

SOUND & COMMUNICATIONS

FOR CONTRACTORS, SYSTEM MANAGERS AND SPECIFIERS

DECEMBER 1987



Large scale concert sound reinforcement has a smaller future.

**Manifold Technology™
delivers...twice the output
in half the space!**

Concert sound is getting smaller. System size, that is, not tour dollars! In fact, the high-level sound market is stronger than ever. But high transportation and setup costs are forcing lighter, smaller and more efficient speaker systems. While audiences demand better fidelity.

That's why we've made Manifold Technology *systems twice as loud in half the space*. The two-box, 4-way active MT-4 uses 4 (four!) drivers in each bandpass for unequalled acoustic output. Now, your system can be one quarter the size or four times as loud compared to other designs.

The MTA-42 Manifold Technology adapter combines four compression drivers without added distortion. And without the phase cancellations of Y-adapters! That's 4 supertweeter and 4 upper-midrange compression drivers on identical 60° x 40° constant-directivity horns. To complete the MTH-4 "high" box, four DL10X woofers use proprietary phase plugs to provide seamless vocals from 160-1600 Hz. The result is flawless 138-dB midbass at 1 meter!

The MTL-4 "low" box combines four 18-inch woofers in an ultra compact 36" x 36" x 30" cabinet. More efficient than horn-loaded subwoofers, Manifold Technology design prevents woofer "bottoming" even at 40 Hz with 1,600 watts input!

MT-4

Concert Sound System
50,000-Watt Array



**High output plus high
fidelity**

To produce high-level sound, most concert systems aim many horns at the same seating area. Unfortunately, this approach causes peaky frequency response, decreased sensitivity and ragged coverage patterns. With four drivers on each horn, a large-scale MT-4 system has fewer independent sources. For fewer phase-cancellation problems. Frequency response is smoother, sensitivity increased, and coverage perfectly constant.

**A flying system that's
second to none**

MT-4 cabinets are optionally equipped with a unique two-point flying system that allows true point-source arrays. Tilt angle adjustment is easy because track positions are pre-engineered for popular array configurations. Trial-and-error guesswork is a thing of the past. Nothing is as easy as an MT-4.

You don't have to wait for the system of the future. It's here now! For a free MT-4 brochure, see your EV Professional Audio Dealer or write: Electro-Voice, Inc., Dept. SC-4, 600 Cecil St., Buchanan, MI 49107.

Circle 201 on Reader Response Card

Electro-Voice®

a MARK IV company

THE WINNING HAND

THE NEW 900 SERIES PLUG-IN MODULES

Toa introduces 7 new fabulous hi-tech modules that perform wonders when incorporated into Sound Reinforcement Systems utilizing 900 Series amplifiers. The new additions to the 900 Series plug-in modules offer Voice Gate, Variable Muting, Mic and Aux Compressor features and allow the sound contractor or specifying engineer to choose from a total of 36 modules in six different categories. These modules have been designed with Toa's "install and forget" philosophy. They utilize thoroughly

modern surface mount technology, provide ease of installation and increased reliability.

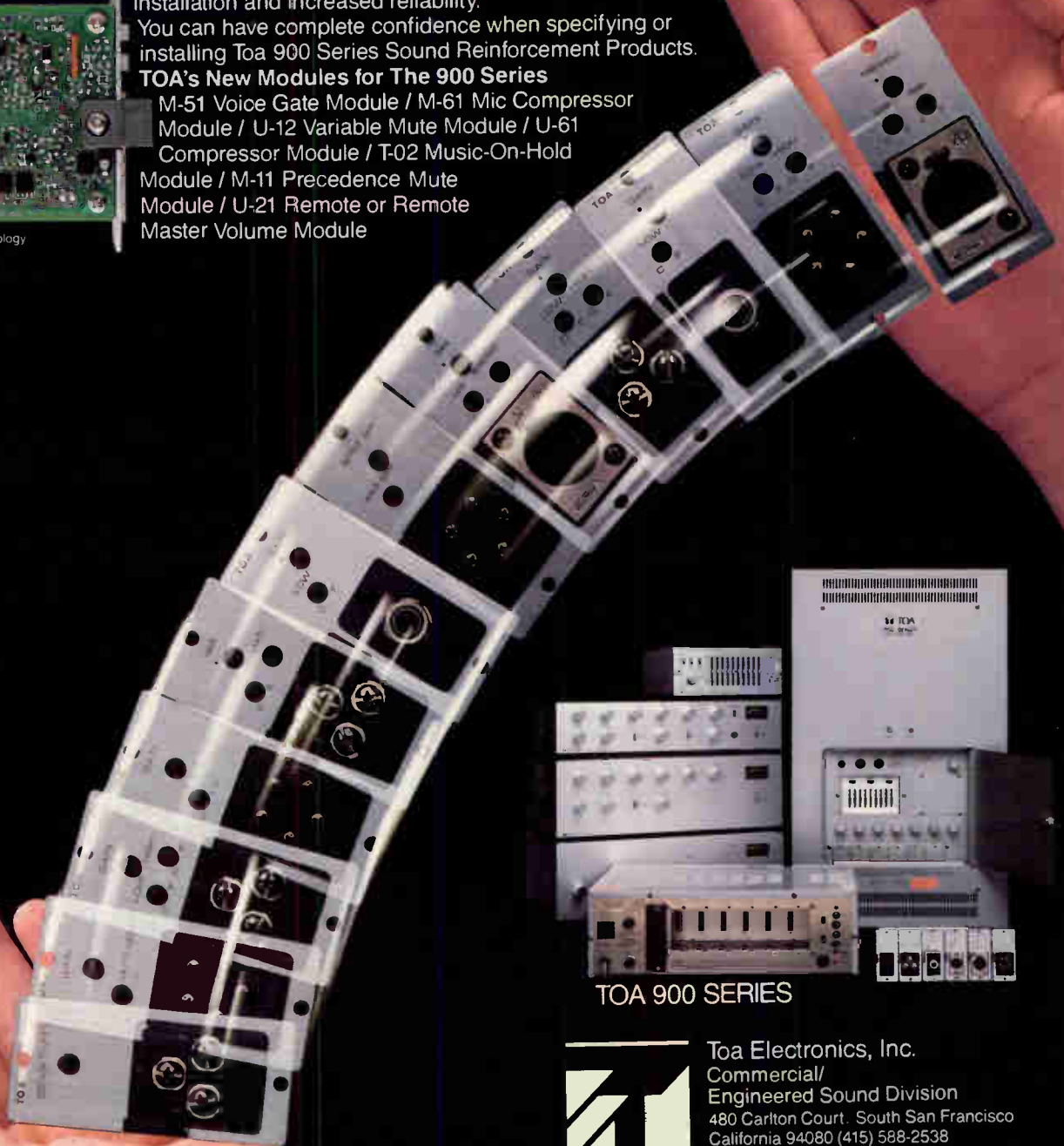
You can have complete confidence when specifying or installing Toa 900 Series Sound Reinforcement Products.

TOA's New Modules for The 900 Series

M-51 Voice Gate Module / M-61 Mic Compressor Module / U-12 Variable Mute Module / U-61 Compressor Module / T-02 Music-On-Hold Module / M-11 Precedence Mute Module / U-21 Remote or Remote Master Volume Module



Surface Mount Technology



TOA 900 SERIES



Toa Electronics, Inc.
Commercial/
Engineered Sound Division
480 Carlton Court, South San Francisco
California 94080 (415) 588-2538

Toa Canada: (403) 489-5511 Edmonton or
(416) 624-2317 Toronto — Toa U.K. (0277)
233882 Essex — Toa Europe: (040) 2506091
Hamburg — Toa Japan (0797) 71-2222

Circle 218 on Reader Response Card

DDA APPOINTS NEW DISTRIBUTORS IN BRAZIL AND ITALY

Gerald Squires, product manager of DDA, has announced the new distributors which will handle all DDA products in Brazil and Italy. In Brazil, DDA products will be distributed by Savana Comunicacoes Ltd. based in Rio de Janeiro. In Italy, DDA has reformed their distribution and split the product line. The AMR24 console will be handled by Professional Equipment of Milan while the D Series, S Series PA and S Series Monitor consoles will be handled by Audio Link of Parma.

ITT UNITS SUPPORT AIDS RESEARCH WITH DONATION TO W.H.O.

ITT World Communications Inc. presented a grant to the World Health Organization (WHO) to support ongoing research to combat the AIDS disease. A \$100,000 check was presented to Dr. Gururaj Mutalik, executive vice president and general manager of the ITT Corp unit here. Dr. Mutalik said the funds would be used for AIDS research sponsored by WHO from its headquarters in Geneva, Switzerland. At the request of ITT, U.S. Surgeon General Dr. C. Everett Koop prepared a special introduction for his Report on AIDS in June. With his permission, ITT translated the report into six other languages and offered it electronically via its Update™ news and information service. ITT agreed to donate \$2 to WHO each time its service was accessed by telex subscribers.

MCI ANNOUNCES SERVICE TO WEST GERMANY

MCI Communications Corp. has announced that an agreement has been reached with the Deutsche Bundespost to provide long distance telephone service between the United States and the Federal Republic of Germany (West Germany). Germany is the second largest intercontinental for overseas calling from North America and the 60th country to enter into agreement with MCI®. Service to the Federal Republic will be available to MCI customers early in the first quarter of 1988.

GENTNER LAUNCHES TELECONFERENCING DIVISION

Gentner Electronics Corp. has announced the formation of a new division to manufacture and market teleconferencing related products, *Gentner Teleconferencing*. According to Russell Gentner, president, "This new division will focus on the telephone requirements of executives, particularly the need for higher quality product performance. Through our telephone interfacing experience in the broadcast market, we have developed the technology to virtually eliminate cutoffs and poor audio quality in boardroom teleconferencing."

YAMAHA ANNOUNCES CHANGES IN EXECUTIVE PERSONNEL

Yamaha Corp. of Japan, the parent company of Yamaha Electronics Corp. of U.S.A. has announced that Michio Kondo, president, will assume the position of chairman of the board and chief executive officer.

The announcement, made at Yamaha Headquarters in Hamamatsu, Japan, also named Donald Palmquist to the post of president and chief operating officer. Palmquist formerly held the position of executive vice president of sales and marketing.

At the same time, Yamaha announced that Katsuyama Nakahama will assume the responsibilities of executive vice president of marketing of the U.S. company; Luther Hudson, vice president of administration, will become senior vice president and secretary/treasurer of Yamaha Electronics; and Steve Girod, currently manager of marketing and sales, has been promoted to vice president of marketing.

FOX TECHNOLOGY FORMS NEW DIVISION CALLED DAYTON RADIO PLUS INC.

A new division of Fox Technology, Inc. was formed to serve the needs of its music, sound and light industrial customers. The name of this new organization is Dayton Radio Plus, Inc. The company is being led by individuals in the music and sound contractive area. They are Kurt Farmer, vice president engineering, and Robert McDougall, vice president-sales and marketing. Dayton Radio Plus, Inc. currently supplies the sound and music industry with a variety of sound products including SCA tuners, amplifiers, unique narrowband amplifiers, field tuneable antennas, field strength meters and other products.

MUZAK AND POP RADIO TO PROVIDE CUSTOMIZED IN-STORE PROGRAMMING

Muzak and POP Radio have announced a joint operating agreement to create a national in-store network for a spectrum of retail store chains. The joint venture is an international agreement to provide chain stores with customized in-store radio programming, including DJ chatter, seasonal features, music programming and commercial messages. Muzak will furnish the music programming and the music delivery systems; POP will customize the DJ segments to each retail chain's requirements and will handle the sales of advertising time on the in-store network. Muzak and POP radio will focus on the development of in-store audio networks for U.S. supermarket chains, expansion of POP Radio's successful audio network in drug chains and the creation of similar-in-store networks for mass merchandisers.

AEI MUSIC LAUNCHES SATELLITE BROADCAST MUSIC CHANNELS

AEI Music Network Inc. is expanding its music programming and distribution capabilities by launching audio channels on the RCA K2 satellite positioned over the U.S. which operates in Ku-Band. One of the benefits of Ku-Band is that there is no terrestrial interference, which is inherent to C-Band. Using Ku-Band frequencies offers AEI flexibility in providing two-way and Direct Broadcast Satellite (DBS) communication to its clients in the future. Multiple music channels will be available to clients' satellites direct from an on-premise dish or through satellite distribution to SCA's, VHF FM, 960 MHZ technology or other ground networks. The company's programming department, also will continually update the channels with fresh music. AEI will provide clients with the necessary downlink (or receiving) facilities and hardware. The company will maintain its own uplink and facility at its headquarters in Seattle, WA.

SENATE PASSES ICIA-BACKED BILL TO WIPE OUT LATE PAY

The U.S. Senate has passed legislation to stop federal agencies from paying late on millions of dollars of purchases of video, audio-visual and computer products sold by members of the International Communications Industries Association (ICIA). Responding to complaints from ICIA members, the Senate passed the Prompt Payment Act Amendments (S.328) to tighten rules under the 1982 Prompt Payment Act. Senate passage follows by one year the White House Conference on Small Business, whose 1,800 delegates—including several from ICIA—voted prompt pay legislation as one of their major goals for 1987. The ICIA-backed bill does include: Giving agencies no more than five days to officially "receive" and "accept" what they buy; eliminating a 15 day extended payment-due date privilege which agencies used to stretch from 30 to 45 days; and starting the 30-day payment clock ticking when the company's bill first arrives, rather than after the bill has been shuffled through layers of government bureaucracy.

by Marc L. Benington

The Outline Specification

As I have indicated in previous columns, the design specification is preferable to other types of sound systems specifications because it is the most complete and the most detailed. Therefore, it is easiest to bid for a contractor, and the submitted bids are the most straightforward for the owner to evaluate. But the design specification is, of course, the most difficult to generate because of the level of detail involved. It is a very time intensive operation to consider every aspect of a sound system including equipment selection, interfacing, location and mounting of devices, rack layouts, coordination with other specified systems, submitted procedures, testing requirements, and numerous other details. And, it is no

secret that "time intensive" can translate to "expensive" in many cases.

For most sound system projects that a consultant is involved with, a design specification is worth the additional expense because of the more predictable results that it gives. This is the case for large projects such as performing arts centers, or complex custom projects such as teleconferencing facilities. In both cases, the consultants fees for sound system design are a very small fraction of the total project cost. However, there are a large number of projects where the fee is not justifiable, either by choice or by budget. In these cases, an outline specification may be a better alternative than the other extreme of performance specification.

What is an outline specification and how does it differ from other types of specifications? As the name suggests, it is a summary description of the design and type of equipment to be used, without the level of detail required for a complete design specification. Essentially, the outline conveys the general idea of the final system envisioned by the consultant or designer, with a larger portion of the design details left to the imagination of the contractor.

One such detail could be the rack layout. A good chunk of this is required to account for and locate equipment in the rack. If the contractor submits a layout as part of the shop drawing package, the consultant can

(continued on page 63)

HOW BRIGHT IS YOUR PRESENT STROBE?

FARADAY'S NEW STROBE AVERAGES 3.0 CANDELA PER U.L. STANDARD 1638



STAND ALONE STROBES



BELL/CHIME STROBES



HORN STROBES

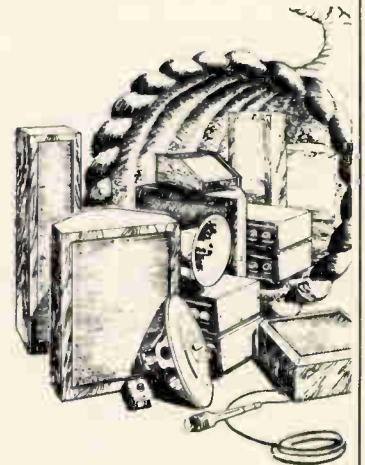
- U.L. LISTED • CSFM LISTED
- BSA APPROVED • 12, 24 VDC; 120 VAC
- CUSTOM LETTERING AVAILABLE
- WHITE, YELLOW, BLUE, RED LENS
- LOW CURRENT DRAIN

FARADAY

805 SOUTH MAUMEE STREET
TECUMSEH, MICHIGAN 49286
517-423-2111

THE ONE SOURCE FOR YOUR SIGNALING NEEDS.

*the original
Single Source Supplier*



FOR 54 YEARS, SPECIALIZING IN SERVICE TO SOUND CONTRACTORS.

TO RECEIVE OUR FULL LINE CATALOG CALL:

1-800-527-5705 NAT.

1-800-442-1564 TX

1-214-651-7341 LOCAL



J.W. DAVIS & COMPANY

Circle 241 on Reader Response Card

Sound & Communications

SUBSCRIBE NOW!

SOUND & COMMUNICATIONS

IT'S NOT JUST A MAGAZINE... IT'S AN INDUSTRY

YES! I WANT TO STAY ON TOP OF THE INDUSTRY BY RECEIVING A COPY OF SOUND & COMMUNICATIONS EVERY MONTH

NEW RENEWAL
 1 Year \$15.00 3 Years \$37.50 (Savings \$7.50)
 Payment Enclosed Bill My Credit Card Visa MC AC
 (Foreign: Add \$5 for delivery) Card # _____ Expires: _____

Signature _____
 Name _____
 Company _____
 Address _____
 City _____ State _____

- 1** Are you a subscriber to Sound & Communications?
 Yes No
- 2** Primary Job Function (only one):
 A Management/Owner
 B Engineering/Technical Mgt
 C Sales/Marketing
 D In-House Maintenance/Service
 E Field Installation/Maintenance
 F Consultant
 G Advertising/Promotion
 H Other _____
- 3** Primary business of company (only one):
 1 Contractor—Engineered Sound/Acoustical
 2 Contractor—Interconnect/Intercom
 3 Contractor—Fire/Alarm/Safety
 4 Electrical Contractor
 5 Pro Audio/Studio/Reinforcement
 6 Architect/Designer
 7 Engineering/Acoustical Consulting
 8 Maintenance/Service
 9 Dealer/Distributor/Rep
 M Manufacturer
 O Other _____
- 4** Your purchasing authority is:
 Final approval/Buyer
 Recommend/Specifier
 No Direct Authority/User
- 5** Intensity of your product need:
 Have salesman call
 Need within 3-6 months
 Future projects
- 6** Number of employees at your company:
 1-3 4-10 11-25
 26-100 over 100

YES! I WANT TO STAY ON TOP OF THE INDUSTRY BY RECEIVING A COPY OF SOUND & COMMUNICATIONS EVERY MONTH

NEW RENEWAL
 1 Year \$15.00 3 Years \$37.50 (Savings \$7.50)
 Payment Enclosed Bill My Credit Card Visa MC AC
 (Foreign: Add \$5 for delivery) Card # _____ Expires: _____

Signature _____
 Name _____
 Company _____
 Address _____
 City _____ State _____

- 1** Are you a subscriber to Sound & Communications?
 Yes No
- 2** Primary Job Function (only one):
 A Management/Owner
 B Engineering/Technical Mgt
 C Sales/Marketing
 D In-House Maintenance/Service
 E Field Installation/Maintenance
 F Consultant
 G Advertising/Promotion
 H Other _____
- 3** Primary business of company (only one):
 1 Contractor—Engineered Sound/Acoustical
 2 Contractor—Interconnect/Intercom
 3 Contractor—Fire/Alarm/Safety
 4 Electrical Contractor
 5 Pro Audio/Studio/Reinforcement
 6 Architect/Designer
 7 Engineering/Acoustical Consulting
 8 Maintenance/Service
 9 Dealer/Distributor/Rep
 M Manufacturer
 O Other _____
- 4** Your purchasing authority is:
 Final approval/Buyer
 Recommend/Specifier
 No Direct Authority/User
- 5** Intensity of your product need:
 Have salesman call
 Need within 3-6 months
 Future projects
- 6** Number of employees at your company:
 1-3 4-10 11-25
 26-100 over 100

SOUND & ***COMMUNICATIONS***

IT'S NOT JUST A MAGAZINE...
IT'S AN INDUSTRY

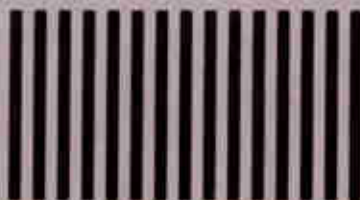
TESTA COMMUNICATIONS

SOUND &
COMMUNICATIONS

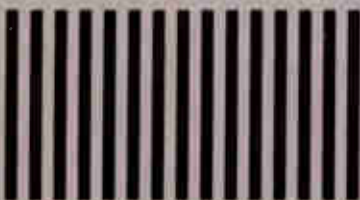
25 Willowdale Avenue
Port Washington, NY 11050



Place
Stamp
Here



Place
Stamp
Here



TESTA COMMUNICATIONS

SOUND &
COMMUNICATIONS

25 Willowdale Avenue
Port Washington, NY 11050

AKG... IT'S OBVIOUS.

