokesman, is past president and chairman of the board of the National Electronic Distributors Association (NEDA) and also served NEDA as its vice president, education, and as a vice president of the Mid-America Industrial Chapter.



OLIVER GOOLD



ANDREW M. MUSCI

Bogen Names Musci, Product Manager, Commercial Sound

Andrew M. Musci has been promoted to the new position of product manager, commercial sound, for Bogen, a Lear Siegler Company. The announcement was made by Carl C. Dorwaldt, vice president, marketing.

Musci has served as marketing specialist for the past year. He joined the company as sales engineer in 1984. Previously he spent seven years with Altel Sound systems, New York, NY.

Schiffman Named to Sales Staff at Bozak, Inc.

William Kiltyka, director of marketing and sales at Bozak, Inc., has announced the appointment of Melanie Schiffman as sales administrator. Schiffman will be in charge of sales orders and follow-up as well as general marketing administration.

Schiffman's background includes a bachelor of music degree, music management, from the Hartt School.

In an effort to achieve a nationwide representation force by September, 1986, **Eddor** has commissioned four new manufacturer's representatives: **Lewis & Dunnigan** in upstate New York, **W.A. Hendrickson** in New England, **John Amos Associates** in Arizona, and **Meyer & Ross** in northern California.

Biamp Systems has announced the appointment of three new territory representatives: **Dave Spalding** of **Double Edge Marketing**, covering the states of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island.

Rick Parent and **Kevin Talmant** of **Fleetwood Marketing**, covering the states of Wisconsin, Michigan, Illinois, Indiana, and Kentucky.

Pete Wood of **Woodco** covering the states of Texas, Oklahoma, Arkansas, Mississippi, west Tennessee, and Louisiana.

TOA Electronics, Inc., Commercial Division, has appointed **LCA Sales Co.** of Tuckahoe, NY, its

representative in the New York/New Jersey territory.

Established in 1945, LCA President, **Joel H. Schwartz** and General Manager **Robert R. Sherwood** and their sales staff of 15 bring years of experience and expert technical knowledge of the electronic industry.

Switchcraft, Inc., has appointed a new representative company to handle its North Carolina, South Carolina, Georgia, Alabama and eastern Tennessee territories. The new rep company is **DHR Marketing**, headquartered in Raleigh, NC, with branch offices in Atlanta, GA, Huntsville, AL, and Greenville, SC.

MISCO/Minneapolis Speaker Company announces the appointment of the following firms to represent its commercial sound product line: **Pacnor Marketing, Inc.** Lynnwood, WA, will cover UTP 30A & B; **Audio Marketing Associates**, Brecksville, OH, will cover UTP 9, 14, and 15; **Dick Bellew Sales**, Dallas, TX, will cover UTP 21, 22, and 23.

Benson & Friedman Buy New Breed

Following the death last March of New Breed Associates' principal Barry Wolfson, marketing executives Tom Benson and Paul Friedman bought the firm early this month and have changed its name to Metropolis Audio Marketing Inc. Metropolis will retain New Breed's Edison, NJ, address and phone number. And Debbie Mott, who served as office manager for New Breed Associates, will continue with that title at Metropolis.

"We are proud to set an industry precedent by keeping the New Breed package together for the benefit of maintaining an established, strong representative firm in this market. We are also proud that provisions have been made which will last years to help Debbie Wolfson and recognize the hard work her husband spent building the firm to what it is today," said Benson, formerly marketing manager for AKG Acoustics U.S. Inc.

Benson said Metropolis will benefit from its two principals residing in

strategic locations for coverage of the New York/New Jersey area. Benson resides in Bayside, NY, Friedman in Westfield, NJ. Friedman's specialization in the sound contracting market and Benson's in professional audio and broadcasting will benefit Metropolis, especially in light of the fact that 10 of the manufacturers the new firm represents exhibited at the recent National Sound and Communications Association Expo in Las Vegas, Benson said.

Friedman, formerly national sales manager for Numark Electronics, said, "We plan to offer New Breed clients better coverage with more people. Our plans for the future are practically unlimited."

Metropolis Audio Marketing has already secured New York metropolitan area distribution for Electro-Voice Inc., QSC Audio, ProCo Sound, Furman Sound, Samson Music Products, Allen & Heath Brennell, Symetrix, ads/DeltaLab, Galaxy Audio, and Ronco Video Corp.

Conclusion

In some cases, the sound masking system may afford the viability of a space which would otherwise have no alternative. In any case, it is clear that a sound masking system modifies the acoustical characteristics of a space and enhances its performance. As such, the sound masking system can be categorized as an electronic architecture implementation. Contractors who serve as electronic architects are responsible for the designs and construction of these systems, just the same as architects are for the entire space. Treated as a science and art, sound masking in the electronic architecture context can be an economic environmental solution for the owner, and therefore, profitable for all.