Some things are just obvious. For any number of applications, headset mics are the only way to go . . . but they also can be a big headache. Many on the market sound bad and feel — after only a few minutes — even worse.

Not the **AKG Q-series**. Whatever your need in an intercom or broadcast communications application, we've got a headset ready to meet it with unparalleled comfort, audio quality, and reliability. Features like close-talking, noise-cancelling microphones, removeable/washable ear cushions, self-adjusting headband and options providing squelch circuit, carbon equivalency, in-line mic preamp and PTT switching.

It takes the best sound and best feel to make the best headsets.

With **AKG**, some things after all, are just obvious.

Q-34



Q-31



Q-32



Q-35



K-18



77 Selleck Street
Stamford, CT 06902

© AKG 1987 Akustische und Kino-Geräte GmbH, Austria

simple measurement of the input and output. For a loudspeaker, white noise would be used on the input. A voltage lead would be connected to Channel 1 and the output voltage of a microphone would be used for Channel 2 of a Fourier Analyzer. By using a large number of averages, the response of the loudspeaker would be obtained as shown in Figure 3 which contains the plot of the magnitude and Figure 4 which has the phase.

The key advantage of the cross-spectral density is *quality control*. If noise exists on the input or output, measurements are tainted. Noise on the output might be encountered

while making measurements in the field of a loudspeaker system in a room with high background noise. To determine the quality of the measurement, the coherence function is used. It is defined as:

$$\gamma_{xy}(f) = \frac{[S_{xy}(f)]^2}{[S_x(f) \cdot S_y(f)]}$$

where:

$$\begin{aligned} \gamma_{xy}(f) &= \text{coherence function} \\ [S_{xy}(f)]^2 &= \text{magnitude of the cross-spectral density squared.} \end{aligned}$$

The coherence is bounded by 0 and 1. If the coherence is 1, the measurement is very good and "perfect" results have been obtained, assuming

that both signals are in the dynamic range and self-noise of the instruments is not being measured. (The coherence will be 1 in many cases for instruments if both signals drop into the noise floor and crosstalk exists between channels.) If the coherence is 0, then the result is totally invalid and the results are nonsense. Generally, in practice, a high coherence would be expected, e.g. 0.9 to 1.0.

Figures 5, 6 and 7 show the coherence function. Figure 5 is for a measurement of the loudspeaker with no noise on the input or output. Figure 6 shows the coherence for the test

(continued on page 63)

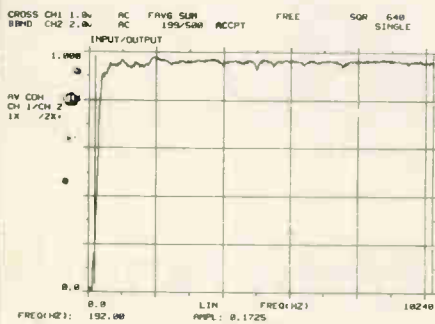


FIGURE 5

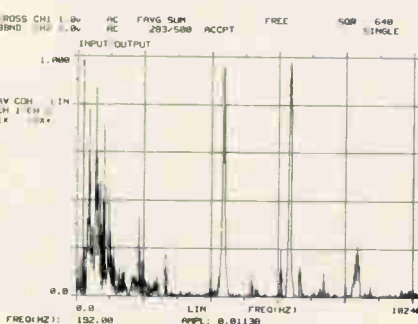


FIGURE 6

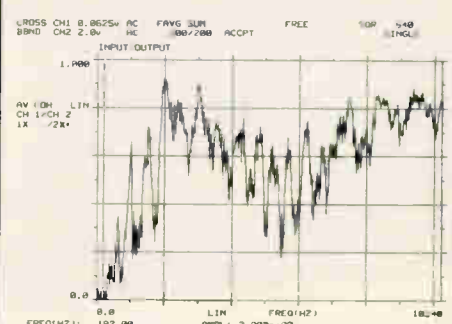


FIGURE 7

NEW!

FROM TekTone®

The Tek-Lite CM-700A series Annunciator Intercom System is ideal for: residential health care facilities, senior citizen housing, college dormitories or any application where defined, two-way communication and announcement may be required.

Attractively designed with a focus toward "ease of operation," the CM-700A system is ideal for any application where reliability and accuracy is mandatory!

CM-700A
MASTER



GET
THE
FACTS:

CALL OR WRITE...

TekTone®

Sound & Signal Mfg., Inc.
1331 S. Killian Dr.
Lake Park, Fl. 33403
(305) 844-2383
Toll-free order (outside Fl.)
1-800-327-8466
TLX 51-3438
FAX: 305-845-1587

TA-700
ROOM
TELEPHONE



SF-117/2
EMERGENCY
STATION



THE PANASONIC CCTV LINE...



A strong foundation you can build in.

Whether you're a small retail business or a large manufacturing facility—no matter if you're looking for one piece of equipment or a complete system—Panasonic has you covered. With a full line of CCTV equipment to suit a host of different applications.

Like our wide array of B/W and color cameras and monitors—including one of the largest selections of tube and solid-state cameras. There's also a choice of Time-Lapse VCRs and B/W and color Quad Systems and pre-packaged, ready-to-install Mini-Systems. Plus all the Pan/Tilts, housings, switchers and accessories necessary to complement our full line.

And of course, every piece of CCTV equipment features the same Panasonic quality and reliability you've come to expect. Not to mention the support of a strong dealer network throughout the country. With the technical expertise to help you select and design a CCTV system to meet your particular specifications—regardless of how simple or complex.

What's more, all Panasonic equipment is backed by a nationwide service network. And each authorized service center is trained and fully equipped to handle the repair and maintenance of every CCTV product we sell.

So when it comes to CCTV equipment, take a look at the Panasonic line—a foundation strong enough to support the growth of your needs.

For more information, contact your nearest Panasonic Industrial Company Closed Circuit Video Equipment dealer or call your nearest regional office.
Northeast: (201) 348-7303, Midwest: (312) 981-4826,
Southeast: (404) 925-6835, Southwest: (214) 257-0763,
West: (714) 895-7265.

Panasonic
Closed Circuit Video Equipment



**HOSPITAL &
HEALTH CARE
COMMUNICATIONS**
Part One

**From Now
to the
21st Century**

BY RON ROSEN

The Orwellian title of this article is occasioned by the sobering thought that in a scant 13 years we will be entering the year 2000. The Nurse Call system you install today could very well last into the next century!

This article will focus on two main issues of concern to the sound and communications contractor: Will Health Care Communications Remain A Viable Market? What Technological Changes Can Be Expected In The Future?

The author spoke with a number of major manufacturers regarding the state of the market, how it looks for the future, and their plans for new and innovative communications for the health care institution. In a "cottage" industry, such as ours, some manufacturers tend to hold back about both their production figures and their future plans, and facts and figures presented represent a distillation of the best available information.

IS THIS A DECLINING MARKET?

Asked why he is not active in the health care market, more than one contractor has been heard to say, "They're not building new hospitals anymore." It is true that not many *new* hospitals are being built. In comparison to the baby boom of the 1960's and 1970's, there are not many new schools being built either, but it's amazing how many manufacturers and contractors still sell a lot of school sound systems.

The answer is obvious—bricks and mortar outlast electronic components. An institutional building can be expected to

At St. Mary's Hospital in Brooklyn, NY, a nurse responds to a patient by pressing the nurse location indicator at her station.

This is used when there isn't an operator at the Teletracer (below), a centralized patient communication system that is used throughout the hospital.



last about 60 years, and an electronic communication system averages about 12 years. (We know many last 15 or 18 years, but some are ready for replacement after seven.) Based upon this average, we can expect to outfit the building with new communications about four or five times during its lifetime. In other words, the bulk of your *hospital* sales will be into the retrofit market. This is not necessarily the case with other long-term health care facilities such as nursing homes, which in many parts of the country are experiencing steady building growth.

A majority of today's hospitals were constructed in the years following World War II in response to the population increase, not to mention the peak building of V.A. hospitals to care for the wounded and disabled veteran.

The rise and decline of hospital construction can be directly traced to the Hill-Burton Act. Enacted in 1946, this

legislation granted \$75 million a year for hospital construction. In 1949, it was enlarged to \$150 million and the maximum federal share of construction costs boosted to two-thirds.

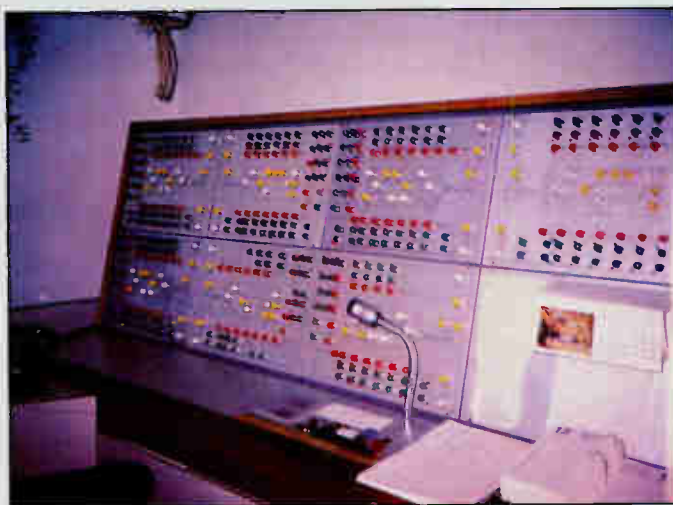
The Hill-Burton Act was extended in 1953 with an additional \$60 million a year for special facilities, allowing for federal aid in construction of nursing homes, etc., opening up a building boom and consequent growth in our industry. By 1974, the Hill-Burton Act had helped finance construction of almost 500,000 beds.

Around 1974, unused hospital beds were costing this country more than \$1 billion dollars a year to maintain and the Hill-Burton act expired. The number of manufacturers of nurse call systems began to dwindle as some left this industry. A few years later this market rose Phoenix-like from the ashes, and today presents a stable, if not exciting, opportunity for the alert contractor.

MARKET POTENTIAL

As previously mentioned, exact production figures and sales of nurse call systems are difficult to extract and correlate. Many of the major manufacturers of this type of equipment belong to the Hospital Signaling Group of the National Electrical Manufacturers Association (NEMA), chaired by Robert Fisher, president of Fisher-Berkely Corp., manufacturers of the Ektacom systems.

According to Fisher, members of this group turn in their sales figures on nurse call systems to an independent auditor in strictest confidence, who then factors in the best possible estimate on non-member manufacturers' shipments and pres-



The Teletracer (a Dukane product) is designed to answer the patient's request and to help the nurse meet the patient's needs as quickly as possible.



Aiphone's NEM System.



Rauland-Borg's Responder III Microcomputerized System.



Jeron's AV-600 Master Console.

CALL 800/245-4964 AND... LET YOUR FINGERS DO THE STOCKING

From Anchorage to Miami, Los Angeles to Boston and anywhere in between, if you need wire in a hurry, just call West Penn Wire. With hundreds of different types of plenum and non-plenum electronic cable in stock, we'll ship exactly what you ordered, right to your door...that's our promise. (Stock items shipped within 24 hours.)

Reliability, quality, service and the best price. That's what West Penn Wire is all about.

Send for our free electronic cable catalog.

WPW
WEST PENN WIRE
Washington, PA 15301
In PA 800-222-8883
FAX 412/222-6420



Circle 221 on Reader Response Card

but most commonly know as *Residential Care*, is a resource for those individuals (usually elderly) who are to a large degree capable of taking care of themselves but who should have the services of a trained staff close at hand to monitor and respond if necessary. In this type of facility—(resembling an apartment house more than a nursing home)—each individual or couple has their own residence allowing privacy.

One manufacturer to directly address the needs of this market is the Tektone Sound and Signal Company of Lake Park, Florida, with their "Up & About" system. When this system is installed, the resident, upon awakening, registers his wake-up by momentarily depressing a pushbutton during a pre-determined time frame. Failure to register during this time frame results in the dispatching of supervisory personnel to physically register the status of the unregistered tenant. ("Panic" buttons can also be installed at strategic locations such as the bedside and bath areas, allowing calls for assistance to be registered at the office, and outside each apartment corridor light).

Tom Hendricks, Tektone's director of marketing, sees the advances in medical care as contributing to longevity of our senior citizens, and describes construction of this type of facility as a "vibrant" market.

Part two of this article will discuss equipment and systems and current and emerging technology.

Ron Rosen is a freelance writer and has been both a contractor and district manager in the sound and communications industry. Currently, he is the designer and manufacturer of the InterStat nurse call, a radio-controlled system designed for temporary use during retrofit. ■

Who would believe a microphone this flat...



Model AT871 UniPlate™
Condenser Cardioid

could have a curve to match!

If you've tried other hemicardioid boundary microphones, you may have been disappointed in the sound... thin, peaky, and requiring lots of equalization. If so, it's time to listen to ours: the new AT871 UniPlate Condenser Cardioid.

UniPoint Technology at Work

Our experience pioneering UniPoint miniature condensers permitted us to take a new approach to boundary microphone design. We optimized the basic UniPoint cardioid element for boundary use, creating remarkable reach and presence, yet retaining extended high and low-frequency



response so vital to natural sound reinforcement.

Outstanding Gain-Before-Feedback

The AT871 UniPlate Cardioid has both the polar pattern and response curve to provide higher gain-before-feedback than you may have thought possible. But better gain-before-feedback and a great sounding element are only a part of the story.

Less Noise Two Ways

By using a very low-mass diaphragm and a case heavier than the others, we sharply reduced sensitivity to mechan-

ical noise. The electronics are audibly quieter as well – a tremendous advantage in typical boundary microphone applications. We also include a low-cut switch to help control acoustic room noise. The AT871 can be powered by an internal battery or from 9-52VDC phantom power.

Effective Problem Solver

The AT871 is solving problems in stage sound reinforcement, church sound, teleconferencing, boardroom applications... even TV and film locations. Wherever great sound is needed...unobtrusively. We urge you to test the AT871 side-by-side with any of the rest. Choose your most critical sound problems. The difference you hear will prove our point.



audio-technica®

1221 Commerce Drive, Stow, OH 44224
(216) 686-2600


Circle 205 on Reader Response Card



Installation Profile

QUALITY FILM SOUND IN LARGE THEATRES

TORONTO'S FESTIVAL OF FESTIVALS



I recently participated in the installation of a BOSE Cinema Sound System at the Toronto "Festival of Festivals," the largest film festival in North America. The festival was hindered this year by a shortage of quality venues for the films due to the closing of several theatres in the downtown Toronto area. The most devastating loss was the University Theatre which had previously served as the gala theatre for world premiere films. Selected to replace the University was the auditorium at the Ryerson Polytechnic Institute in downtown Toronto.

While the Ryerson Theatre was an appropriate venue from the size standpoint (1,150 seats), it was not designed as a movie theatre and, therefore, possessed many acoustical

by Brian L. McCarty

qualities that are undesirable in a movie theatre. After several traditional suppliers of cinema sound were approached by the festival and declined to get involved, BOSE Ltd., the BOSE subsidiary in Canada, was approached and decided to participate. BOSE Ltd. enlisted my services to design the system and supervise the installation. BOSE engineer Dr. William R. Short was instrumental in the development of the cinema system and also was the co-inventor of the Acoustic Wave™ technology along with Dr. Amar G. Bose.

Quality of presentation was foremost in the mind of festival director Helga Stephenson; Stephenson and festival administrator Peter Roberts were impressed with the criteria that are used by BOSE for system development. These five criteria are: 1.) Deliver the audio experience intended by the filmmakers 2.) Provide even, consistent surround sound coverage 3.) Be flexible to match the acoustic and architectural needs of many different theatres 4.) Be simple and reliable and 5.) Use less space. The audience for the Festival of Festivals is sophisticated and demanding and the festival board wanted no compromises in quality of presentation, especially at this gala premiere venue.

Installed at the same time as the sound system were new 35/70mm projectors and a Dolby CP-55 stereo processor. The installation and alignment of the A-chain electronics was performed flawlessly by Best Theatre Supply to Toronto. The technicians from Best had not seen or heard a BOSE cinema installation and while initially skeptical, they were subsequently impressed with the design and installation.

The design of the system in the Ryerson was complicated by many issues not normally present in cinema installations.

These complications included the existence of a full stage behind the screen, which can cause acoustical difficulties in the sound design; the Ryerson Theatre's management requirement that no holes be drilled in the walls for surround speakers; and the acoustics of the space, which were designed for stage presentations and not for high level film soundtracks.

During my initial visit to the site two weeks prior to opening, I became aware of all of these factors as well as the acoustical difficulties of the room itself. Because of the hard-surfaced walls, the reverberation time was exceptionally long. This would present design challenges for both intelligibility and for coverage of the balcony area.

Under normal circumstances the design and installation of a Bose Cinema Sound System is somewhat different than traditional cinema sound systems; I will explain the design and installation criteria used by BOSE in its system as well as how it related specifically to the Ryerson design.

A proprietary computer program developed by BOSE can accurately predict the performance of a sound system in the room prior to installation. This program, Modeler™ Design Program, is used to assure the cinema owner that the installation for his theatre will be of high quality as well as cost-effective. Modeler™ was invaluable in predicting both the performance of the Ryerson Theatre's system and for solving some of the difficult acoustical aberrations in this room. Figures 1 thru 4 show the grey scale maps generated by Modeler™ for this installation.

The Ryerson Theatre is an historically significant building in Toronto and the theatre management was naturally unwilling to make interior changes to the

house, such as sound-absorbing panels and other cinema-specific acoustical treatment. Construction of expensive walls behind the screen used to baffle more traditional bass cabinets were also ruled out because of time constraints before and after the festival. Modeler™ allowed the design to accurately account for the room acoustics present and to compensate in speaker placement. I was able to aim the speakers with a high degree of precision in order to guarantee even coverage of sound in the theatre as well as high dialog intelligibility.

SYSTEM COMPONENTS

The behind screen loudspeakers used in Toronto are the BOSE 802-II mid-high frequency array and the new BOSE Acoustic Wave Cannon® System. BOSE 402 arrays are used as surround speakers.

The Acoustic Wave Cannon system was originally developed by BOSE specifically for cinema use. The Cannon is actually a 12-inch specialized driver captured between two different length tubes. The Cannons are modular in design and can be arrayed in various configurations and mounted in a variety of ways. The Cannon system offers significant improvements over ported systems which include greater efficiency over a wider frequency range, lower distortion, greater dynamic range and small size.

The Cannon system operates in a frequency range from 25 Hz to 125 Hz. The system has only one crossover (actually accomplished by band filtering) at the 125 Hz point, which eliminates one of the major problems in traditional systems: crossover coloration in the frequency band containing the dialog. Conventional cinema systems have crossovers between 500 Hz and 1000 Hz which can often result in poor dialog intelligibility in the theatre. Since dialog intelligibility was

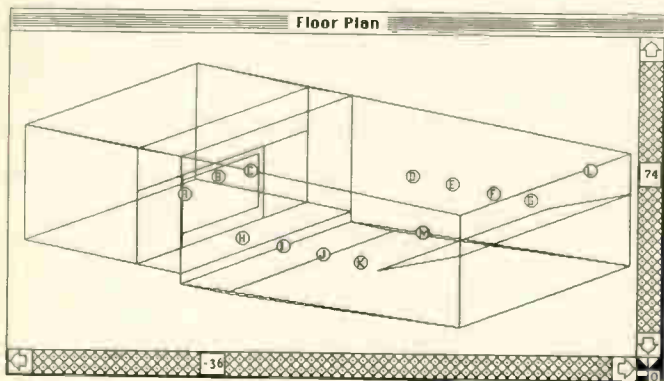


Figure 1: Oblique view of Ryerson Theatre as constructed in Modeler™ Design program. Lettered circles are speaker locations used for this system.