Acknowledgment

The author would like to thank David H. Kaye, consultant in acoustics, of Boston, MA, for his contribution during the development of this article.

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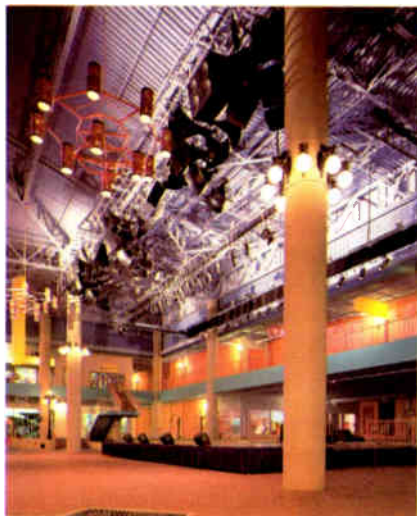
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Southwest Sound Installs Theater System in Shopping Mall

The traditional Mexican *plaza* has no reverberation problems, because there are no walls or ceilings to reflect sound. But putting a *plaza* indoors, especially in the center of a shopping



Fiesta Plaza's entertainment area.

mall, typically causes reverberation problems.

Southwest Sound of San Antonio, TX, faced such a problem in designing the sound system for an entertainment area at the center of the Fiesta Plaza International Market in San Antonio. The entertainment area, which has a portable 40- by 40-foot stage and port-

able seating for 2,500, has featured Mariachi groups, flamenco dancers, the San Antonio Symphony, and "Dancing Waters," a 40-foot fountain with colored lights and music.

The challenge was to provide sound coverage for the entertainment area while preventing sound from reverberating down the mall's corridors and disturbing shoppers at Fiesta Plaza's 56 stores.

An original plan called for mounting all the system's speakers on a 66- by 10-foot motor-winch gondola. While this would have allowed imaging adjustments by raising and lowering the gondola, the plan was scrapped due to its costliness.

As an alternative, Southwest Sound chose three fixed speaker platforms to cover the balcony, near-field, and far-field. To provide additional control over the sound field, Southwest divided the system into eight speaker-zone channels, each with its own power amplifier and EQ.

Despite the system's design, the system filled the entire mall, not just the entertainment area, with sound. But spokesmen for both Fiesta Plaza and Southwest Sound attributed this to the lack of acoustical absorption material in the mall and said that installation of the acoustical absorption material had not been Southwest

Sound's responsibility.

Mike Ramirez, Fiesta Plaza marketing and advertising director, said, "The equipment is terrific as far as quality goes. The sound company did



The control room overlooks the entertainment area.

everything we paid them to do. We still need to put up acoustical absorption material around the ceiling area to absorb some of the sound that reverberates through the halls."

Steve Simpson, III, president of Southwest Sound, said placement of fire safety equipment such as sprinklers and heat sensors had prevented installation of the sound absorption material.

According to Simpson, equipment used in the installation included a Technics SL-1200 MK II turntable, a Tascam 122 cassette deck, an Otari open-reel deck, a Yamaha Professional PM-2000 mixing board, Urei 537 equalizers, Urei 1176 compressor/limiters, JBL Professional 6230 and 6260 power amps, JBL 2360 and 2366 horns, JBL 2445J compression drivers, JBL 2204H high-frequency drivers, JBL 3508 bass cabinets with JBL 2225J low-frequency transducers, JBL 4602B floor monitors, and JBL 4663A side-fill speakers.

CANDLESTICK PARK UPDATE

Caraway Audio of Belmont, CA, has recently upgraded the main stadium PA system at Candlestick Park, home of the San Francisco Giants and 49ers.

"The system sounded great but to perfect the stadium's sound I felt we needed to add something to enhance the ultra top-end...the "S's" and "T's" if you will," said Doug Caraway. "The original cluster consisted of six Harbinger 509 bass bins, and six Mark Wayne-designed Harbinger dual entry horns loaded with 12 JBL 2445 drivers. What we added to that is six Harbinger dual entry long throw horns packed with 12 JBL 2425 drivers."

Candlestick Park's deficiencies have been well publicized, however, one of the positive features of the stadium is its public address system. Regarded by such audiophile baseball stars as The Giants' Chili Davis and The Atlanta Braves' Dale Murphy as "the best stadium sound system in the country."

A CLOSER LOOK

(continued from page 42)

quarter-inch and barrier strip inputs, front mounted gain controls, AC switch and breakers, and flow-through fan cooling.

Performance specifications for the MX-1500 are: 750 watts per channel (1kHz, less than 0.25 percent THD, 2 + 2 ohms), 500 watts (20kHz-20kHz, less than 0.25 percent THD, 4 + 4 ohms), 330 watts (20kHz-20kHz, less than 0.1 percent THD, 8 + 8 ohms), IM Distortion 0.02 percent, Slew rate greater than 30 V/microsecond.

The MX-1500 retails for \$988.

Comments: The QSC MX-1500 would appear to be a unique package...a dual mono, 750 watt per channel (into 2 ohm) high quality amplifier in a 3.5-inches high x 19-inches wide rack mountable package for under \$1,000! I wondered about the amp's reliability, and about the accuracy of the claimed specs in the QSC release, so I talked to Barry Andrews at QSC. Barry told me that, electronically, the MX-1500 is almost identical to the QSC 3500 amp, which has been field proven for a couple of years. However, in order to fit things in a small space, and keep the cost down, the meters, octal "accessory" sockets, and general packaging were changed. Extra heat sinking and a fan were also added so that the output current could be increased.

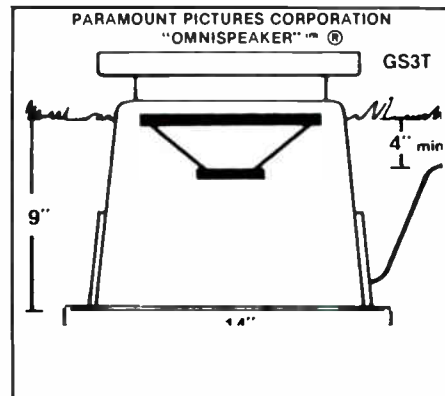
All that seems reasonable, but can an amp deliver 1,500 watts (two channels x 750), drawing this plus the "overhead" power lost in inefficiency, from a single 15 or 20 amp 115 V AC circuit? Well, yes and no. The 750 watt/channel rating at 2 ohms is spec'd at 1 kHz, and the broadband power is somewhat less. However, it is a "beefy" amplifier which QSC said can work safely, and indefinitely, into a 2 ohm load. The real reason for the 2-ohm rating, however, is so that a 4-ohm load can be accommodated without any chance of "blowing" the amp. Many nominal 4-ohm loads, Barry explained, actually dip well below that at some frequencies. I would consider the MX-1500 as a reasonable 2-ohm amp, or a "bullet proof" 4-ohm unit.

How does it work? There are two high voltage, bipolar power supply busses (or "rails"), one at the maximum supply voltage, the other at half that voltage. Most of the time the outputs operate from the lower voltage

rails, but when the demand is there, diodes instantaneously switch up to the full voltage rails. The Class G circuit means that less heat need be dissipated during a large percentage of the time the amp is operating, which keeps things cooler.

While compact packaging, a cooling fan, Class G circuitry, and a variety of protection circuits are hardly revolutionary, the combination of them in the MX-1500 add up to something new. We think QSC has shown real ingenuity in this model, a power amp that warrants your closer look.

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Now SCAMP — the world leader in speech privacy — is better than ever. So much so, that we've increased the guarantee to 6 years — the industry's longest. Output stability is enhanced with added power supply regulation. Switch selection for mineral fiber or glass fiber ceilings. 12 position output adjustment in 1½dB steps, 16VAC input power.

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STRATEGIC SELLING

(continued from page 11)

plex sale. They present strategies for identifying the four key buying influences present in every complex sale, the "economic buying influence," the "technical buying influences," the "user buying influences," and the "coach." They explain how to locate a "coach" and how to use that person (or persons) to help locate the other buying influence and to determine what each buying influence expects from the sale. They explain how to evaluate the response mode of each buying influence and how to structure your sales effort to fit those response modes. And they explain how to turn every sales into a "win" for each buyer—and for the seller.

Although the approach is highly analytic, it is also very humanistic. Miller and Heiman decry the "tricks and techniques" approach to selling and scoff at the "find the weak spot and sink the hook" school. They sympathize with those buying organizations that "have created professional dragon-slayers (purchasing agents and buyers who) form a defensive perimeter against the supposedly barbarous hordes of sales representatives." And they warn against approaching a sale as a battle and the customer as the enemy. In place of these worn-out ideas, Miller and Heiman propose the "win-win" approach to mutual seller/ buyer satisfaction and they present a method of using positive psychology and scientific strategy to make those wins happen.

Like the character Willy in "*Death of a Salesman*," the old-school salespeople are on their way out. They simply cannot succeed, except by chance, in today's complex selling situation. In their place will come a new breed of salespeople, schooled in the methods presented in "*Strategic Selling*."

This book is for old-school salespeople who know they need help in making complex sales. It's for new sales recruits who want to get started on the right track to success. It's for salespeople, sales managers, and for those marketing people who understand that marketing is just a fancy word for sales strategy.

"*Strategic Selling*" is published by Morrow Books. It is also available from the Fortune Book Club (at a discount). Get this book before your competitors do. I mean it.