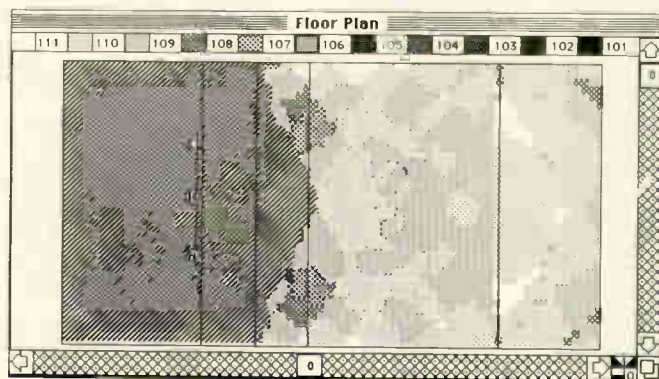


Figure 2: Sound intensity map showing only the center channel (Location B). This calculation is of both direct field and reverberant field in the auditorium at 1 kHz. Note that coverage from this channel is ± 3 dB in virtually the entire auditorium, including the balcony.



SUPERIOR PERFORMANCE ANYWHERE, ANYPLACE, EVERY TIME.

No matter how much you spend on a wireless system without selectable channels in the receiver and transmitter, you'll always be vulnerable to potentially damaging interference.

That's why the Samson Broadcast STD wireless system offers ten selectable channels in *both*. Simply dial up the ideal channel in the receiver, then select the identical channel in the transmitter

for optimal transmission quality.

We also included an exclusive Samson feature to let you see the RF level on each available frequency before you use the system. The receiver's visual "window", two five-segment L.E.D. level ladders, scans each channel for instant confirmation of the clearest frequency.

But the real benefit of Broadcast STD truly becomes apparent once

you hear the system. Samson's sophisticated "new generation" RF circuitry with dbx* noise reduction provides more dynamic headroom and the purest, most transparent audio quality available in wireless today.

The Broadcast STD Series combines these leading edge features so you *know* you're getting matchless performance. Anywhere, anyplace and every time.

Broadcast STD Series available in Hand-Held, Lavalier & Instrument Systems.

Samson Technologies Corp., 485-19 South Broadway, Hicksville, NY 11801 (516) 932-3810
TLX 284696 SAM UR FAX (516) 932-3815
In Canada: Omnimedia Corporation Ltd., 9653 Cote De Liesse, Dorval, Quebec H9P 1A3
514-636-9971

* dbx is a registered trademark of BSR North America Ltd.
© 1987 Samson Technologies Corp.

SAMSON[®]
WE TOOK THE WORRY OUT OF WIRELESS[™]

Circle 209 on Reader Response Card

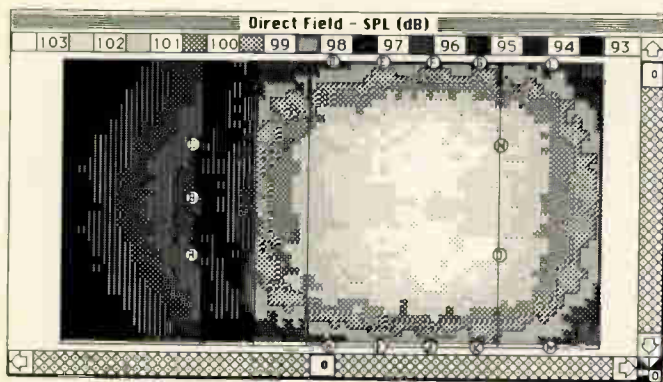


Figure 3: Floor plan view of surround speaker coverage of the main floor and balcony area. (Direct field) Coverage is ± 3 dB in 90% of seating area, and proved to be even smoother after reverberant field was added.

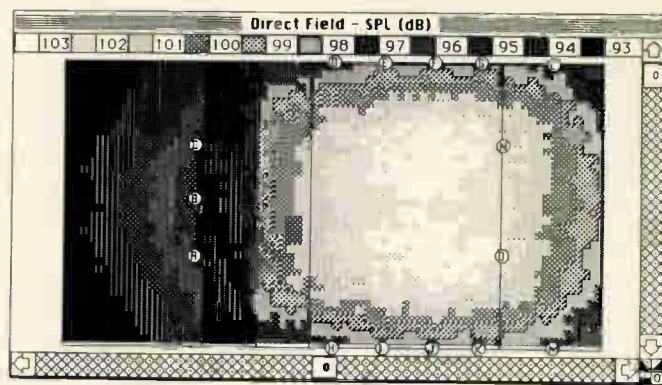


Figure 4: Surround coverage on main floor and seating area underneath the balcony area. (Direct field only).

critical to good sound in this theatre, the BOSE design criteria worked in our favor for designing an intelligible and dynamic system with exceptional clarity.

Three cannons were flown over the front of the stage proscenium arch attached to a fly rail normally used for stage lighting systems. The depth of the stage precluded putting the cannons near the preferred position against the back wall and the only other logical placement was overhead. The light weight of the cannon system (55 lbs.) allowed us to use this location which would not have been possible using traditional "large-box" type low frequency speakers that would have weighed close to one ton for the same acoustic output.

The mid-high frequency speakers used are the BOSE 802-II loudspeakers. Unlike traditional systems, the 802-II uses eight 4½ inch drivers mounted in an articulated array baffle. The 802-II is designed to be stacked in modular arrays depending on the size of the theatre. The 802-II is also unique in that the system has much wider dispersion than traditional horn-loaded loudspeakers. This results in smoother coverage, elimination of "hot spots," and better stereo effect in a larger area of the theatre. Two 802's were used for the left and right channels, and three 802's were used for the center channel. Speakers were flown from a fly rail with standard hardware; speaker height was generally 16 feet although adjustments were necessary during the festival depending on the format of film being presented.

Placement of surround speakers in the Ryerson was difficult due to the configuration of the theatre and the desire of theatre management to use existing light fixtures as surround speaker mounting points. This allowed us only four possible locations on each side with the

task of having to adequately cover sound across a theatre over 60 feet wide. Usually the BOSE 102 system would be used for surrounds; it was obvious that this loudspeaker would not have adequate SPL at only four per side. The 102 could normally be used in a theatre this size with a larger quantity of them; because of the temporary nature of the cinema system in this theatre, we used the BOSE 402 for the surround channel. Modeler™ predicted surround coverage using the 402's as being $+ - 3$ dB in the theatre (this calculation being a direct field prediction only). In reality the surround coverage in the theatre was $+ - 1$ dB; the smoothness occurring when the reverberant field gain was added. The use of a hi-fi type three-way loudspeaker for surrounds in this theatre would have been fatal to the performance of the stereo surround channel in this theatre due to differing coverage patterns in low, mid, and high frequency devices.

The rack furnished to the theatre was provided by Stage Sound Productions, a BOSE dealer in Toronto. Electronics in the system were Crown Microtech 1200LX amplifiers and the BOSE CSC-1 Cinema system controller. The CSC-1 contains active equalization for the BOSE loudspeakers including high-frequency screen compensation, bass summing circuitry for the Cannon System, and a novel feedback limitation circuit. This protects the Cannon system drivers from excessive amplifier voltages, making the system virtually indestructible from accident or abusive operation.

SYSTEM OPERATION

The system was installed over a two-day period with a third day scheduled for equalization and adjustment. After initial pink noise analysis and subjective listening, it was determined that the room had

a unique resonance at about 250 Hz which interfered with dialog intelligibility. This resonance corresponded with the prediction of reverberation made with Modeler™. (Figure 5)

Present during the subjective listening was Gary Chandler, vice president of feature post-production at Lorimar Tele-Pictures. The world premiere of the Alan J. Pakula film "Ophans" was scheduled for the second night in the Ryerson Theatre and Chandler was there to ensure for Lorimar that the picture was presented in an acceptable fashion. Chandler was deeply concerned about intelligibility of the system because "Orphans" is a mono release that depends totally on the dialog to tell the story. Many film producers choose to mix and release dialog films without the Dolby matrixing process because experience has shown that incorrectly aligned Dolby theatre processors can degrade center channel dialog intelligibility. (The same decision was made for the mixing of a film with which the author was involved, "On Golden Pond.")

After considerable discussion it was agreed not to make any more equalization adjustments that day; my feeling was that further EQ in an empty room might make the empty room sound good but would not accurately reflect what might happen when almost 1,200 people were in the room.

The opening night movie was also a mono release and, in addition, was in a strange format because the film was blown-up from 16mm; a situation totally uncommon in regular movie theatres. The format required dropping the screen masking and also lowering the 802-II speakers to clear the mask. After the opening, one minor equalization adjustment was made. The behind-screen

(continued on page 66)



Platinum album starter kit. \$595.

If you want the band to be big, you have to think big. A bit difficult when the only precious metal you're even close to right now is there jingling in your pocket.

But now you won't have to part with much of it to get your own Yamaha EM Series Powered Mixer.

The EM Series comes in 4, 6 or 8 input channel models, depending on how ambitious you are.

Each channel can handle just about any input from microphones to keyboards. And you can adjust each one for just the sound you need, because every input has its own three-band EQ.

A six-band, master graphic EQ adjusts the overall output, so you can match the room you're in.

There's even a built-in reverb unit. Plus two auxiliary outputs when you want to tape, use external effects or plug into stage monitors.

The EM built-in power amp delivers 150 watts

into four ohms, with two output jacks and a large, easy-to-read VU meter. And with exceptionally large heat sinks, the EM runs cool and quiet.

Best of all, the EM Powered Mixer has the Yamaha name on it. There you go. You could be working with a big name in music already.

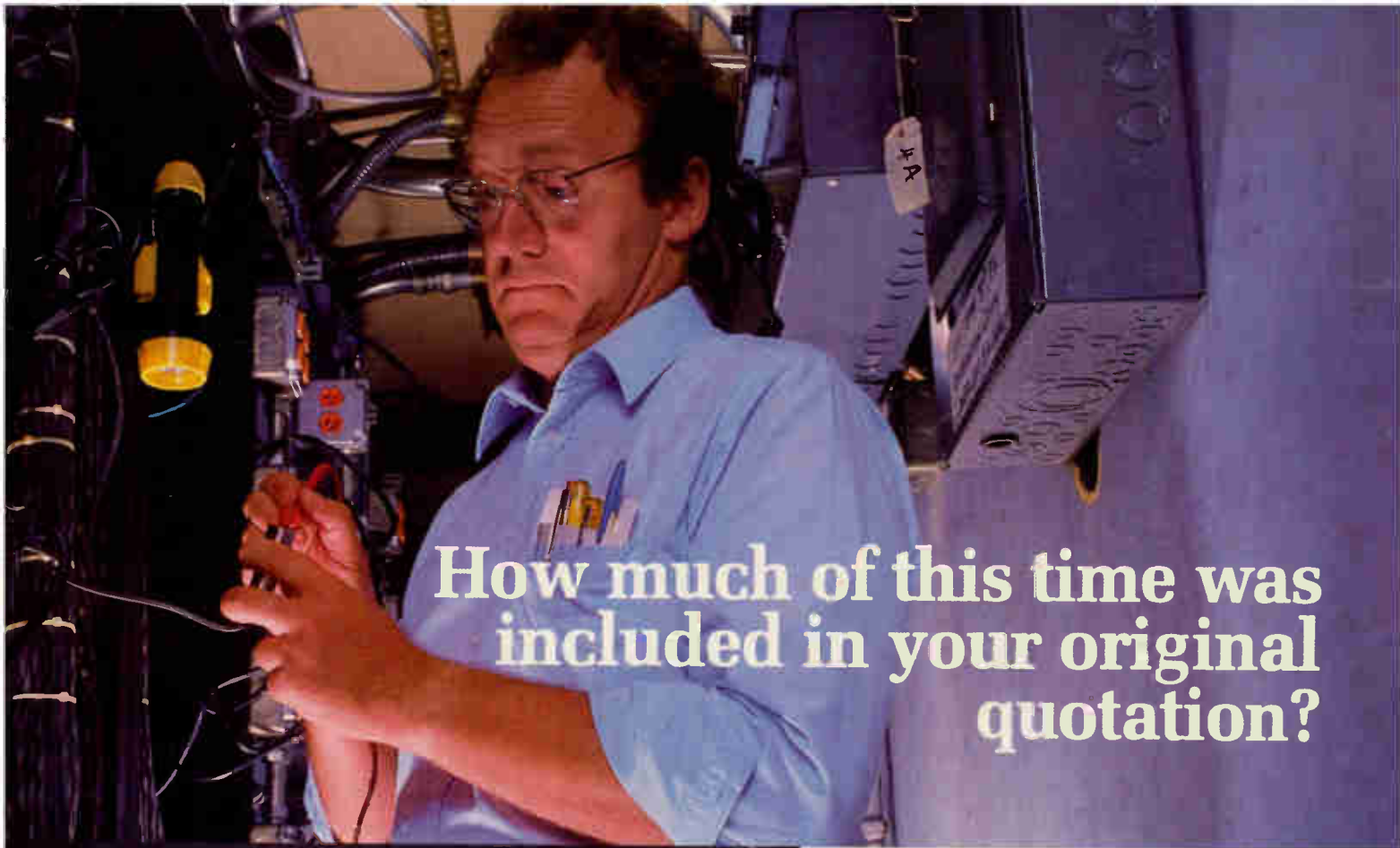
Your road to fame and fortune is the one that leads to your nearest Yamaha Professional Audio dealer. Stop by and see him today.

Yamaha Music Corporation, Professional Audio Division, P.O. Box 6600, Buena Park, CA 90622. In Canada, Yamaha Canada Music Ltd., 135 Milner Avenue, Scarborough, Ontario M1S 3R1.

Circle 211 on Reader Response Card



YAMAHA
Engineering Imagination™



How much of this time was included in your original quotation?



Klark-Teknik reliability means lower total lifetime cost

Unplanned service calls will consume your profit margin on an installation faster than you can say "I'll take care of it." That's the best reason we know of to specify and install equipment on the basis of its total lifetime cost, not just the initial purchase price.

Klark-Teknik standards deliver operational security

Our standards are so demanding because operating conditions can be so severe. We use only the highest grade components: oil-damped metal shaft faders, sturdy rack mount chassis, toroidal power supply transformers.

Years ago, our equalizers pioneered the use of thick film micro-electronic circuits. This technology reduces equivalent solder connections by more than 50%: its proven reliability is one reason we back Series 300 Graphic Equalizers with a five year limited warranty.

The other reason is the 100 hours of testing every Klark-Teknik product undergoes before being shipped. Our standard procedures include stereo dynascope board inspections, full performance verification and a cycled burn-in followed by a complete re-check.

Lower standards of design, construction and testing could make our equalizers less expensive to purchase. But it would make them more costly to own. There are no short cuts to true "set and forget" operation.

Klark-Teknik products for a full range of applications

Perhaps you'd like to spend less time patching things up: if so, you owe it to yourself to investigate Klark-Teknik graphic or parametric equalizers and digital delay lines. For full information on their design, construction and applications, write to Klark-Teknik or your distributor at the address below.



Each one of Klark-Teknik's Series 300 Graphic Equalizers, Series 400 Parametric Equalizers and Series 700 Digital Delay Lines is optimized for specific applications.

Klark-Teknik Electronics Inc.,
30B Banfi Plaza North,
Farmingdale, NY 11735 (516) 249-3660
Klark-Teknik Plc., Klark Industrial Pk., Walter Nash Rd.,
Kidderminster, Worcs., U.K. DY11 7HJ (0562) 741515
Distributed in Canada by: Omnimedia Corp., 9653 Côte de Liesse,
Dorval, Quebec H9P 1A3 (514) 636-9971



Circle 215 on Reader Response Card

World Radio History

PSYCHOACOUSTICS

PART I: THEORY AND PERFORMANCE SOUND

BY STEVEN J. ORFIELD

Psychoacoustics is a broad area of study that spans a number of fields, including acoustics, audio, and psychology; it is represented by a committee of the Acoustic Society of America, and it is a subject of much recent publication. Specifically, this field includes the study of perceptual variables, such as: loudness and hearing thresholds, frequency resolution, masking and time resolution localization.

Through consideration of perceptual performance information, there have been many attempts to establish criteria for the quality of a performance or an architectural space, by such metrics as: reverberation time, intelligibility, background noise criteria, interaural correlation, linearity of frequency response, and time delay standards.

Much of the study of psycho-acoustics has centered on the design of large rooms, including concert halls, theatres and churches. Additional writing has considered the perceived quality of sound by

listeners in small rooms, and these areas of interest have, to some degree, been the center of much recent psycho-acoustic writing. First, a brief look at basic aural sensitivity phenomenon.

The Ear as Filter

The ear, as with any sensory apparatus, tends to be a filter for sound, being more or less sensitive to differing frequencies, and this frequency sensitivity varies with sound level. From minimum levels of about one decibel in the 3000-4000 Hz range, research has established equal loudness contour curves for the range of the audible spectrum. Within these curves are established the reasonable range of speech and music. (See Figure 1).

These curves have also influenced the weighting scales used in sound measurement, such as the "A" weighting network built into most sound level meters. This scale, oriented toward midfrequency perceived loudness, prescribes the additions and subtractions to be used to adjust sound energy measurements to relate them to typical human frequency sensitivity.

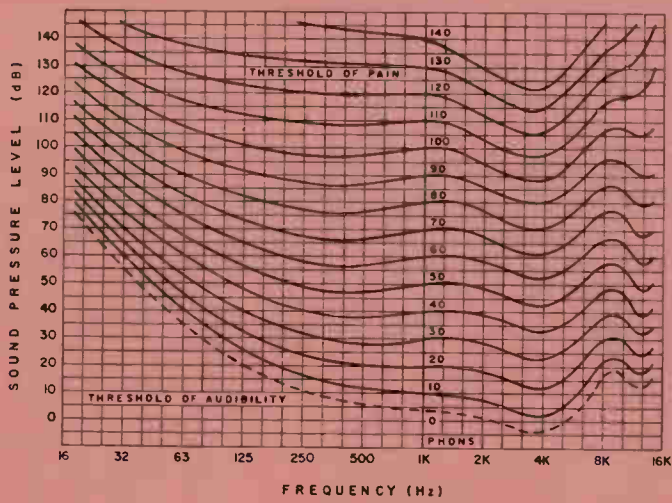


Figure 1

This weighting is somewhat controversial, and many others have been proposed.

A-Weighting (dBA)

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Correction	-25	-15	-8	-3	0	+1	+1	-1

In addition, the ear tends to resolve sound to general ranges of frequency resolution, and these are commonly known as the critical bandwidths (frequency ranges). (See Figure 2).

These bandwidths are used to establish how much resolution a measurement must have in order to be perceptually parallel with the response of the ear, and in the current view, 1/3 octave bandwidths tend to be the most suitable common bandwidth which provides this perceptual equivalence. This is why the 1/3 octave real time analyzer has received so much play in the acoustics and audio fields. (Exact bandwidth measurements, such as those available on the TDS analyzer and FFT's, can provide higher resolution information and can measure more closely to the critical bandwidths, but there is no software in place

as yet to accomplish this.)

Auditory Masking

One of the most important phenomenon not generally considered in audio design is that of auditory masking. In general, sounds can have the effect of reducing the perception of other sounds based on their level, center frequency and bandwidth and time of arrival. In general, a tone tends to have a masking effect on other sounds within frequency range, and this masking effect also spreads to frequencies adjacent to and above its own frequency range, based on the bandwidth of the masking signal. (See Figure 3 & 4).

This masking phenomenon is used quite successfully in the sound masking field and is the basis for the concern for background noise levels in acoustically sensitive rooms, such as conference rooms or auditoriums. Via the use of NC criteria, the consultant can establish a minimum masking effect for rooms, so that the problem of audio system level can be reduced. (See Figure 5).

Additionally, the masking effect of re-

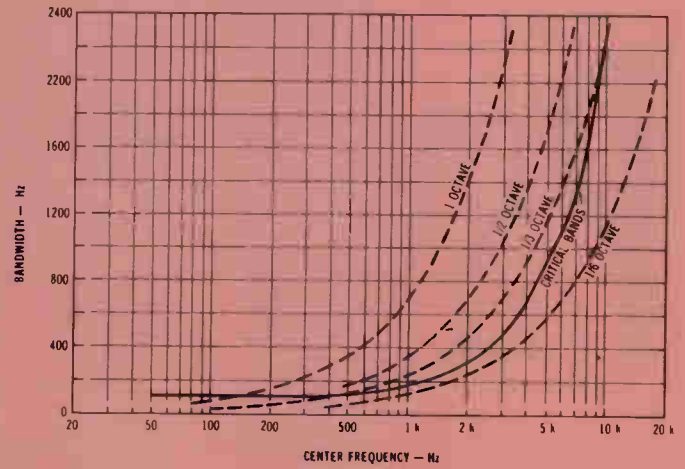


Figure 2

verberation is significant, both in the speech and music fields, as excessive reverberation times mask speech and reduce the clarity of music. The newer IEC RASTI intelligibility standard is based on this inverse proportionality between reverberation time and intelligibility and background noise level. (See Figure 6).

Time Resolution

Another psychoacoustic variable in common use within acoustics and audio design is time resolution; the ear tends to perceive sounds as distinct only if they are separated by a minimum time period. Multiple path or multiple time sound arrivals within a specific time window can produce echos, frequency distortion, intelligibility reduction and spatial disorientation.

Typically, sounds which arrive within about 30 milliseconds of each other appear to be part of the source sound event. This is commonly referred to as the "Haas Effect," and research regarding this effect and its corollaries has had much application

(continued on page 42)

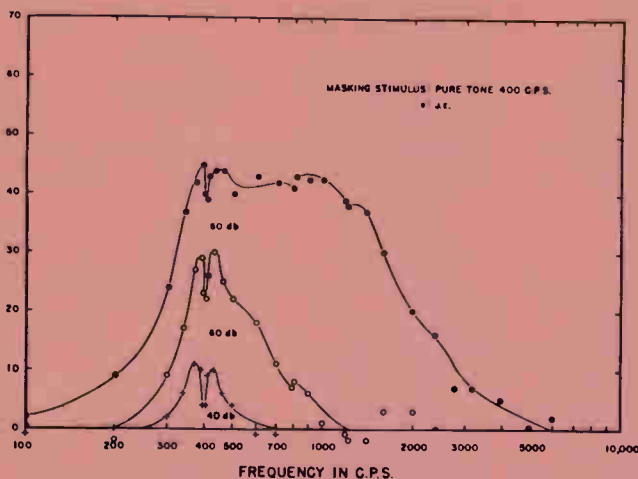


Figure 3

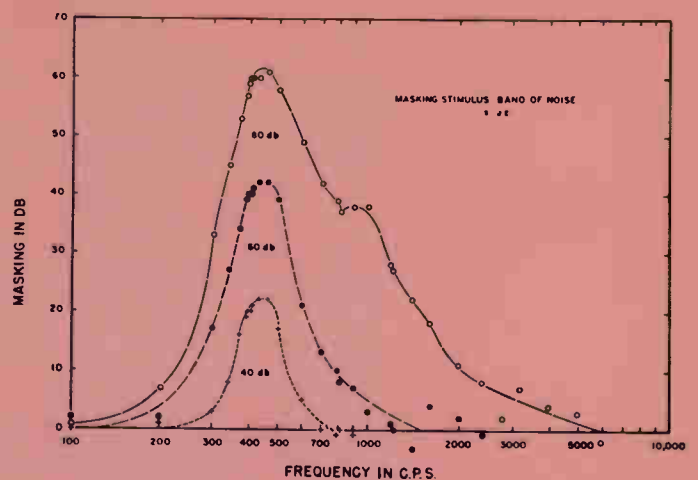


Figure 4



ECONOMIC
1987
REPORT

As 1987 comes to a close, it's time for us as an industry to take stock of ourselves—and see where the sound and communications industry is at and where it's going. This year's Economic Report—the most extensive ever done by *Sound & Communications* magazine—seeks to provide readers with this information so they can stay on top of this growing industry.

For the second consecutive year, the Harry Heller Research Corp., a nationwide market research company, conducted the survey. This insured the integrity of the data and guaranteed the confidentiality of the responses. The survey includes manufacturers own data and statistics, which were analyzed to paint a total picture of the industry.

In addition, we conducted in-depth interviews with highly respected individuals on the state of the economy as it relates to the sound and communications market. (See page 38.)

This indispensable report is aimed to help everyone in the market make more accurate sales forecasts and better marketing plans for 1988. It includes not only 1987 average sales volume, but distribution of sales, perceived customer criteria for product selection, perception of future sales, selling posture, product lines, product priorities, new markets, and applications for 1988.

This year, we expanded our survey sampling to include additional small companies to represent their influence in producing aggregate figures. Both smaller and larger companies say, in the main, they plan to be as optimistic and aggressive as last year.

The sound and communications market looks to be very productive for 1988 with manufacturers reporting advances in new technology and many manufacturers committed to prioritizing new product introductions. New technology may create a sense of excitement and further market expansion. Many technologies which grew in 1987 presumably will continue to grow in 1988. (In 1987, fiber optics was estimated to be a \$540 million business, ISDN was implemented in several areas around the country on a trial basis, and voice synthesis and recognition passed the \$300 million a year market.

The year 1987 also clearly established that computer technology will play a leading role in communications. The total computer hardware/software market was \$6 billion.)

Sales Volume

The numbers reported in this part of the survey reflect the product sales of the industry in a particular product category. The front column in **Figure 1** shows the average sales per company in each product category. The column behind the first one is an estimation of total industry sales in a given category. It is important to note that all sales figures reflect *only* sales made by manufacturers.

In comparing identical categories and excluding these unavailable from last year,¹ this year's survey figures show an increase of the overall estimated market size of 20 percent. The sound and communications industry is estimated at almost \$2 billion.

The average sales per company responding to the survey for audio is \$3,466,000. Our 1987 estimated market size for audio is \$1,206,168,000 indicating that the rest of the sound and communications industry is about \$800 million (taking into account this year's statistics for additional categories). This may indicate healthy growth for the audio industry, and may be a result of new players coming into the market with products, or new existing companies improving the products that they have in order to allow customers to trade up. This healthy outlook may also be due to more industrial venues demanding more and better audio products.

Climbing fast in the industry is the selling and installing of security systems. This market has grown in average sales by \$949,500 from 1986. (Also see "Today & Tomorrow's Contracting Business Report," May 1987.) Sales in this area may have skyrocketed because security has gone from being perceived as a market of gadgets to being accepted as a utility market. It seems as though the security market is now being looked at as more of a necessity than it once was.

¹Last year support systems, teleconferencing, sound masking and test equipment figures were unavailable.

Another growing business is the subscription area, which includes background and foreground music systems. Average sales are up by \$203,080. This could be due to an increased customer base towards video foreground music systems in department stores and malls. (See "Foreground Music Videos: A Year of Change," October, 1987.) Also coming into play in 1988 will be the new multi-channel system that delivers music programs via satellite. This may or may not have a large impact on the foreground music industry—1988 will see the outcome.

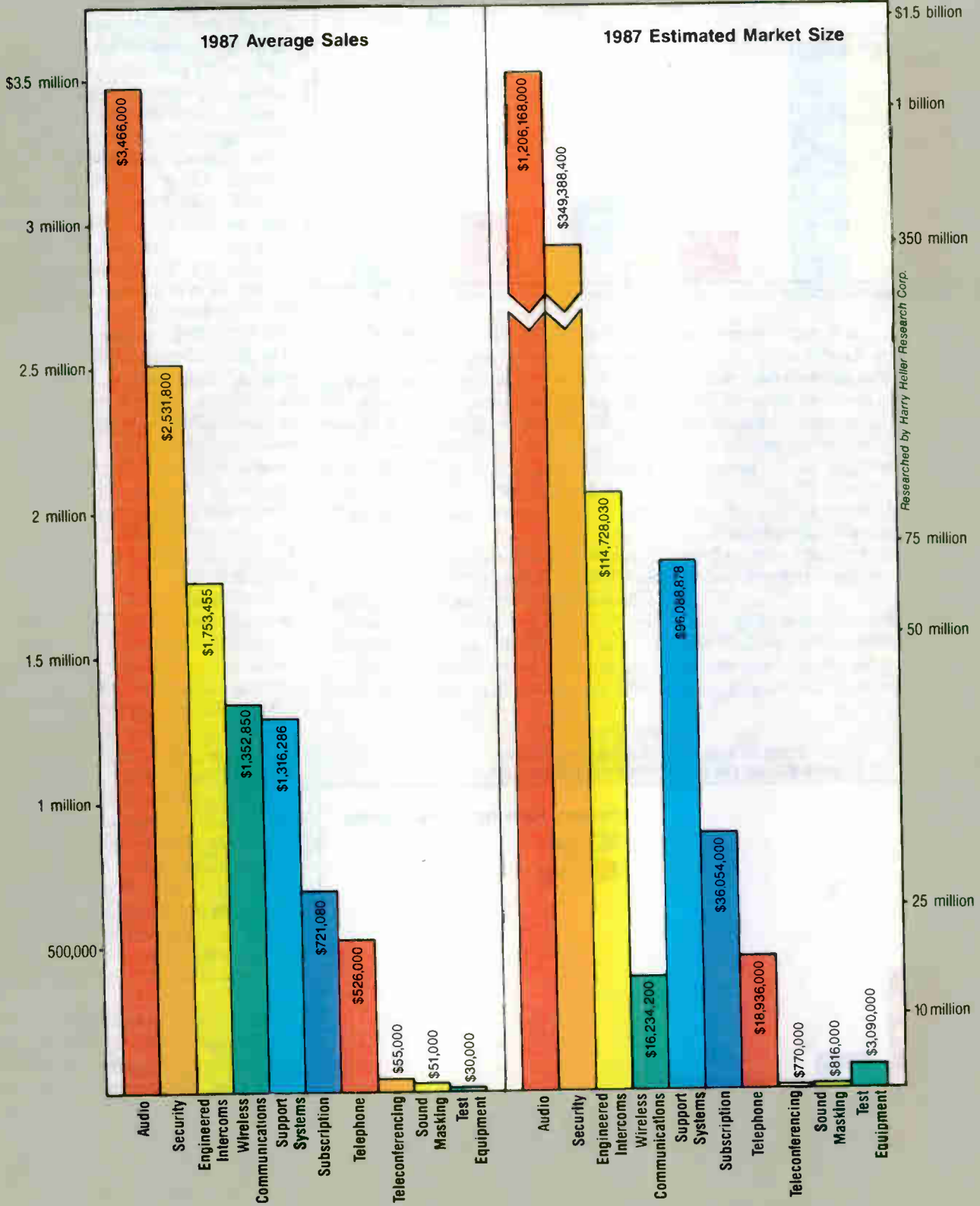
The overall estimated market size for engineered intercoms has decreased slightly. However, *Sound & Communications* studies reveal that sources within the industry remain optimistic. This slight decrease may be due to a decline in hospital construction. But the current process of retrofitting and installing new hospital systems is expected to counteract the slowdown in construction. (See "Hospital & Health Care Communications—From Now to the 21st Century," this issue.) According to informal sources within this market segment, non-telephone office intercoms are slightly on the rise. The consensus is that the engineered intercom business is in flux.

Telephone systems are down by \$1,148,401 in average sales from 1986. This figure was also down last year from 1985 which indicates that this market has been on a down-swing for some time. The decline in this segment of the industry may be due to an adjustment in the type of manufacturers producing the bulk of phone systems sales, or a redefinition of phone systems within this industry toward intercom systems. (See preceding paragraph.) Average sales for 1987 in teleconferencing and sound masking were each about \$50,000—indicating a healthy outlook for these market segments.

Distribution of Sales

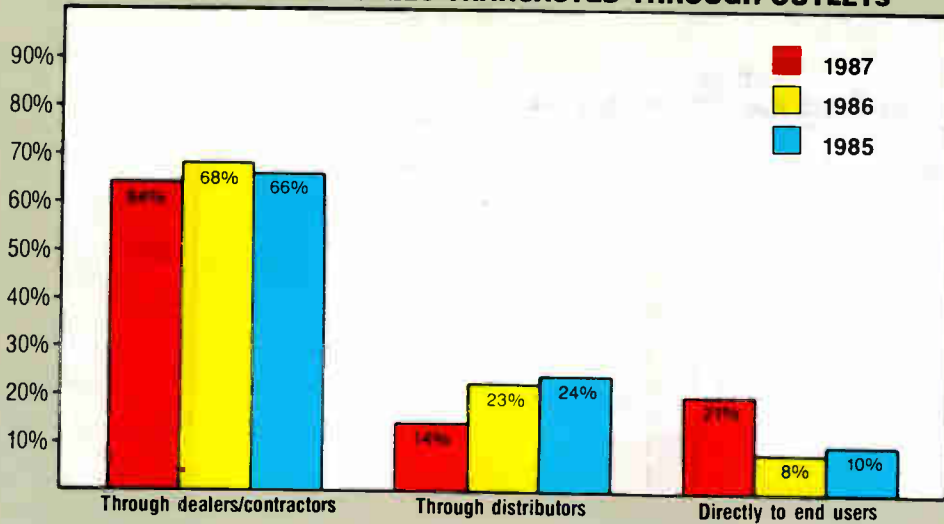
Respondents were asked to indicate the breakdown of their company's sales among dealers/contractors, distributors and directly to end users. According to the results, in 1987 nearly two-thirds of sales go to dealers/contractors with the remainder going to distributors and end

FIGURE 1
SALES VOLUME AND ESTIMATED MARKET



Researched by Harry Heller Research Corp.

FIGURE 2
PERCENTAGE OF SALES TRANSACTED THROUGH OUTLETS



Researched by Harry Heller Research Corp.

users, more so to end users—a reversal of last year. (See Figure 2).

Comments: Sales through dealers/contractors are down from 68 percent in 1986 to 64 in 1987. (Sales were 66 percent in 1985.) Sales are down dramatically to distributors, dropping to 14 percent in 1987 from 23 percent in 1986 and 24 percent in 1985. However, there has been a drastic change in sales to end users. In 1987, it was up 21 percent—a swing from 1986 and 1985, being 8 percent and 10 percent, respectively.

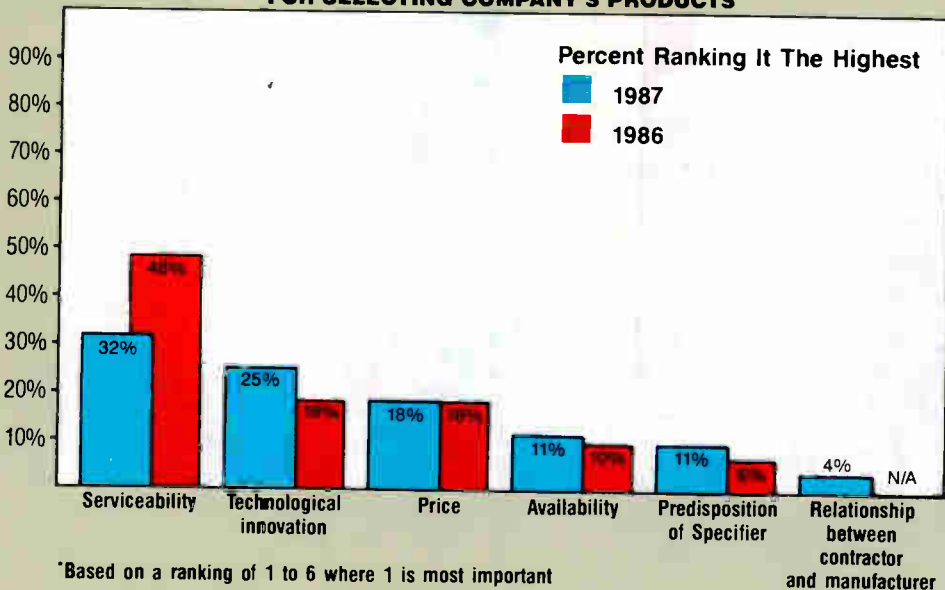
Some manufacturers responding to our survey seem to be putting more of their energies into selling to end users than to dealers/contractors and the two-step mar-

ket. This may be due to uncertainty with dealers/contractors and distributors, or a shifting away from distributors, or possibly an increasing security on the part of manufacturers in their ability to market directly. It is more likely that smaller manufacturers may be dealing direct. In any event, contractors and distributors should flag this and react accordingly.

Perceived Customer Criteria for Product Selection

Respondents were asked to indicate which criteria they believe are most important to their customers. They did this by ranking six criteria from “1” to “6” where “1” is the most important. This

FIGURE 3
PERCEIVED CUSTOMER CRITERIA FOR SELECTING COMPANY'S PRODUCTS*



*Based on a ranking of 1 to 6 where 1 is most important

Researched by Harry Heller Research Corp.

year's report includes relationship between contractor and manufacturer, which was not included in the 1986 survey. (See Figure 3).

Comments: Clearly, serviceability is the most important criterion, being considered most important by about one-third of the respondents. This may be attributed to end users' demand for the best quality systems—and not in just the systems manufacturers make, but also in the longevity customers can expect from them. Manufacturers may thus presumably be willing to produce more service capability for a sound and communications product if it is perceived as durable enough to last as a long-term solution.

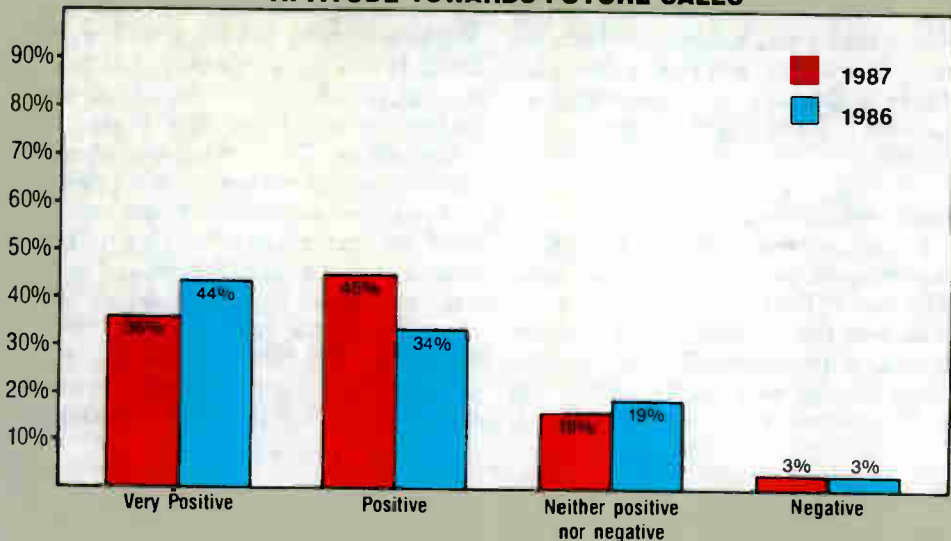
Although serviceability went down somewhat in percentage points from 1986 to 1987, these points were picked up in the technological innovation criterion. This year, 25 percent of the respondents considered it the most important criterion, whereas only 18 percent selected it in 1986. This indicates that manufacturers feel they cannot pour out the same products of yesteryear, but should invest more into creating a perception of research and development. This could imply that technological innovation goes hand in hand with quality or serviceability.

Price ranked third, with 18 percent this year and the same for 1986, availability remained about the same for each year, and predisposition of specifier was up 5 percentage points from 1986 to 1987. A new category in this year's report, relationship between contractor and manufacturer, ranked last at 4 percent. Apparently, the manufacturer doesn't consider his relationship with the contractor of utmost importance. Contractors should evaluate this stance. This may also mean that the specifier is becoming more important to the manufacturer. With the increase in direct dealing to end users and the ranking of the relationship with contractor least important, maybe contractors need to take a closer look at their industry.