AD INDEX

<u>RS#</u>	<u>Company</u>	<u>Page</u>
203	Amek	III
222	Astatic	32
207	Beyer Dynamic	10
212	Bose	30, 31
240	Cetec Vega	43
242	Eastern Acoustic Works	25
224	Edcor	7
201	Electro-Voice	II
208	Environmental Sound	41
223	ESG	33
215	Fane	55
204, 213	Harris Corp.	16, 17, 19
225	IBMA	56
206, 210, 211	Insul-Art	49, 51, 53
209	IRP	44, 45
214	JBL	27
221	MacKenzie	20
205	Nady Systems	6
231	NSCA	52
229	Oaktron	37
217	Panasonic Industrial	5
227	Portland Instrument	49
218	QSC	3
241	Quam Nichols	15
202	Shure Brothers	IV
226	Sonic Systems	29
230	Soundolier	38
219	TekTone	54
	TOA	21
220	Vegas Valley	54
216	White Instruments	7

SALES & MARKETING

(continued from page 11)

national sales meeting," said Carolyn Stohlberg, an assistant to Greg Michele, technical marketing division. "They bring the whole sales staff in and hold special workshops."

The company looks for sales people with some technical knowledge. Bruel & Kjaer calls its sales people "field application engineers" which reflects upon their background.

"We sell various products and sales people must have a very thorough knowledge of these products," said Stohlberg. "Knowing the products and their applications is the most important formula for successful salesmanship. Of course because this is a small company, generally speaking, the people have to be more personable. It would be too difficult for someone who just had an MBA to sell these products because it is quite technical."

All new people to Bruel and Kjaer are required to attend a training program held at the factory in Denmark. "They are there for a few weeks and periodically sent back for refresher courses."

While many manufacturers offer formalized training programs for their sales personnel, it is also necessary for contractors to provide training for their sales people. Primarily the only difference between the two is that the manufacturer is usually selling a specific product and the contractor is often selling the product and installation.

Jack Ferlino, a sound contractor in Allentown, PA, has a company called Daveland. Although he only has a complete staff of 10, he has an informal training program for both application engineers and salesmen.

"We do it with the idea of trying to give almost hands-on experience so that there is a close familiarity with the application, the function, and the product," said Ferlino. "For example, let's assume we were discussing mixing consoles. We'd like to have a mixing console available and go through the signal flow of the console—the mix, the foldback, the echo, the inputs, and the outputs, along with a flow diagram to show them how it is done."

Ferlino also takes advantage of seminars held by manufacturers. "We have access to training programs provided by manufacturers," said Ferlino. "For instance, Bruel & Kjaer has programs in acoustics and electro-acoustics, and Altec Lansing and JBL also

offer seminars."

Ferlino said he believes that the most important quality selling a system to a client is the sales person's attitude. The attitude of a salesman selling a system has to be one where the learning process is continuous and to strive to do the very best for the end user regardless of the amount of dollars the end user may have," said Ferlino. "If the end user can't afford what he needs, the salesman must tell him so, explaining why and substantiating it with facts. The end user will appreciate the fact that you have been honest with him."

When selling systems and contrac-

ting services, Ferlino said that technical knowledge is necessary. "We want our sales people to make an RT 60 test in the field and bring back the data," said Ferlino. "We want them to be aware of the overall conditions which can contribute to the benefit, or the lack thereof, of the system. Of course, they should be thoroughly familiar with the system functions that are required of the end user. If it's a performance hall, you need to know how the room is going to be used. If these needs can't be fulfilled it is important to be able to anticipate this so there won't be any unpleasant surprises later on."

SATELLITE

Sound masking made easy.

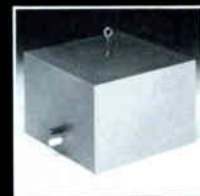
Insul-Art's Satellite all solid state system is a centrally located noise source that allows masking to be spectrum adjusted at the job site. Provides more random masking than conventional central systems.

Key features include: 100 watt wide band power amplifier; Digital noise source; 10-band octave equalizer for fine tuning of noise masking spectrum; Separate microphone pre-amplifier level and tone control; Selectable filters for mineral fiber or glass fiber acoustical ceilings; Master output for extra slave units; Additional auxiliary, test and telephone inputs; 25 volt output simplifies wiring and eliminates need for conduit; Choice of 5 1/4," 8" or 8" coaxial speakers with 4 position level control.

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World Radio History

Broadcast Dictionary Debuts at NAB

The Wind River Group has introduced *The Broadcaster's Dictionary*, at the 1986 National Association of Broadcasters convention in Dallas. According to Jim McDonald, the author of the Dictionary, this is the first comprehensive broadcasting dictionary to be released in nine years.

"I wrote *The Broadcaster's Dictionary* so that it will find daily use around the station. It contains the definitions normally found in a dictionary plus extensive appendices which present more detailed views of today's broadcast issues," McDonald said.

McDonald has written numerous articles for the sound and broadcast industries. He is one of the authors of the 1985 edition of the *NAB Engineering Handbook* and a principal author of a recently published book on multi-channel television sound.

The Broadcaster's Dictionary covers digital audio, satellites, MTS, preventive maintenance schedules, staying

current with FCC rules, and training new personnel.

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Paso Releases Packaged Sound Systems Catalog

Paso Sound Products has announced the release of its 1986 Packaged Sound

Systems catalog. The 28-page catalog illustrates Paso's portable public address systems, power megaphones, AC/DC sound lecterns, mobile sound systems, wireless microphones, and accessories. Technical data and detailed application illustrations are provided.

New additions to the catalog include the CA 160/L, Paso's latest entry to the Amplicolumn® series of portable P.A. systems.

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ICIA Membership Guide Available

Over 1,300 video, audio-visual, microcomputer and photographic firms are listed in the recent publication of the 1986 *Membership Directory* of the International Communications Industries Association. The directory includes information on services and products offered by each ICIA member firm, as well as contact names, addresses and telephone numbers.

The *ICIA Membership Directory* is distributed to thousands of equipment and materials/software users who want to locate dealers for sales, service, and rentals. In addition to dealers, the directory lists manufacturers, producers, commissioned agents, independent representatives, systems consultants, non-theatrical film distributors and those firms who perform special services for the industry. A separate section is included for international companies. Members are listed both geographically and alphabetically.

The directory indicates companies employing Communications Technology Specialists. Communications Technology Specialist (CTS) is a designation awarded by ICIA to commercial business people involved in the sales or sales management of audio-visual and video equipment and/or materials. Qualified applicants have completed designated training and education programs.

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BOOK REVIEW

by Ted Uzzle

Guides for Technical Writers

Michaelson, Herbert B., *How to Write and Publish Engineering Papers and Reports*, Philadelphia, ISI Press, Second Edition, 1986, xiv + 182 pp., \$14.95 (paperback)

Style Manual, New York, American Institute of Physics, Third Edition, 1978, viii + 56 pp., \$7.50 (paperback)

Each of us has read engineering papers in journals and technical articles in magazines that were outstandingly good; papers and articles that said something important in an accessible way, and which may have had a profound influence on our technical thinking. Each of us has read papers that were outstandingly bad, in that we got little or nothing out of them. What is the problem?

The short and not-so-polite answer is, "the authors."

Why is the author writing this paper? Unfortunately, he may have a purpose quite distinct from communicating information to the reader. He may have a product or service for sale, and he may think making himself look incomprehensibly scientific will have an influence on his customer's perception of what he has to sell. If the author has an academic affiliation, it may be that more publications in his resume will help him keep his job or help him enlarge his budget for next year. These kinds of private agendas often are identified quickly.

Is the author writing for his peers only, or for a wider audience? In the ages of Galileo, Newton, and Darwin, they wrote for other scientists and for the educated general reader. The degree of specialization that we have today did not exist then. Today, there may be some little sliver of the audio profession where only 100 people are working and each of them will tend to write for the other 99, leaving the rest of us to scramble for whatever little we can get out of their papers.

In what language is the author writing? Science and technology have evolved their own languages, and the introductory or survey textbooks are the grammar and vocabulary books.

All technological languages share their own poetry. Mathematics—the equations may spin on for a hundred pages, like a narrative poem by Tennyson; they may state incredibly complex ideas in a half page, like a Shakespearean sonnet; or they may compress a single statement into incredibly small space, like Japanese haiku.

Many technical readers are afraid of mathematics, and this is a problem both for them and for those who attempt to write for them. Abstract manipulation of symbols is a most powerful analytical and communicative tool, probably the most powerful tool, whether in a computer or in the human mind. The guy who operates a

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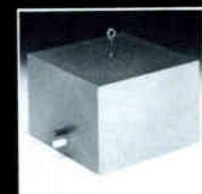
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locomotive is called an engineer, and the guy who operates a mixing console is called an engineer. As audio becomes more sophisticated and professional, the ability to read mathematical language will become the line of demarcation between operatives and engineers. This is not to denigrate mixing operators; we give more money and accord more respect to those who operate pianos in concert halls than to the engineers who design the pianos.

Two books should be kept in reach

focused on the design work you actually performed.

Fourth, finishing your paper earlier gets it into the editing and review mill earlier, and published earlier. This is especially important in establishing your priority if the work is not to be patented.

Michaelson's incremental method exploits a subtle interaction between the engineer, the research project, and the paper, in which the project and the paper are each a tool for making the

The most striking advice offered is: plan the paper or report at the same time you plan the project.

as technical authors draft their writings; Herbert Michaelson's *How to Write and Publish Engineering Papers and Reports* and The American Institute of Physics' *Style Manual*.