Perception of Future Sales

Respondents were asked to indicate how positive or negative they feel towards 1988 sales. Based on the responses, the future looks as bright as it did a year ago. Over three-fourths of the companies are positive or very positive or with about one-third saying “very positive.” Almost no negative attitudes emerge. Although there is a small drop in the “very

**FIGURE 4
ATTITUDE TOWARDS FUTURE SALES**



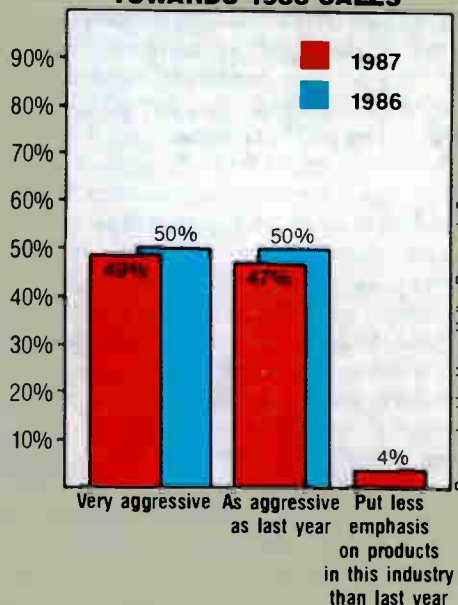
positives" from last year, the optimistic attitude is consistent. (See Figure 4).

Comments: These positive attitudes may stem from a feeling of expansion within the market, a trading up of installed equipment, or entries into related markets. In any event, the general optimism bodes well for the industry.

Selling Posture

Given the optimistic attitude, companies were asked how aggressive they plan to be in 1988. Everyone will be aggressive. Half say they will be as aggressive as last year; and the other half plan to be even more aggressive. The

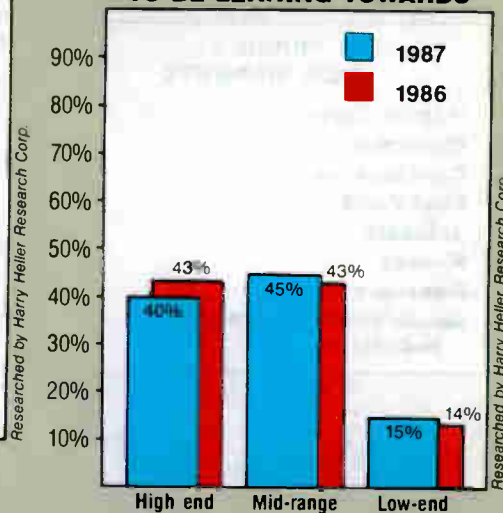
**FIGURE 5
EXPECTED STRATEGY TOWARDS 1988 SALES**



same aggressive behavior estimates were seen in last year's survey. However, this year 4 percent said they put less emphasis on products for this industry than last year (See Figure 5).

Comments: This seems to indicate that the industry is still highly competitive — manufacturers can't pull back in a race to get customers. This could lead us to expect more attention to the factors respondents considered most important — serviceability, technological innovation and pricing. We should also expect to see more creative marketing. Given the optimistic attitude by manufacturers, aggression seems healthy. However, this year 4 percent of the manufacturers are pulling back from marketing products for this industry. Perhaps, the aggressive

**FIGURE 6
AREAS PRODUCT LINES APPEAR TO BE LEANING TOWARDS**

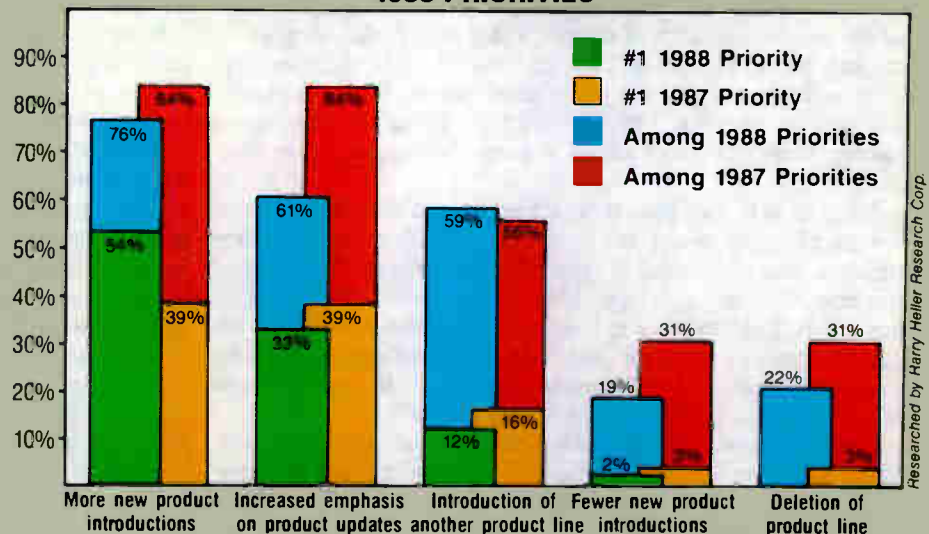


stance of the other 96 percent has caused this. Aggressive behavior on the part of manufacturers is usually a plus for contractors and purchasers.

Product Lines

Companies were asked a few questions about their 1988 product line. First, what was their opinion on market trends concerning product quality? There is a pretty even split between those who feel the market is moving towards the high end products and those who feel it is leaning towards mid-range products. A little more than 1 in 10, however, feel the direction is toward the low end. These data is again consistent with the 1986 survey. (See Figure 6).

**FIGURE 7
1988 PRIORITIES**



Comments: Manufacturers seem to perceive the industry as wanting more reliable, durable, quality products; therefore, the trend would be towards high end

**FIGURE 8
NEW MARKETS**

**Health Care
Churches
Contractors
Fast Food
Schools
Homes
Restaurants
Audio/Video & related
Industries**

Researched by Harry Heller Research Corp

and mid-range products, as opposed to less expensive, less reliable models. Pricing, remember, came in third, behind serviceability and technological innovations. Availability was even below that. These results may also indicate that the industry is continuing to be more market driven.

Product Priorities

Companies were also asked about their priorities for their 1988 product lines. The major 1988 priority among more than half the companies is more new product introductions. This represents a major increase over 1987 priorities. Increased emphasis on product updates re-

mains as the second most important priority (See Figure 7). Companies also filled in areas of the industry where they will be addressing new markets. They include health care, churches, fast food, schools, homes, restaurants, audio/video and related industries. (See Figure 8).

Comments: The number one priority among respondents is more new product introductions—up from 39 percent in 1987 to 54 percent in 1988. This, accompanied with a healthy, aggressive, competitive attitude in selling posture may mean substantial excitement in the industry for 1988. No companies indicated deletion of a product line. Only 2 percent indicated fewer new product introductions.

Manufacturers' Viewpoints

For the second consecutive year, *Sound & Communications* contacted several major participants in the industry and asked them what their thoughts were on our findings.

Although it remains prevalent that more sales are being made through dealers/contractors, the overall statistics have changed. This year, some manufacturers seem to be putting more emphasis into selling directly to end users. Several of the manufacturers were not surprised and even expected this change.

"The traditional channels of distribution may not be working," said John Stiernberg, sales manager, Pro/OEM products, dbx. "The sophistication of a product increases the need for special sales techniques and special financing. Whoever is doing the selling to the end user must be well-qualified and in some cases the manufacturer may feel he is the best qualified. Others, like myself, feel that dealers and distributors are part of the company's team effort and can best represent the company's product line."

Chris Foreman, Panasonic/Ramsa's marketing manager, feels that some companies may be going in that direction but certainly not the majority of them. "I feel that dealer support is critical; he benefits us and the end user. I think the majority of manufacturers who are going direct are making a mistake. It's not in their self-interest and it doesn't make sense economically. We can't afford to keep the support team that a dealer can."

Mark Cohen, vice president of Fostex, said that the situation is a double-edged sword. It's sometimes difficult for the manufacturers to have confidence in dealers/contractors and distributors. For example, contractors should know the market—they're in it; but it's difficult for them to keep up with so many product lines and changes in a retailer's sales people. It's difficult for them to know the depth of each manufacturer's line. It's not easy for retailers either—I sympathize with them also."

Jim Morrison, national sales manager of Aiphone, also disagrees. "I'm not aware if this trend is happening. I sell zero to the end user directly and everything goes through distribution. Once a manufacturer leaves a distributor, it's difficult for

the manufacturer to come back. As a result, the distributor may have lost some confidence in him. A company just starting out might have to go directly to the end user to move his product until he can get hooked up with good dealers. But I feel that the majority who are going direct are stabbing themselves in the back."

We asked manufacturers why they thought serviceability remained number one as the perceived customer criterion for selecting company's products. Some manufacturers felt other criterions should have been first.

David Merrey, president of Altec Lansing, said, "The trend today in any industry is to expect things to be more and more reliable without requiring service calls every month. Japanese manufacturers are known for products that last, and it has pushed U.S. manufacturers in this direction."

"Reliability is a better word than serviceability," said Bill Little, president of Quam. "In fact, availability is really the key over reliability, given that products are expensive and contractors are often in a situation when they need a product quickly."

Foreman said that serviceability and reliability go hand-in-hand as the top criteria. "The end user wants a product that is easy to deal with; he is concerned with the ease of doing business with the dealer, contractor or manufacturer."

Although Morrison felt that serviceability was important, he felt that price should have followed in importance. "If you have a reliable product and the price is competitive, the manufacturer will get the order no matter what the perceived relationship between the company and the contractor is. And I think more people think about price before they think about technological innovation. If your products are not technologically advanced to begin with, you're not in the ball game anyway."

"In many jobs, price is neck and neck with serviceability in customers' minds," said Ron Means, president, JBL. "Price is the big indicator in the total sales. Technological innovation could cause the price to hit what the target is and make the sale in some cases. I also feel that the specifier's importance is on the way up and many times their capabilities are not taken

New product introductions and increased emphasis on product updates are primarily what manufacturers are working on—they make up 87 percent of their priorities.

Applications for '88

We also asked companies what new applications they planned to address in 1988. Although many of these applications are not new to the industry, they may be new to a particular company. This may indicate that many companies want to branch out and become more full-line manufacturers so that contractors will use them as one source for a total sound and communications installation.

FIGURE 9 NEW APPLICATIONS

Card access
Sound analysis
Sound reinforcement
Consoles for ADR, Foley/Lay up
Emergency voice evacuation amplifiers and systems
OEM/VAA
Sound control
Industrial OEM
Custom cabinetry electronics
Security/page/intercom
Decorative & durable acoustical material
CCTV

Researched by Harry Heller Research Corp

Harry Heller Research Corp. is a full-service independent market research company serving the market research community since 1972. It is well respected and draws its clients from all over the United States. Its president, Harry Heller, last year completed a one-year tenure as president of the New York American Marketing Association. The Heller client list includes 40 of the Fortune 500 companies, 20 of the top 25 advertising agencies, and 25 of the top 100 national advertisers.

The current study was supervised by Dr. Arnold Diamond, vice president and research group head at Heller Research.

advantage of. The relationship between the contractor and the manufacturer is not at the top of the list because the end user in most cases is too removed from that relationship."

According to manufacturers who responded to the survey, their outlook for sales in 1988 is positive even with the stock market being shaky, the value of the Japanese Yen and the U.S. dollar not in the best of shape, and the possibility of a recession.

"The October stock market crash itself is not going to affect our industry that much," said Peter McClean, vice president of the Ring Group of North America. "We're still planning to be as aggressive because we believe any problem is short term. However, we may be a bit more cautious in 1988."

Cohen is not as optimistic, "Up until recently the general trend for manufacturers was to make new equipment, with more features, better performance and for a better price. Now, manufacturers are still making better equipment, with more features, better performance but for a higher price. The new version of a product covers up the price increase. We've been spoiled. The situation has come to this because of the dollar being devalued so greatly. Something has to change."

Little feels that 1988 will be a good year for the sound and communications industry. "Despite changes within the economy within the past few months, we're planning to be as aggressive as ever."

Foremen feels that 1988 will be an interesting year because of the world-wide economic state, including the value of the dollar and the crash. "If the economy stabilizes and does not get worse, it will be a very good year. However, if it doesn't, we could all see bad times coming—there will be less building or renovating of new systems, with the exception of entertainment systems."

Means is optimistic about the future for several reasons. "First, I've been through a few recessions and have never seen any drastic problems during those times for our industry. Second, our industry is more resistant to recessionary pressures than say the consumer market. Third, I see the dollar read-

justing itself due to the more normal positioning in regard to other currencies. There is nothing to stop us from having a healthy and productive 1988."

McClean said the trend towards new product introductions indicates a healthy market for 1988. "I believe that many companies will be introducing new products as a one stop shopping center such as amps, speakers, a new intercom system, etc. This helps fill the need of a large percentage of smaller and even some larger companies. Contractors like to deal with one manufacturer who offers him a full line of products to suit all his needs."

"I think that the new products that come out in 1988 will fill voids and exploit strengths," said Little. "I also feel that more people will be concentrating on the lines that they have and updating them. There is still room to get a bigger share of the sound and communications market. But this business is not as big as people think it is when they enter it. It will never be a multi-million dollar business like consumer electronics. I think there will be a shakeout this year of those companies that came into the industry with those expectations."

Merrey also said there is more profitability in penetrating deeper into improving existing products than going into new market segments. "Anytime you focus on something, you see it more clearly than from a panoramic viewpoint."

Morrison feels that there will be few new product introductions in 1988. "I think it will be a year of upgrades and greater market penetration of existing products because of all the new technology that emerged in 1987. The next phase of new technology will be in three or four years."

"I think on the electronics side of new technology, costs have come down and we'll see more rapid changes in 1988," said Means. "We'll continue to introduce new products in different markets within the industry in 1988, allowing us to have larger product lines and therefore, maintain our competitiveness. I believe there is plenty of room for growth in the sound and communications market."

Crosstalk

A Television Symposium

Did you catch Crosstalk at AES?

Whether you were at any or all of the three television symposiums or not, here's an opportunity for you to catch them now on one VHS cassette.

Testa Communications' publications hosted three panel discussions during AES: *Music & Sound Output* magazine hosted a symposium on **Engineered Obsolescence? . . . The Future of the Recording Engineer**, *Post* magazine sponsored a discussion on **Audio for Television & Film: I Heard it at the Movies**, and *Sound & Communications* magazine hosted a panel discussion on **Speech Intelligibility . . . What Measure/Whose Ruler?**

The *Sound & Communications* panel was hosted by technical editor Jesse Klapholz. Held before a live audience, well-known guest panelists were Daniel Queen, president of Daniel Queen Associates; David Klepper, co-founder of Klepper Marshall King Associates, Ltd.; Donald Davis, president and co-founder of Synergetic Audio Concepts (Syn-Aud-Con); and Clifford Henrickson, consulting engineer for U.S. Sound Company. A lively discussion was followed by a question and answer segment by the studio audience.

Order your tape copy now by calling Deborah Droge at (516) 767-2500 or fill out the order form below.

Engineered Obsolescence? . . .

The Future of the Recording Engineer

Speech Intelligibility . . .

What Measure/ Whose Ruler?

Audio for Television & Film:

I Heard it at the Movies

Mail to: **Sound & Communications** magazine

25 Willowdale Ave.

Port Washington, NY 11050

Attn: Deborah Droge

_____ **\$19.95**

Title of Symposium

_____ **\$29.95**

All 3 Symposiums on 1 VHS tape

PAYMENT MUST ACCOMPANY ORDER

Sorry, we cannot bill you

CHECK ENCLOSED MONEY ORDER

AMERICAN EXPRESS MASTER CARD

VISA

CARD # _____ EXPIRATION DATE _____

SIGNATURE _____

PRINT NAME _____

COMPANY NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

When adequate is no longer good enough.

MPS 2300



In today's highly competitive business environment you need every advantage you can get. Adequate is no longer good enough. Leading businesses are gaining an advantage by installing high performance foreground systems to provide their customers an enhanced listening environment. At QSC, we have brought our reputation as a leading manufacturer of amplifiers to the foreground. The MPS 2300 is the first professional music and paging system combining advanced mixer/preamp, signal processing, and power amplifier technology in a simple to use package. The MPS 2300 enables businesses to use high performance integrated music and paging systems to their full advantage.

So, when adequate is no longer good enough . . .

QSC
A U D I O

QSC AUDIO PRODUCTS, INC.
1926 PLACENTIA AVE.
COSTA MESA, CA 92627 (714) 645-2540

Circle 206 on Reader Response Card
World Radio History

PSYCHOACOUSTICS

(continued from page 32)

with the audio design field. Haas found further that reflections must be in the order of 10 dB-20 dB higher than the direct sound in order to be considered an echo. Interestingly, reflections can extend the Haas zone and echos can be masked by control of sound level. (See Figure 7 & 8).

Auditory Localization

A final psychoacoustic issue that strongly affects the evaluation of recorded music and of performance halls is auditory localization, and this relates to the ability of the ear to determine the directionality and distance of the source. (Some of the last work that was undertaken by Richard Heyser, the inventor of time delay spectrometry, was regarding the correlation between interaural sound arrival and sound quality.) This localization is thought to be the joint result of differing sound pressure levels and differing times of arrival of sound at the two ears.

Since hearing is horizontally binaural, this suggests that the listener should be able to discriminate sounds most easily on a right to left continuum, and this is in fact

true. Additionally, localization is most accurate to the front of the listener, due to the orientation of the outer ear. Localization remains quite accurate until the source is about 60 degrees to the side of the listener, and then depreciation occurs rapidly. Additionally, the listener can enhance localization capabilities by movement of the head. Localization is also better for sounds that occur within the Haas Zone. Narrower bandwidth sounds are more difficult to localize indoors, due to the room resonance effects that are clearer with narrower frequency sound. Localization is also thought to be of clear perceptual assistance in isolating and listening to a desired sound within a noisy background. Research has suggested that this localization is more difficult with multiple sound paths, with distance and with multiple sound sources, such as loudspeakers. (See Figure 9).

Current Psychoacoustic Quality Standards

Having discussed some of the basis for psychoacoustic interest, let us now consider some of the theories of quality of sound and their application to acoustics and audio design. There are many available quality

metrics, and they tend to be generally classified under the two variables most often important in room acoustics, music/room performance quality and speech intelligibility.