How to Write and Publish Engineering Papers and Reports is a little gem of a book that encourages engineers to approach the writing job in the same analytical, planned way they approach their design projects. The most striking advice offered is: plan the paper or report at the same time you plan the project. Then, work on the paper as you work on the project. Michaelson calls this the "incremental" method, and it makes good sense for many reasons.

First, it removes the anxiety many writers feel when they see the first sheet of blank paper rolled into the typewriter (or the empty screen of the word processor). After you define the problem your design project will attack, you make this the first section of your paper: "The Problem." After you review pertinent basic theory, you write the second section: "Theory." After you work out our strategy for attacking the problem, this becomes the third section of the paper: "Overview of Proposed Solution." And so on, right to the conclusion of your design project, and the section of the paper entitled, "Conclusion."

Second, the incremental method reduces to very small blocks the time you spend exclusively on writing, which keeps the writing fresh. It may also make this expenditure of time more palatable to those around you, who might not agree to several weeks spent on nothing but writing, after your research is over.

Third, it keeps your paper strictly

other better. This method deserves to be better understood and more widely used.

The chapter on avoiding information traps makes the engineer look at his writing in a new way. (Not unlike the change all writers go through after reading the classic *Elements of Style* by Strunk and White.)

Consider these sentences: "The heating rod consisted of talc and zinc. This element proved unsatisfactory." The engineer who wrote them probably thought them completely unambiguous, but the word "element," according to the dictionary, can mean either "heating rod" or "zinc." This is easy to do, but papers full of such pot holes are bumpy reading indeed.

The chapter on presenting papers orally should be required reading for every presenter at technical conferences, followed by a quiz to determine if he has mastered the key differences between a written paper and its oral presentation from the podium. Certainly, we in the audience would benefit from better oral presentations; our minds would stay alert even as our rear ends die.

Michaelson takes up touchy subjects not usually covered in "how to" books for the technical author, such as, how many co-authors? What order for the names? He deals with compiling a bibliography, getting the paper approved for publication in scholarly journals, and constructing data tables and illustrations.

Finally, this book defines the quality of a technical paper or article as a balance between the author's project and his purposes, against the reader's

(continued on page 57)



Technical Projects Unveils Input And Output Adaptor

Technical Projects has introduced the AD903, a two- to four-wire adaptor that allows the connection of any audio source to a TecPro "party line" two-wire system.

The four-wire (via XLR) input and output transformer is balanced, isolated, and floating, thus reducing the possibility of hum and interference.

The adaptor can also include a microphone or line level external input to the communications system and provide for external equipment such as recorders, radio links, audio consoles, or paging systems. The resale price is \$275.

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density rating and an excellent flammability rating. The Halar cable is also chemically resistant, radiation resistant up to 200 megarads, and offers maximum continuous use in temperatures of 284 degrees F (140 degrees C).



Circle 14 on Reader Response Card

Belden Introduces Coax Cable For Long Distance Applications

Belden has introduced the new 9193 CATV drop cable, an oversized RG-6 type cable designed for long distance applications.

The 75-ohm 9193 features a shield of DuoBond® II bonded foil, followed by an aluminum braid shield, and a

second foil tape shield with a shorting fold. According to Belden, this foil-braid-foil construction helps ensure signal integrity over a wide frequency range. The cable is surrounded by a black PVC jacket.

The inner foil's bonding to the dielectric core simplifies termination by eliminating foil pushback. The outer foil is bonded to the jacket and the resulting cable is less bulky

Circle 15 on Reader Response Card

Yale Audio Introduces Vinyl Markers for Labeling

Yale Audio has introduced two new vinyl marker products, the C-1 position markers and the C-2 identification markers. The C-1 position markers can be used for labeling on control panels the proper settings of knobs, switches, and push buttons. The C-2 identification markers are for labeling cables and chassis jacks.

The markers come in black, white, and red. The price of the C-1 is \$6.49. The price of the C-2 is \$5.49.

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Whirlwind Introduces Compact Cable Tester

Whirlwind Music has introduced the Whirlwind Cable Tester, a pocket-size tester that accepts all standard audio connectors and uses LEDs to give information on the condition and phasing of cables. The Tester is housed in a heavy-duty die cast aluminum box and features a belt clip and accessibility.

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Panduit Introduces Cable Ties For In-Plenum Wiring

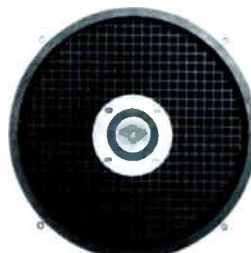
Panduit Corporation has announced two new cable ties designed to meet the NEC requirements for bundling wires in plenums.

The ties are made of Halar, a material which is said to offer a low smoke

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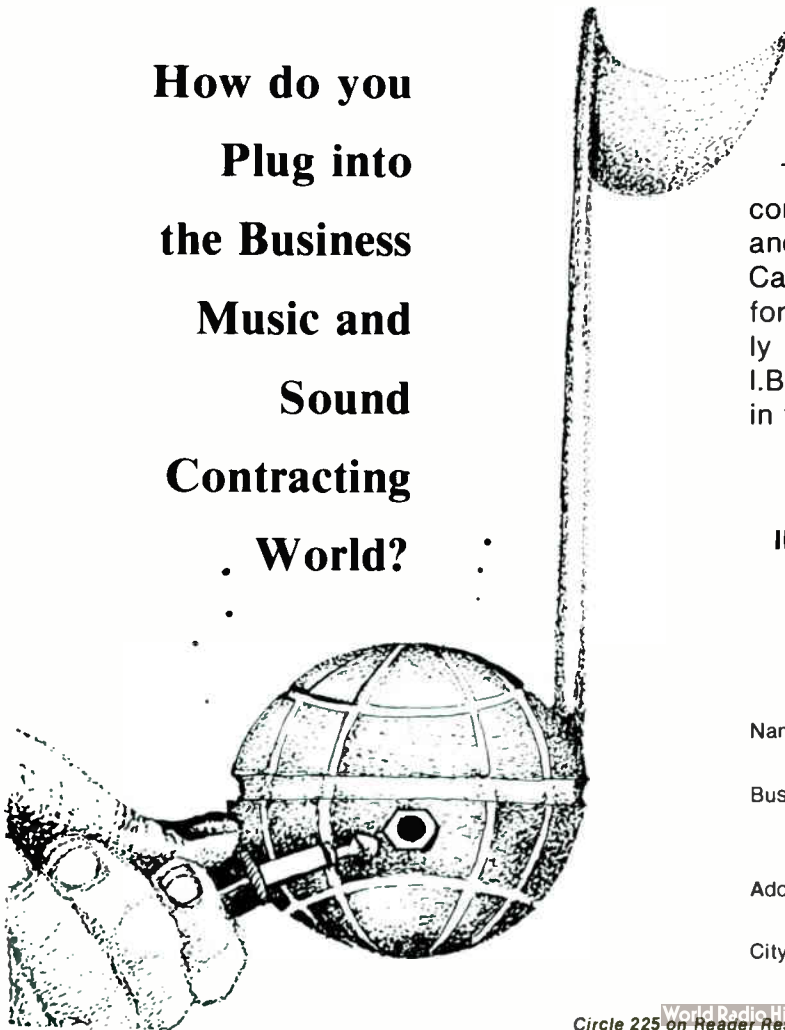
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DATE BOOK

DATE	EVENT/COMMENT	LOCATION	CONTACT
June 9-13	23 Annual Conference & Technical Exhibition For healthcare telecommunications.	Clarion Hotel St. Louis, MO	Nancy Montenegro American Society for Hospital Engineering (312) 280-6139
June 12-13	Centrex: Strategic Directions Market & technology outlook.	Key Bridge Marriot Hotel Arlington, VA	Cross Info. Co. (303) 444-7799
June 14-17	International Music & Sound Expo Seminars & exhibits.	Chicago, IL	NAMM (619) 438-8001
June 16-19	National Computer Conference Seminars & exhibits.	Las Vegas, NV	AFIPS (703) 620-8900
June 19-21	International Security Conference Sound, Signal & Security.	Chicago, IL	ISC (312) 299-9311
Aug 21-24	International Business Music Association Meeting & Conference.	Traverse City, MI	IBMA (216) 833-4164

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BOOK REVIEW

(continued from page 54)

needs and interests. When this balance is perfect, the paper is a classic.

The *Style Manual* published by the American Institute of Physics is intended to guide authors of papers for journals published by the A.I.P. and its member societies. If you wanted to submit a paper to the *Journal of the Acoustical Society of America*, for example, you would have to do footnotes, captions, mathematical notation, and the like, only in the manner shown in this book. That makes it useful, by the way, for readers of papers published in that journal.

There may be more than one "good" way to prepare these mechanical parts of the paper, but every publication should state the way it prefers it done. This allows easier comprehension by the reader, because he needn't figure out how to read each different equation or data table, from the beginning. The reader can go from one paper to the next more easily and quickly.

This style manual is more than arbitrary, however; it's outstanding, and the great bulk of technical papers would be improved, on their individual merits, if they followed the techniques shown here.

Of special value is the chapter on figures. Few things make papers and articles look more amateurish than graphs or diagrams whose axes aren't identified, whose units aren't shown, or whose lines are so light in the original they disappear or break in reproduction. It matters less that they are drawn freehand, or that the labels are typewritten (or even printed by hand): if pertinent information isn't given, or if it reproduces illegibly, it communicates nothing. And the paper or article has failed its most basic purpose.