Below is a listing of some of the current metrics in use worldwide:

Music Quality

1. Reverberation Time
2. Noise Criteria
3. Preferred Noise Criteria
4. Lateral Fraction
5. Interaural Correlation
6. Direct to Reverberant Ratio
7. Diffusion
8. Intimacy
9. Liveness
10. Clarity
11. Loudness
12. Ensemble

Speech Quality

1. Articulation Index
2. Speech Interference Level
3. Rapid Speech Transmission Index
4. Noise Isolation Class

J.S. Bradley of the National Research Council/Canada has categorized the music/room acoustics and the speech intelligibility metrics under these general headings:

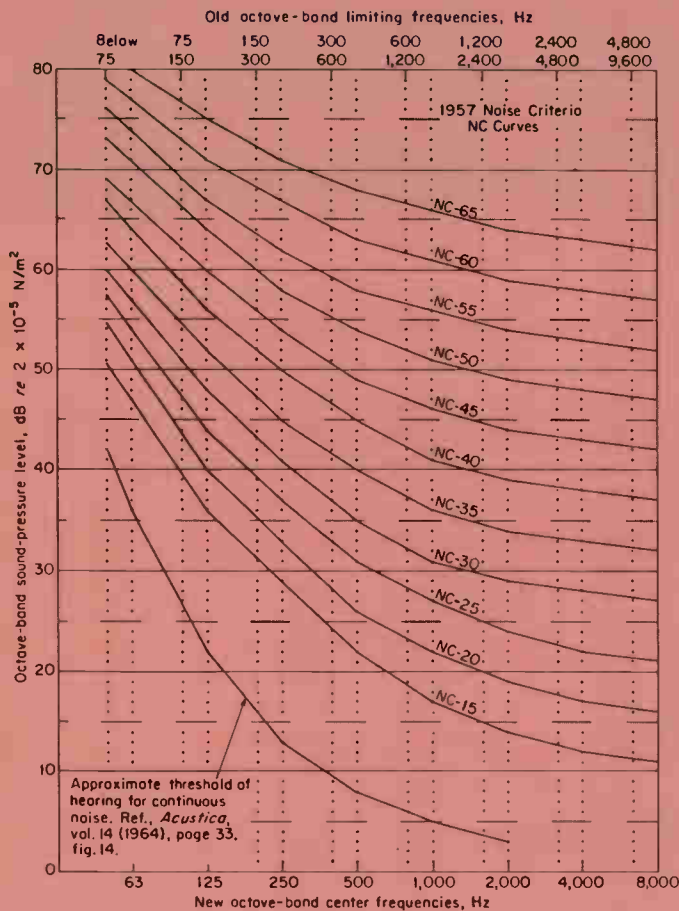


Figure 5

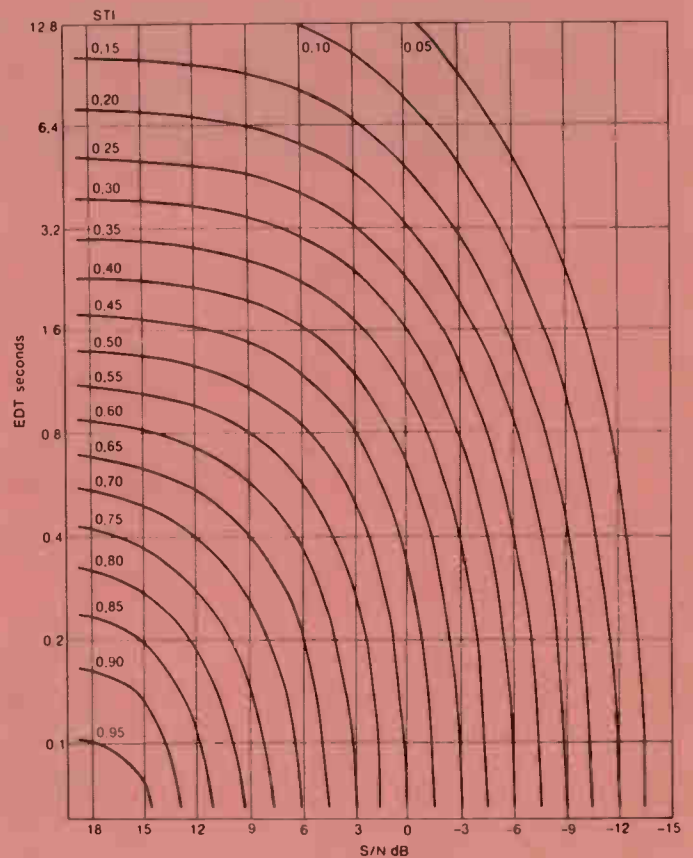


Figure 6

KING OF CLUBS



Go downtown and look around. The fancy pants dance where the music is cool. And the smoothest, easiest way to perfect a club's sound is Rane's innovative MP 24.

We've loaded this new Stereo Program Mixing Console to the gills with features. You're looking at more flexibility and performance in this one unit than in any other mixer/preamp made. Furthermore, it's got the highest level of signal quality: noise and distortion are virtually eliminated. And it's priced at \$1099.

Here's a partial rundown of why the MP 24 just made the competition obsolete. Nine stereo inputs (three phono and six line)

are accessed through four stereo mixing buses, each with its own 4-position selector switch and Alps studio grade 60mm slider. Crossfade is completely assignable via another 60mm slider and two selector switches. Then there's

separate mic and program EQ, mic and program loops, master balanced outputs, zone and booth outputs, light trigger output, cue system... whew! And that's not the half of it.

Those in the know are already saying our MP 24 will be the industry standard. But why be modest? We think it'll be the king.

Rane Corporation, 6510 216th Southwest, Mountlake Terrace, WA 98043. 206/774-7309.



**RIGHT
AS
RANE**

Circle 208 on Reader Response Card

World Radio History

Room Acoustics/Music Criteria

1. Decay
2. Clarity
3. Strength
4. Spatial Impression

Speech Intelligibility

1. Signal to Noise Ratio
2. Room Acoustics

While there are many acoustical metrics now in place, a number of them are now easily measureable with newly introduced equipment, and I would like to deal with a small number of those measureable parameters:

Music/Room Acoustics

- C 80 Early Late Ratio (80 ms)
- TS Center Time
- LF Lateral Fraction

Speech Intelligibility

- RASTI Rapid Speech Transmission Index
- E 80 Useful to Detrimental Ratio (80 ms)

While measures such as reverberation are analysis of the liveness of a room over specific decay times, such as 20 dB of decay or 30 dB of decay, early-to-late ratios and center times are measurements of sound energy limited by specific temporal cut-off; the choice of the cut-off time is based on research into the relationship between these fractions and reported performance.

The C 80 early-to-late ratio has been correlated to "clarity" of sound, or the balance between clarity and reverberation, and it is evaluated by the use of an impulse response that is then processed via the ratio calculation. The TS center time value is a similar calculation based on an impulse response.

The lateral fraction (LF) is an older evaluation parameter that compares the direct sound arriving at the ear with the sound being reflected from the side, and

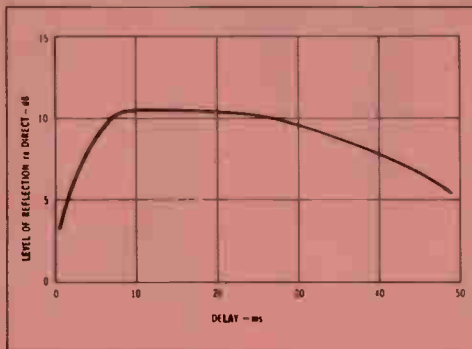


Figure 7

this metric is used to evaluate the spatial impression at the listener's ears. While these parameters have been used most frequently to evaluate the live performance of rooms, there is no question that the advances in the audio field, such as assisted resonance systems that electronically expand the perceived reverberation in rooms, will dramatically increase their use in the audio field.

At this time, the C 80 and the TS can be arrived at via the use of the TEF time delay spectrometry analyzer, via as yet unreleased software. The C 80, TS and LF metrics can be derived from the use of the Norwegian Electronics dual channel real-time analyzer and an IBM AT computer.

With regard to the speech intelligibility metrics, one is based on the earlier Articulation Index (RASTI) and the other is another time fraction measurement of sound energy, much like the above standards. The RASTI standard is based on the evaluation of the modulation reduction of the test signal at 500 Hz and at 2000 Hz, and includes consideration of background noise and early decay time.

The U 80 ratio is based on considering the early decay time and the early-to-late signal ratios, under the view that the early arriving signal is more important to intelligibility and the later portion is more detrimental.

The RASTI measurement can be made

via the Bruel and Kjaer RASTI test system, which incorporated both a transmitter and a receiver, or it can be made via the TEF analyzer. The U 80 parameter can be evaluated by the TEF analyzer via the Norwegian Electronics dual channel real-time analyzer.

Bibliography

Figures 1, 2, 7, 8 and 9: Ballou, Glen (Editor), *Handbook for Sound Engineers, The New Audio Cyclopedia*, pages 31, 29, 37, 37 and 35, respectively. Indiana: Howard W. Sams & Co., 1987.

Figure 5: Beranek, Leo L. (Editor), *Noise & Vibration Control*, page 565. New York: McGraw Hill, 1971.

Figure 6: Bruel & Kjaer Instruction Manual "Speech Transmission Meter Type 3361 Consisting of Transmitter type 4225 and Receiver Type 4419," 1986.

Figure 3 and 4: Egan, James P., and Harold W. Hake, "On the Masking Pattern of a Simple Auditory Stimulus," *ASA Journal*, vol. 22, pages 623 and 625, respectively. (1950).

Part two of this article will discuss measurements from these devices, the test systems and the benefits of the results of these types of tests. Also, we will look at the laboratory testing being performed by Floyd Toole of the National Research Council/Canada related listening room user preference tests. Finally, alternative analyses of evaluations with more common test systems will be reviewed.

Steven J. Orfield, a Minneapolis consultant, has been involved with architectural technology consulting for 15 years and practices in the fields of acoustics, audio, lighting, daylighting and thermal environment. He is a member of ASA, AES, ANSI, ASTM, IES and IFMA, and is on the ASTM E-33 Committee on Environmental Acoustics. ■

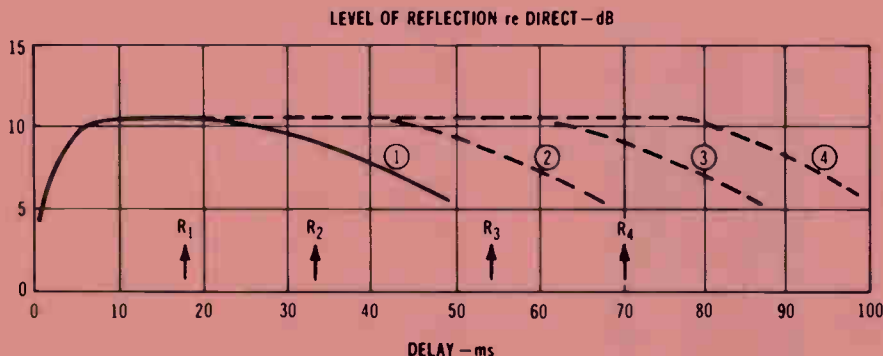


Figure 8

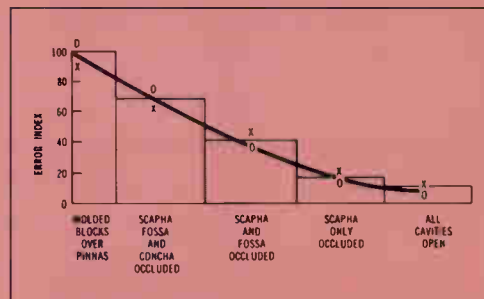


Figure 9

Effective.

CS Series speakers put new efficiency in sound reinforcement.

Introducing four new high-efficiency ceiling speakers. Speakers that offer what contractors tell us they want—high quality at a reasonable price.

Close tolerances, select materials and precision assembly methods fill the need. With reduced power requirements—especially significant in large installations. And a smoother, less peaky midrange—CS Series speakers often require no EQ.

What's more, the universal transformer option on both 4- and 8-inch models permits installation in systems with 25-, 70.7- or 100-volt lines. Complete and accurate spec sheets are another plus, featuring helpful guidelines for proper system design.

Put our new CS Series speakers to the test. Compare them with any others. Your decision should be easy. And effective.

The CS Series—pro quality in commercial sound from:

 **University
Sound**TM
a MARK IV company
600 CECIL STREET
BUCHANAN, MICHIGAN 49107
(616) 695-6831



Circle 212 on Reader Response Card

PRODUCTS IN REVIEW



Ashly Audio Introduces Gated Compressor

Ashly Audio Inc. has introduced a new addition to its line of Limiter/Compressors, the model CG-85 Gated Limited Compressor. The new unit combines the signal handling and transparent sound of previous Ashly units with a new detector section that incorporates gated release. An internal gate monitors the audio signal and interrupts changes in gain during periods of silence. For example, as an announcer is speaking, a conventional compressor would begin to increase gain whenever there is a pause resulting in pumping and modulation of background noise. The CG-85, however, will distinguish between actual

changes in program level and the absence of program (pauses). During such a pause, the CG-85 locks the gain at its current level and waits for the next audio signal before deciding whether to increase or decrease gain. The result is a decrease in pumping and breathing without sacrificing accurate level control.

Circle 6 on Reader Response Card



Altec Lansing Introduces Programmable EQ System

Altec Lansing Corp. has announced

“The Programmable Equalizer System.” This new system is comprised of five new products, two equalizers and three controllers, that working together constitute a complete programmable equalizer system. The equalizer products are: the 8551A 28 Band/Single EQ Programmable MicroAudio Equalizer and the 8558A 28 Band/Multiple EQ MicroAudio Equalizer. The controllers are the 8051A MicroAudio Autoprogrammer, the 8055A MicroAudio Programmer, and the 8061A MicroAudio PC Computer Control Adapter with Acousta Graphic™ Software.

The controllers include the 8051A MicroAudio Autoprogrammer is a full-featured control unit. It provides a 1/3 octave equalizer, a controlled real time analyzer, a microprocessor, and a pink noise generator. This unit may be left in a system if desired but is usually used by the installer to set up one of the stand-alone equalizers permanently installed in the system.

The equalizers include a stand-alone, 1/3 octave equalizer, the 8551A 28 Band/Single Memory MicroAudio Programmable Equalizer, which has a nonvolatile memory so even if the AC power goes off, the settings programmed into the equalizer are “remembered.” The unit is connected to one of the controllers (8051A, 8055A, 8061A) only during the programming process.

The Altec Lansing programmable Equalizer System is tamperproof, has multiple memory EQ with read/write capabilities and is quiet with noise floors below -90 dBm.

Circle 7 on Reader Response Card



Atlas/Soundolier Introduces CCTV Accessories

Atlas/Soundolier has introduced a selection of positioning equipment

Stay on top of this industry by using the BLUE BOOK the only complete reference guide for sound contractors

**Contact:
Deborah Droge
Circulation Department
25 Willowdale Avenue
Port Washington, NY
11050**

Introducing the New Generation of Wireless Microphones from HME.



All New RF Link. All New Switching Diversity. All New Packaging. And Unbeatable Sound.

HME's new Series 50 is so advanced that anything else is a compromise.

Here's just a few highlights:

A completely new RF link greatly improves the capture ratio for dropout-free performance under the most demanding conditions. Our new state-of-the-art noise-free switching diversity system has broken the price/performance barrier.

There's a new, rugged ABS body on the hand-held models, along with an advanced internal antenna with superb radiation characteristics. The new dual-frequency body pacs give you top

performance under physical as well as electrical abuse.

HME's new NRX II™ noise reduction system has to be heard to be believed. It's the only noise reduction system designed *expressly* for wireless microphones. And it's available only in HME's New Generation Series 50, both hand-held and body pac.

See your HME dealer for the final shock:

You'll find HME's Series 50 price *below* every other professional system. That's because we're sure every thinking professional will standardize on it.

And why not. There's nothing even close.



HM ELECTRONICS, INC.

6675 Mesa Ridge Road
San Diego, CA 92121
(619) 535-6060

HME's New Series 50 Wireless Microphone—with NRX II™

No Equal. Nothing Close.

Circle 213 on Reader Response Card

World Radio History

and accessories for CCTV Systems consisting of six models of camera housings, eight camera mounts, various performance accessories and hardware adaptors.

Intended for the security market, industrial use, and application in educational and religious facilities, the new products will protect CCTV system-components and provide many practical advantages such as ready access for servicing and cost-efficient installation.

Circle 8 on Reader Response Card

Heliotrope's Message Repeater Needs No Tape

Heliotrope General has introduced the Delta-T™ TR-1000 Tapeless Recorder™. It enables eight or more messages to be recorded, programmed and played back by digital memory. Recording time can be 15 or 30 seconds or longer in length. The Speak-easy™ memory storage card overrides

a program with an instant message. Sample rates of seven, 14, 28 or 56 kHz are available. The message repeater is especially useful for safety, security and public address announcements.

Circle 9 on Reader Response Card



MicroAudio's PC 280 Interface Card

MicroAudio has announced the introduction of the PC 280 interface card which is an IBM PC compatible and allows interfacing of the entire MicroAudio line of products to the IBM PC and compatible computers. The PC

280 card reads information from and sends information to as many as 16 EQ PODs, the stand-alone blank panelled 1/3 octave equalizer. Multiple EQ PODs can be addressed and EQ settings changed by programmable sequential time code. The PC 280 card allows the operator to read RTA and EQ data from the MicroAudio 2800, store that information on a disk and provide hard copy.

Circle 10 on Reader Response Card

Amplifier Research's New RF Power Amps

Amplifier Research has expanded its line of ultrabroadband rf power amplifiers with two new models, both covering the frequency range of 100-1000 MHz.

Models 25W100M7 and 10W100M7 deliver 25 watts and 10 watts minimum, respectively.

Circle 11 on Reader Response Card

(continued on page 68)

Special Memo: New IED
6000 Series Power
Amplifier!

*The Smallest, Lightest,
Most Efficient amplifier
per watt in the market!*

A new concept of Plug In Power Amplifiers:
- Class D operation, combined with integral switching-mode power supply
- 200W - 70 Volt - 25 Ohm
Active Balanced Floating Output

- ☑ **SIZE:** 8 amplifiers in one 7" high standard rack unit
75% SAVINGS IN SPACE REQUIRED
- ☑ **WEIGHT:** One pound of weight produces 50 Watts of power!
- ☑ **EFFICIENCY:** 83% at 200 WATTS OUTPUT
- ☑ **SAVINGS IN POWER REQUIRED - INITIALLY & CONTINUOUSLY**
"Let the customer pay YOU - instead of the power company!"

For more details call
Tom Roseberry at
Innovative Electronic
Designs, Inc.
(502) 267-7436.



Circle 236 on Reader Response Card



**SUPPLIER
OF
INTERCOMS
AND
ELECTRONIC
WIRES**

Call toll free
1-800-247-9099



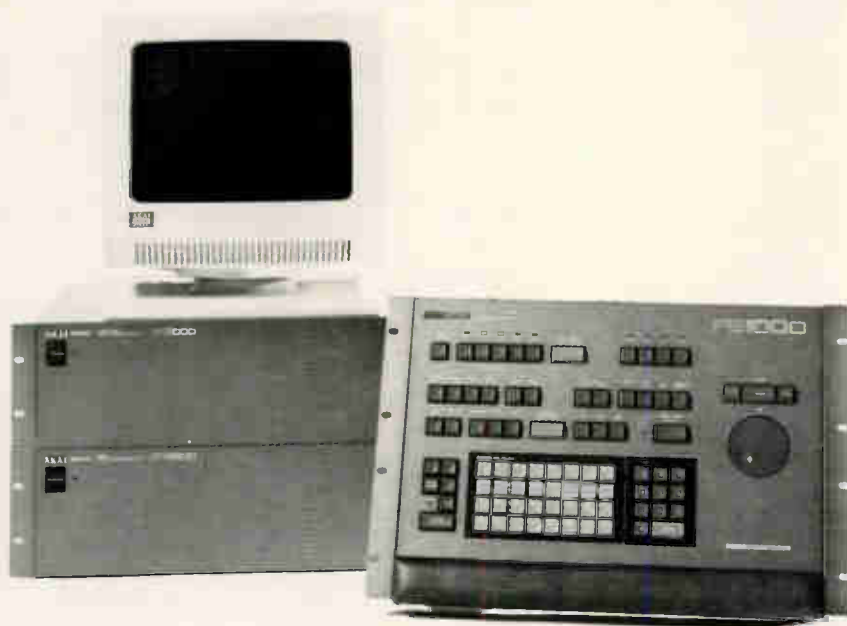
**TAPPAN WIRE
• CABLE, INC.**

256 OAK TREE ROAD,
TAPPAN, NY 10983

Circle 240 on Reader Response Card
Sound & Communications

a closer look

by gary d. davis



In the past, we've prepared this column after examining press releases that were submitted to the magazine, and generally after telephone discussions with representatives of the manufacturer whose equipment was being reviewed. Starting with this issue, we are taking an even closer look; we are also examining the sales literature (spec sheet and/or catalog) and the operating manual for the equipment. We feel that the information provided to the user—how to install and use the equipment—is very important. The evaluation of the quality and usefulness of such documentation is solely the opinion of this reviewer. Once again, we must qualify all our comments by reminding you that we are reviewing only the represented features, functions and performance; we do not actually use or test equipment for the purpose of preparing this column. That caveat aside, we hope the expanded coverage will prove useful to our readers. [Note: If you're a manufacturer wishing to submit products for review in "A Closer Look," you'll save time by including the spec sheet and manual(s) with the press release you send to us. Preliminary documentation is OK, but should be identified as such.]