A word is in order about the projection of graphics at technical conferences. Transparencies for the overhead projector have largely supplanted slides. Transparencies are cheaper, quicker, and easier to make than slides. Most of those actually shown are also utterly illegible beyond the first few rows. Because the projected image is small, usually badly key-stoned, and consists of a black line against a dazzling white background, it is necessary to pay careful attention to the size and boldness of the lettering, and the width of the lines. Those who obey the A.I.P. *Style Manual* will have

no trouble with their overhead transparencies.

If you write engineering papers or articles, these books will help you write them better. If you read engineering papers or articles, these books can help improve their quality, where the authors have mastered their insights.

* * * * *

The A.I.P. Style Manual can only be purchased from the American Institute of Physics, 335 East 45th St., New York, NY 10017.

CONSULTANT'S VIEW

(continued from page 20)

medical and attorney's offices and waiting rooms, restaurants with private dining areas, and even libraries where an overly quiet atmosphere makes normal activity sounds highly distracting and bothersome.

There are two basic types of sound masking systems; self-contained masking units and central cabinet systems.

The self-contained units have all of the electronics incorporated in the speaker enclosure suspended in the ceiling and only require power. They are economical for small installations less than 10,000 square feet but their small speaker size and minimal sound spectrum adjustment limits the quality of the masking sound.

The central cabinet system can be designed with a high-quality amplifier, equalizers, and zone attenuators

feeding a grid of efficient eight-inch diameter loudspeakers. This system permits tuning of the announcements to the desired volume and quality without having to open the ceiling at every speaker. Special double facing or omni-type speaker assemblies for unusual ceiling plenum conditions can also be used when necessary.

The principal that a higher ambient sound level can render office noises and conversations more difficult to hear and understand is elemental, but the true success of a sound masking system depends heavily on the quality of sound produced. If the sound is raspy or hissy, or there are strong "hot spots" and uneven distribution, workers will find it irritating and have it turned down or off entirely.

Almost all negative reactions to sound masking are related directly to poorly designed, installed and/or adjusted systems. When the system produces a high quality sound throughout the space, workers find it unobtrusive and often pleasant.

The designer must review the privacy needs of the client before recommending a sound masking system and then carefully lay out the speakers to maximize even distribution considering the acoustical ceiling type, and ceiling plenum depth and obstructions. Selection of this type of system and specifications for the equipment must be prepared to ensure the highest quality sound and a functional system that can meet the clients needs.

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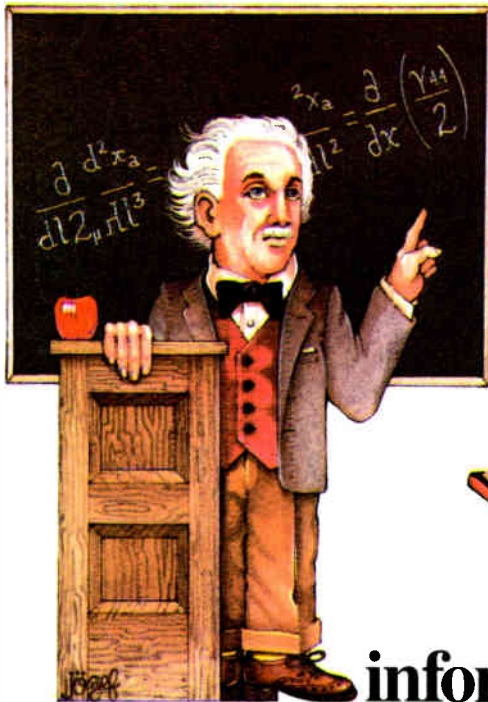
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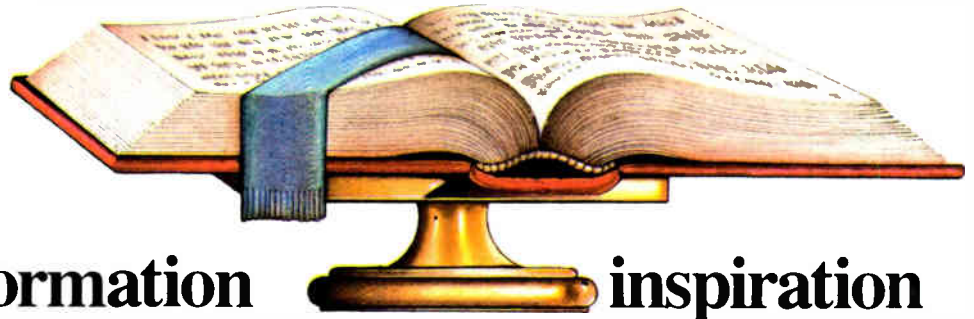
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