Akai's New Digital Patchbays

A new product line of Digital Patchbays was shown at the AES show in New York by Akai Professional. These sophisticated patching systems will bring automated control, with SMPTE lockup, to patching systems for the first time. Each system is controlled by a computer that automatically routes all signal paths. The DP Series Digital Patchbays are available in both audio, and audio/video configurations.

The DP3200 is a 32 input/32 output audio patching system designed to work with balanced line systems. The use of buffer amplifiers allows any number of inputs to feed any number of outputs. Connections are made by multicable which can be terminated in either balanced XLR connectors or balanced phone connectors. A studio can also wire their own connectors to terminate in the multicable. The DP3200 has 64 built-in memory banks for storing patch patterns for the connections and switching of up to 640 patterns. Memory banks are backed up by battery. Multiple DP3200's can

be connected together by using the Control In/Through and AUX-CH jacks. All patch pattern switching is controlled by the PG1000 Programmer.

The DP2000 is a combination audio and video matrix patchbay. It accepts up to 16 balanced audio and 16 composite video signals, and outputs them to 16 audio outputs and 16 video outputs. The DP 2000 shares the same audio specs as the DP3200, with 64 memory banks and pattern switching with up to 640 patterns. Connections and switching of video signals is performed by blanking switching. A GEN LOCK IN terminal makes external synchronization possible with a sync generator. Distribution amplifiers allow each video input to feed multiple outputs.

The DP2000 has many uses in the field of professional video. It can be as an automated switcher for cameras, VTR's and video effects generators for video production. It can be used as a high performance distributor for dubbing or copying video software. It can control up to 16 video screens for use in multi-display systems and security systems.

Each DP Series Digital Patchbay consists of the DP modules, the PG1000 Patchbay Programmer, and MZ1000 color monitor display. Audio connections to the DP3200 and DP2000 are made with the X1064 or PIO64 XLR phone audio junction boxes. Connectors can also be custom wired by the studio. Video connections are all 75 ohm BNC connectors.

The PG1000 Patch Bay Programmer is the heart of the Digital Patchbay system. It is a dedicated computer for controlling all switching and synchronizing functions of the Digital Patchbay system. It can control up to four DP2000/DP3200 units at a time. The system software is contained on an IC ROM card, making system expansion very easy. The PG1000 has a built-in SMPTE generator/reader for

(continued on page 64)

TOA: A family with integrity.

In only a few years, Toa Electronics, Inc., has quietly grown to become a market leader in the commercial sound business. To sound contractors, specifying engineers and other audio professionals—in the U.S. and around the world—the name Toa has become the ultimate assurance of qual-

ity, reliability and integrity. This is because our family of communications products has proved itself to be durable and versatile in thousands of installations, from

airports to night clubs, from church halls to stadiums. Toa equipment provides the value and performance your customers expect in a professional installation. With our hundreds of different products, you have the flexibility to tailor individual solutions in public address, profes-

sional audio, and internal communications applications. And the Toa family continues to expand. A new line of security products was recently introduced, and an innovative wireless communications system is soon available. Our reputation for ultra-reliable, high quality

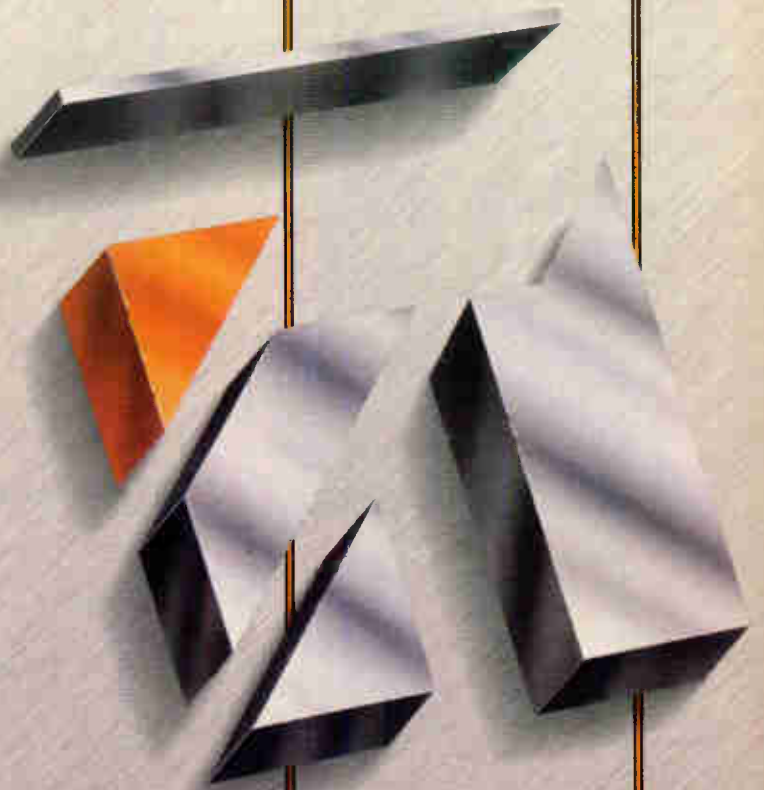


communications equipment is backed by half a century of expertise. In the next half century, we'll be there when you need us.



For more information, talk to your local Toa representative, or call us at (800) 843-4750, in California (800) 632-2157.

Toa Electronics, Inc.
480 Carlton Court
South San Francisco
California 94080
(415) 588-2538



Circle 217 on Reader Response Card

Toa Audio Inc., 50025 N. Royal Atlanta Dr., Tucker, GA 30087 USA
Tel: (404) 934-1851 Tlx: 293827 HLAD

Toa Audio

DATAFILE *info.sources/new literature*

Siedle's 1988 Full Line Catalog

Siedle's 1988 Intercom catalog provides photos, diagrams and product specifications on the company's products.

The 30 page color catalog shows intercom systems for home, apartments, professional offices and industrial applications. It includes the modular two wire intercom, video system and multi-door answering systems.

Circle 1 on Reader Response Card

NATA's Telecommunications Sourcebook is Available

The North American Telecommunications Association's 1988 Sourcebook is available. The Sourcebook contains an alphabetical listing of voice and data system manufacturers and suppliers; comprehensive geographical directory of interconnect contractors and the products they carry; cross reference of manufacturers with the contractors who sell, install, and maintain their products; and an overview of

companies providing financing, leasing, consulting, and publishing services to manufacturers, distributors and end users.

Copies are available from NATA. NATA members pay \$25 per copy, non-members \$35.

Circle 2 on Reader Response Card

Lectronic Research Labs New Catalog

Lectronic Research Labs has announced its new 224-page catalog for 1988. The catalog includes descriptions and prices for 6,000 items of new and used electronic equipment and microwave components. All preowned equipment is reconditioned and calibrated to meet original manufacturers' specifications and are warranted for 120 days.

Some of the manufacturers represented include: B&K, Buckman, General Radio, Fluke, Iwatsu, L&N, Narda, Sierra, Systron-Donner, Tektronix, and Waveline.

Circle 3 on Reader Response Card

Progressive Electronics 1988 Catalog

Progressive Electronics, Inc. has announced the release of its new 1988 catalog. The catalog pictures all of its telephone test equipment products in large full color photos. The catalog lists descriptions, advantages, features, and specifications of each product. A trade price list is printed on the rear cover for easy reference.

Circle 4 on Reader Response Card

Pomona Electronics Offers 1988 General Catalog

The 1988 edition of Pomona Electronics' catalog of electronic test accessories is now available.

The new catalog contains 128 pages, and describes and illustrates more than 840 test products, including 28 that are offered for the first time. Of interest to a growing number of electronic circuit design engineers is an expanded line of 33 accessories designed to test surface-mount devices.

Circle 5 on Reader Response Card



GOOD FOR THE LONG HALL.

You can search every auditorium in the world and not find sound equipment with more innovation and flexibility for less money, than Audio Logic.

Our R2D3 Digital Speaker/Room Delay Unit is one example. It's designed with three independent outputs, each capable of 0 to 327 milliseconds of time delay, with minimum increment of 20 microseconds.

The R2D3 expands easily to 1.307 of delay



R2D3 Digital Speaker/Room Delay Unit. Price: \$799.95

time at a full 20 Hz to 20 kHz bandwidth, ± 0.5 dB. Setup is so quick and accurate, all you do is input the distance value

and it calculates the rest.

Check out Audio Logic's complete line of quality sound contractor products. You'll find we've got more to offer than a triple bill at the Garden.

© 1987 DOD Electronics Corporation. Manufactured in U.S.A. For specifications, contact Audio Logic, 5639 So. Riley Lane, Salt Lake City, Utah 84107 (801) 268-8400.

AL
AUDIO LOGIC

Circle 230 on Reader Response Card

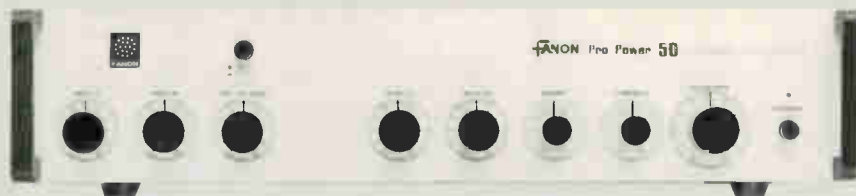
PRO POWER SERIES.. PROFESSIONAL PA and BACKGROUND MUSIC AMPLIFIERS



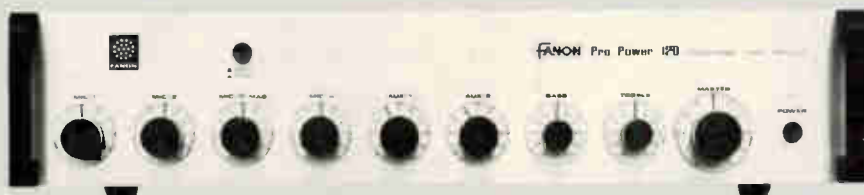
PRO-20T



PRO-40T



PRO-50



PRO-120



PRO-T

- Professional, rugged P.A./ Background music systems
- Built-in custom features
- Balanced or unbalanced, high or low impedance microphone inputs. No matching transformers required.
- ALL CANNON lock-in microphone connectors
- *TRUE RMS* Power ratings
- Efficient integrated circuit construction. Lowest noise microphone preamps in any P.A. line
- Rack Mount construction
- Overload Protection built in
- Equalizer Input feature in all models except PRO-20T
- Up to *FOUR* Microphone inputs
- **PRIORITY PAGING** Feature
- AM-FM Tuner accessory unit (Model PRO-T)
- Background Music AM-FM Tuner built-in (Models PRO-20T, PRO-40T)
- Phone-type jacks for speaker connections
- Traditional Fanon Quality construction and advanced engineering
- Full Fidelity—Factual, guaranteed specifications
- Custom Styling
- "Soft Gold" Anodized front panels
- Four step-up Power Ratings: 20 watts, 40 watts, 50 watts and 120 watts.
- More Watts per dollar

FACES AND PLACES



**FRED
FREDERICKS**

Fred Fredericks Becomes TOA's Dir. of Marketing

Fred Fredericks has become the new director of marketing for TOA. Fredericks comes to TOA from Purvis Systems Inc. where since 1985, he had been a senior engineer specializing in marketing and communications engineering.

Fredericks also worked for Bruel & Kjaer, Gray Sound, and Communications Company, Inc., and in 1982 he founded BDC Inc., a computer engineering firm specializing in the design and installation of local area networks. It was after selling his interest in BDC that he joined Purvis.

QSC Expands, Renovates Manufacturing Headquarters

QSC Audio Products has expanded and renovated its Costa Mesa, CA, headquarters. The expansion includes newly leased office space to house the sales and marketing departments.

Manufacturing improvements started with major building renovation encompassing lighting, electrical, painting and flooring. A major investment in material handling equipment has improved material storage and flow, leading to reduced labor and waste.

REP NEWS

Jones Audio Sales, a manufacturer's representative has appointed **Duke Ducoff** as sales representative. Based in Houston, Ducoff will cover South Texas, Louisiana and Mississippi.

Rebel Audio Pty Ltd. has announced the appointment of **Penn Fabrication** as its agent for Victoria and Tasmania. Penn, owned and operated by **Mark Dryden** and **Tony Hosking**, imports and distributes a

range of case hardware for TV, video, film and instrumentation.

Jeron Electronic Systems Inc. has appointed the following firms to represent its line of nurse call, voice communications and signaling systems: **Silver Peak Marketing, Ltd.**, of Wheat Ridge, CO, to cover Colorado, Utah and Wyoming; **Meyer Marketing** of Deerfield Beach, FL to cover Florida (excluding West Florida, Liberty and Franklin Counties).

EKTACOM G



Many call it the world's best direct-select intercom. This premium quality system has been proven in thousands of installations. Six to 1,000 key masters; all light annunciation; solid gold switch contacts; 4" speakers; 45 ohm, balanced lines; plug-in 25 pair cables; in and out volume controls; solid state T/L muting and compression; desk, flush or rack mounting; UL Listed power supplies. Many options including central and group paging; parallel call from one remote to multiple masters; master-to-master annunciation; 11 watt RMS output. The G is used by all branches of the Government from Walter Reed Hospital to the USS Enterprise. Two year Factory warranty.

**FISHER
BERKELEY
CORPORATION**

5800 Christie Ave., Emeryville,
CA 94608 (415) 655-9696

You should know more
about EKTACOM G!
Write Today!

► S&C JOB REPORT ►

Are you a consultant with a job coming up and are looking for a qualified contractor?

Sound & Communications

Job Report

is the place where these qualified people will see it and respond. Send your

Job Report

information to:

Debra A. Pagan

Managing Editor

Sound & Communications

25 Willowdale Avenue

Port Washington, NY

11050



SOUND & COMMUNICATIONS

QUICK
PRODUCT
INFORMATION
GUIDE

SOUND & COMMUNICATIONS DECEMBER 1987 QUICK PRODUCT INFORMATION CARD

NAME: _____ TITLE: _____
 COMPANY: _____
 STREET: _____
 CITY: _____
 STATE: _____ ZIP: _____
 TELEPHONE: () _____

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 Are you a subscriber to Sound & Communications?
<input type="checkbox"/> Yes <input type="checkbox"/> No | 6 Architect/Designer |
| 2 Primary Job Function (only one):
<input type="checkbox"/> A Management/Owner
<input type="checkbox"/> B Engineering/Technical Mgt
<input type="checkbox"/> C Sales/Marketing
<input type="checkbox"/> D In-House Maintenance/Service
<input type="checkbox"/> E Field Installation/Maintenance
<input type="checkbox"/> F Consultant
<input type="checkbox"/> G Advertising/Promotion
<input type="checkbox"/> H Other | 7 Engineering/Acoustical Consulting
8 Maintenance/Service
9 Dealer/Distributor/Rep
M Manufacturer
O Other |
| 3 Primary business of company (only one):
<input type="checkbox"/> 1 Contractor—Engineered Sound/Acoustical
<input type="checkbox"/> 2 Contractor—Interconnect/Intercom
<input type="checkbox"/> 3 Contractor—Fire/Alarm/Safety
<input type="checkbox"/> 4 Electrical Contractor
<input type="checkbox"/> 5 Pro Audio/Studio/Reinforcement | 4 Your purchasing authority:
<input type="checkbox"/> A Final approval/Buyer
<input type="checkbox"/> B Recommend/Specifier
<input type="checkbox"/> C No Direct Authority/User |
| | 5 Intensity of your product need:
<input type="checkbox"/> 1 Have salesman call
<input type="checkbox"/> 2 Need within 3-6 months
<input type="checkbox"/> 3 Future projects |
| | 6 Number of employees at your company:
<input type="checkbox"/> A 1-3 <input type="checkbox"/> B 4-10 <input type="checkbox"/> C 11-25 <input type="checkbox"/> D 26-100
<input type="checkbox"/> E over 100 |

EXPIRES 4/1/88

SOUND & COMMUNICATIONS DECEMBER 1987 QUICK PRODUCT INFORMATION CARD

NAME: _____ TITLE: _____
 COMPANY: _____
 STREET: _____
 CITY: _____
 STATE: _____ ZIP: _____
 TELEPHONE: () _____

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 Are you a subscriber to Sound & Communications?
<input type="checkbox"/> Yes <input type="checkbox"/> No | 6 Architect/Designer |
| 2 Primary Job Function (only one):
<input type="checkbox"/> A Management/Owner
<input type="checkbox"/> B Engineering/Technical Mgt
<input type="checkbox"/> C Sales/Marketing
<input type="checkbox"/> D In-House Maintenance/Service
<input type="checkbox"/> E Field Installation/Maintenance
<input type="checkbox"/> F Consultant
<input type="checkbox"/> G Advertising/Promotion
<input type="checkbox"/> H Other | 7 Engineering/Acoustical Consulting
8 Maintenance/Service
9 Dealer/Distributor/Rep
M Manufacturer
O Other |
| 3 Primary business of company (only one):
<input type="checkbox"/> 1 Contractor—Engineered Sound/Acoustical
<input type="checkbox"/> 2 Contractor—Interconnect/Intercom
<input type="checkbox"/> 3 Contractor—Fire/Alarm/Safety
<input type="checkbox"/> 4 Electrical Contractor
<input type="checkbox"/> 5 Pro Audio/Studio/Reinforcement | 4 Your purchasing authority:
<input type="checkbox"/> A Final approval/Buyer
<input type="checkbox"/> B Recommend/Specifier
<input type="checkbox"/> C No Direct Authority/User |
| | 5 Intensity of your product need:
<input type="checkbox"/> 1 Have salesman call
<input type="checkbox"/> 2 Need within 3-6 months
<input type="checkbox"/> 3 Future projects |
| | 6 Number of employees at your company:
<input type="checkbox"/> A 1-3 <input type="checkbox"/> B 4-10 <input type="checkbox"/> C 11-25 <input type="checkbox"/> D 26-100
<input type="checkbox"/> E over 100 |

EXPIRES 4/1/88

NEW PRODUCTS: 43 60 77
 (Please Circle) 44 61 78
 45 62 79

1	15	29	46	63	80
2	16	30	47	64	81
3	17	31	48	65	82
4	18	32	49	66	83
5	19	33	50	67	84
6	20	34	51	68	85
7	21	35	52	69	86
8	22	36	53	70	87
9	23	37	54	71	88
10	24	38	55	72	89
11	25	39	56	73	90
12	26	40	57	74	91
13	27	41	58	75	92
14	28	42	59	76	93

ADVERTISING PRODUCTS:
 (Please Circle) 243 260 277
 244 261 278
 245 262 279

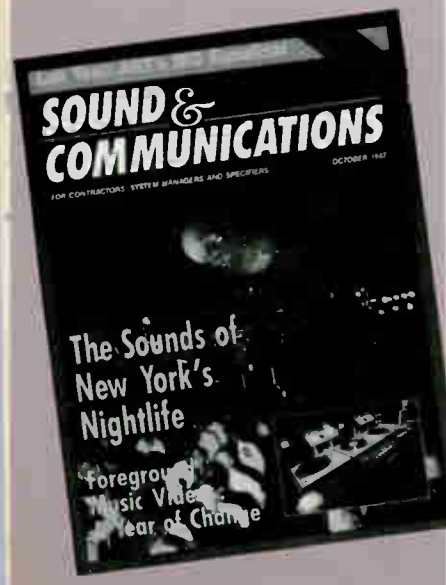
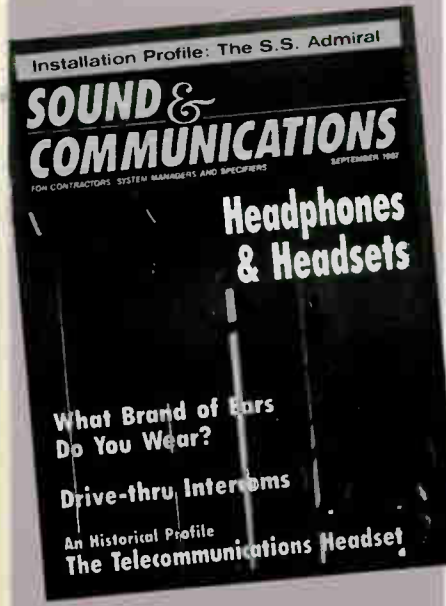
201	215	229	246	263	280
202	216	230	247	264	281
203	217	231	248	265	282
204	218	232	249	266	283
205	219	233	250	267	284
206	220	234	251	268	285
207	221	235	252	269	286
208	222	236	253	270	287
209	223	237	254	271	288
210	224	238	255	272	289
211	225	239	256	273	290
212	226	240	257	274	291
213	227	241	258	275	292
214	228	242	259	276	293

NEW PRODUCTS: 43 60 77
 (Please Circle) 44 61 78
 45 62 79

1	15	29	46	63	80
2	16	30	47	64	81
3	17	31	48	65	82
4	18	32	49	66	83
5	19	33	50	67	84
6	20	34	51	68	85
7	21	35	52	69	86
8	22	36	53	70	87
9	23	37	54	71	88
10	24	38	55	72	89
11	25	39	56	73	90
12	26	40	57	74	91
13	27	41	58	75	92
14	28	42	59	76	93

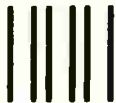
ADVERTISING PRODUCTS:
 (Please Circle) 243 260 277
 244 261 278
 245 262 279

201	215	229	246	263	280
202	216	230	247	264	281
203	217	231	248	265	282
204	218	232	249	266	283
205	219	233	250	267	284
206	220	234	251	268	285
207	221	235	252	269	286
208	222	236	253	270	287
209	223	237	254	271	288
210	224	238	255	272	289
211	225	239	256	273	290
212	226	240	257	274	291
213	227	241	258	275	292
214	228	242	259	276	293



SOUND & COMMUNICATIONS

IT'S NOT JUST A MAGAZINE...
IT'S AN INDUSTRY



Place
Stamp
Here

TESTA COMMUNICATIONS

***SOUND &
COMMUNICATIONS***

25 Willowdale Avenue
Port Washington, NY 11050



Place
Stamp
Here

TESTA COMMUNICATIONS

***SOUND &
COMMUNICATIONS***

25 Willowdale Avenue
Port Washington, NY 11050



THEORY

(continued from page 16)

setup where both signals are in the noise floor of the instruments. Note the large spikes whose coherence is near 1.0. These are due to correlated noise between the inputs. Figure 7 shows the coherence when noise is present on the output. An ILG (broad-band, calibrated acoustic white-noise source) is used next to the speaker. This signal is independent of the test signal and it is not casually related. Hence noise is present at the output and the coherence is lowered accordingly by theory which is beyond the scope of this article. In a simple case, if the noise at the input and output is about the same as the magnitude of the signal, the coherence will be about 0.5 for this test, the general level due to the speaker by itself is about the same as the level of the ILG source at the measurement location by itself. The coherence is observed to be about 0.5 as expected.

This article shows that a transfer function can be measured quickly with white noise. Quality control is monitored with the coherence function. Measurements can be made in a

matter of several minutes or less over the entire audio frequency range with a simple test setup. Future articles will expand on this powerful tool and show how other useful results can be obtained with Fourier Analyzer and cross-spectral analysis techniques. ■

CONSULTANT'S COMMENTS

(continued from page 10)

simply review and correct it when necessary instead of having to generate it. As long as the corrections are limited to relocating equipment, there are no costs involved. If, however, the consultant and the contractor disagree on the number of racks to be used, there is a cost difference involved and a question of who bears these additional costs. Therefore, the owner must be made aware that there will be some decisions to be made along the way that may affect appearance, function, user interface and especially cost.

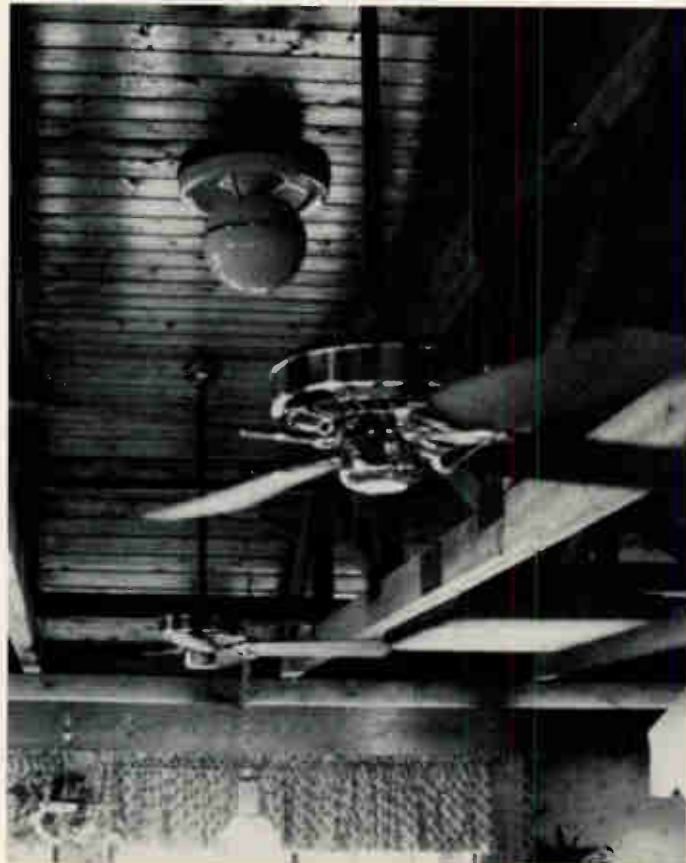
A contractor has a distinct advantage in an outline specification if he has done work for the consultant before, or if he is at least familiar with the

design philosophy or equipment preferences of the consultant. Because of this, bidding on an outline specification is not necessarily straightforward. It depends strongly on whatever the owner and consultant are looking for—the lowest cost, best design proposal, or best price to performance scale. More evaluation of the bids are required than for a design specification.

Because of this, a frequent strategy is for a consultant to recommend a particular contractor that he is sure can do the job correctly and adequately. The consultant can then draw up an outline specification and be confident of its success. Many owners are very comfortable with the zone one movement of an independent consultant and a local recommended contractor, rather than getting involved in the unpredictabilities of bidding. There is a distinct advantage if the process can save some of the owner's budget as well by putting more money into equipment and less into design fees.

The outline specification is advantageous in many situations, particularly for lower budget projects. The contractor should be aware that in addi-

BURGER KING HAS MUSIC "THEIR WAY"



Functional Communications Corp., the Muzak affiliate in upstate New York, serves the business areas of Rochester, Albany and Syracuse, NY. They provide background and foreground music for a broad spectrum of retail, restaurant, and industrial locations.

Wendell Martin, Vice President of Engineering for Functional Communications Corp., has designed the Muzak background music system for many BURGER KING Restaurants. Reviewing the drawings at the S. Salina Street, Syracuse location he concluded that using standard loudspeakers would require the need to install six units. However, Wendell determined that one Soundsphere #110 in the center of the dining area would do the job effectively.

Choosing a sandtone color, the speaker blended in with the wooden ceiling decor. By utilizing one speaker unit, a cost saving was effected in materials and labor. When asked about the Soundsphere #110, the manager stated, "It's the best Burger King I have been in for even background music."

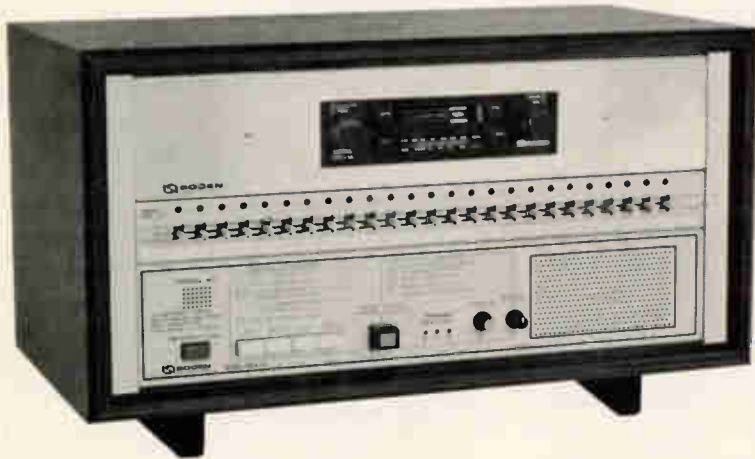
FCC has also used Soundspheres in the main terminal building at Syracuse Airport and the Danbury Fair Mall in Connecticut. John Romig, President of FCC, stated "Soundsphere equipment is an effective tool for acoustically challenging environmentsthat means business!"

Write or call direct for further information.

SOUNDSPHERE A PRODUCT OF
SONIC SYSTEMS, INC.

737 Canal Street • Bldg 23B • Stamford, CT 06902 • USA • Tel (203) 356-1136

Why Bogen's SI-35 Control Center Can Make Sales That Others Can't



Even the most critical customer will see unsurpassed values when comparing the SI-35 to others:

- Desk-top capacity for 75 staff stations
- FM/AM tuner can be built-in with 50 staff switches, or tuner/cassette player combination with 25 switches
- Handsome executive-style cabinet
- Surprisingly low cost

A superb intercom, paging, and background music center for schools, institutions, or commercial establishments, the SI-35 features simple, color-coded instructions right on the panel for easy operation. Dual channels, 8-watt intercom and 35-watt program, permit simultaneous use and effective levels. Push only one button for emergency announcements. Staff calls are annunciated by tone and light. Terrific? The SI-35 is only one model in a whole new line of very saleable control centers serving from 25 to 250 staff stations. For full information, just use the coupon below.

BOGEN®

COMMUNICATIONS, INC.

50 SPRING STREET, P.O. BOX 575, RAMSEY, NJ 07446 • (201)934-8500

Please send information on your new control centers.

NAME _____

TITLE _____ PHONE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Circle 222 on Reader Response Card

tion to construction, his responsibilities include additional design work. To remain profitable, the contractor must consider and include the cost of this work in his proposals. ■

CLOSER LOOK

(continued from page 53)

syncing the patch pattern switching. It can also be synced with MIDI, or put under external computer control with the RS232 port. Patch connections are made on the screen, and can then be automated through a sequence that is synced to SMPTE. This information is retained by battery backup, or can be saved to the optional 3.5-inch floppy disk drive. Data including bank and chain lists, pattern editing, and time editing can be printed out on a Centronics standard printer for hard copy use.

Comments: Akai's new PG1000/DP2000/DP3200 digital patch bay system is, so far as I am aware, a unique set of products. It is now possible to rearrange the interconnection of various audio and video equipment in a pre-programmed, automatically or manually synchronized fashion. A portion of this function could previously be performed by the automation system within certain sophisticated audio mixing consoles or video switchers, but not in a stand-alone product. Given the proliferation of MIDI-controlled synthesizers and effects devices, SMPTE time code controlled audio and video tape machines, and of course SMPTE controlled film chains, there would seem to be a place for this type of product. So, we would commend Akai for breaking ground in a new area of growing importance.

We should point out, however, as to the details of Akai's implementation. For one thing, the PG1000 programmer (which is necessary to set up either the audio or audio/video patch bay) is a complex device. One must first name the various "banks" of patches, along with dates, who they "belong to" and so forth. Then one must define the actual connections (this is akin to labeling the patch bay, which need be done only once so long as the equipment connected to the system remains the same). Then one must define the individual patches within each "step," the steps within each "bank" and how various banks may or may not "chain" together.

Finally, it is necessary to enter information as to when the changes (from step-to-step and bank-to-bank) will occur, either in terms of SMPTE code (H/M/S/F) or MIDI events. The visual representation of the actual patches, as displayed on the *optional* video monitor (we would consider it an essential part of the system, not an option) does not resemble a familiar patch bay with cables, but instead is a lot of type in boxes.

While we have not used the system, the operation will be less-than-intuitive—from what we can see on the manuals. Nor do the manuals help tremendously. First, we would have liked to see a single manual that discussed the entire system. Instead there are three: one for the DP2000 patch bay, one for the DP3200 patch bay, and one for the PG1000 programmer. They are skimpy manuals, without useful tutorials, without indices, and without a useful overview of what tasks are to be accomplished (there are no realistic applications notes). For example, we are told that banks can be copied, but not why we might want to do so. Similarly, we are told how to connect a printer, but nowhere does

the term “edit decision list” appear. A lot is assumed about one’s knowledge of MIDI and SMPTE codes, and about why patches might be useful. These manuals were produced and printed in Japan, and do not really speak to the U.S. reader. Consequently, one is left without a clear impression of how the system may perform, or why it does what it does.

We suspect that nobody was minding the store when they printed spec for audio input impedance as “5 ohms” in both the DP3200 and DP2000 manuals. Maximum output level is spec’d at “+24 dB” without reference to dBu, dBm or impedance; given that the output spec is 100 ohms, we’ll assume that the output can drive 600 ohms so this is +24 dBm spec (but we’re not certain). The video specs look respectable, with 10 MHz bandwidth, 1V p-p level into a 75 ohm circuit, and 40 dB worst-case crosstalk at 3.58 MHz.

Regardless of how reliable the circuitry may prove to be, this non-fail safe design may present a philosophical stumbling block for production facilities where the whole studio will go down if an electronic module fails.

Plug-and-jack audio patch bays may lose a cable or jack from time to time, but not an entire bank of them. On the other hand, the time you will certainly save may outweigh the risks. Also, the balanced circuits have 50 dB common mode rejection at 1 kHz, which is good, but still allows an opportunity for a lot of noise to get in, in contrast to a hard-wired bay. (The high frequency CMRR and crosstalk are not specified, and with high frequency SMPTE code, MIDI codes and/or video signals around, we would like to know there is a lot of isolation from capacitive coupling!)

For most of you, however, these products will perform a function you simply could not achieve any other way, so the Akai digital patch bay systems deserve your *Closer Look*. ■

Circle 15 on Reader Response Card

LOOKING BACK

(continued from page 48)

ty Institute, a nonprofit crime research organization. Of the hospitals that responded only 14 percent had CCTV and 25 percent had electronic alarm systems. Those hospitals who didn’t

No moving parts—no maintenance required

Solid-state, Natural Voice Digital Message Repeater



Shown:
DMR cartridge
and main
frame.

The compact
DMR unit measures
only 8 x 4.8 x 2.4 inches.

An Underwriters Laboratories
recognized component.

MacKenzie’s Digital Message Repeater (DMR) is ideal for:

- | | |
|----------------------------------------------|---------------------------------------------------------|
| <input type="checkbox"/> Fire alarm messages | <input type="checkbox"/> “Watch your step” messages |
| <input type="checkbox"/> Voice evacuation | <input type="checkbox"/> Rental car return instructions |
| <input type="checkbox"/> Fireman’s return | <input type="checkbox"/> Sound effects |
| <input type="checkbox"/> “Code Blue” | <input type="checkbox"/> Dark rides |
| <input type="checkbox"/> Parking warnings | <input type="checkbox"/> Exhibits and displays |

MacKenzie’s Digital Message Repeater is a revolutionary concept in repetitive sound. *No maintenance* is required because our all-solid-state DMR has *no moving parts*.

The DMR uses EPROM memory cartridges to store digitized recordings of human voices, music or sound effects. Upon demand, the digitized information is reconverted to analog and played to an audio output. The sound is *completely natural*—just like a conventional tape recording—and the audio quality is excellent. Messages are permanently stored and may be played repeatedly without loss of sound quality.

The DMR consists of the message cartridge and the controller main frame. The complete unit is very compact—only 8 x 4.8 x 2.4 inches. Standard message length is up to 60 seconds; longer message time is available. Models are available for multi-message random access. The DMR is an Underwriters Laboratories recognized component.

For more information about the DMR—including our new DMR record-play unit—call MacKenzie Laboratories toll-free at (800) 423-4147.

MACKENZIE MacKenzie Laboratories, Inc.

5507 Peck Road □ Arcadia, California 91006 USA □ (818) 579-0440

Circle 239 on Reader Response Card

have these systems rated them on the top five most wanted safeguards.

Sound 911 was a compact light weight air horn that was introduced by Falcon Safety Products. The horn came with a clip so that it could be fastened to a belt or shirt. Its sonic blast could be heard up to a mile away—how's that for a Bronx cheer?

**PLEASE
SEND**
*all your
contracting
company's
news to :*

*Contracting Close-up
Sound & Communications
25 Willowdale Avenue
Port Washington, NY 11050*

10 Years Ago . . .

In the December, 1977 issue of *Sound & Communications*

Among the new products introduced was a Sound Conditioner from Edmund Scientific Co. The Sound Conditioner masked unwanted noise while adding such restful sounds as the ocean surf, falling rain, and a rushing waterfall. Efforts by bosses to persuade employees to accept the devices instead of a week in Hawaii failed.

In the Second Economic Roundup, the overall picture "reflected an industry that has not lost ground in spite of inflation, inertia, and all the many other ills plaguing the national economy during the past year."

5 Years Ago . . .

In the December, 1982 issue of *Sound & Communications*

Among the new products was the Woodline II from Microcommunication. The Woodline was a telephone of hand-crafted oak or walnut that

featured the dial in the base. This permitted a special keyswitch to be included that offered such options as memory, toll restrict and last number redial. No, the company didn't give away a can of termite spray as a promotion.

The Economic Report once again showed that the sound and communications industry was healthy. Audio product sales were up 8 percent; three dominant PBX's producers registered an increase of sales of 20 percent and radio sales were up 25 percent. ■

QUALITY FILM

(continued from page 28)

speakers were raised; these adjustments completely alleviated the room resonances at 250 Hz and the dialog was pronounced exceptionally intelligible in all parts of the the room including the balcony! The wide dispersion characteristics of the 802's were responsible for good intelligibility not only in the center of the theatre where the speakers were ostensibly aimed, but also in areas traditionally off-axis in horn systems as well as the large


SURVICOMM

**MICROPROCESSOR
CONTROLLED
NURSES CALL SYSTEMS**



**Stay on top of this industry by using the
BLUE BOOK
the only complete
reference guide
for
sound contractors**

**Contact:
Deborah Droge
Circulation Department
25 Willowdale Avenue
Port Washington, NY
11050**

Multi-Vox 

9967 BLVD ST-MICHEL,
MONTREAL, QUE.
CANADA H1H 5G7
TEL.: (514) 321-3131

Circle 238 on Reader Response Card

balcony.

Comments from attendees to the festival were uniformly consistent; audience members in all portions of the theatre found the sound to be lifelike, dynamic, and having exceptional clarity. Most were surprised to find out that the system was so compact; the system required only 16 inches behind the screen and uses loudspeakers that are one-tenth the size of traditional cinema systems.

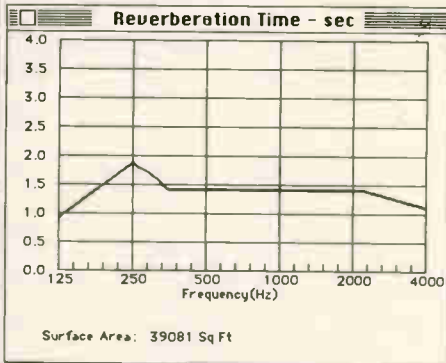


FIGURE 5: Reverberation table for Ryerson Theatre showing increased reverberation at 250 Hz.

We were happy to have the opportunity to demonstrate the system to such an enthusiastic and knowledgeable audience and are confident that the festival organizers will benefit from their commitment to provide state-of-the-art entertainment from around the world.

Brian L. McCarty is a production sound technician in Hollywood; his credits include "Footloose," "Sweet Dreams," and "On Golden Pond." McCarty has been working as a consultant for BOSE in the cinema area for over three years as the cinema system was conceived and designed by BOSE engineers, and holds the title "Cinema Evangelist" in his position with BOSE Professional Products Division. ■

CLASSIFIEDS GET RESULTS

For rates and
information,
please call
(516)767-2500

MOVING?

ATTACH MAILING LABEL HERE

Please enter your new address

Name _____

Address _____

City _____ State _____ Zip _____

Return to: Sound & Communications
25 Willowdale Avenue, Port Washington, NY 11050



Remember 2 new 515/588 dual-Z models and forget 11 old ones.

Shure just made the most popular low cost dynamic mics in the industry easier to stock and sell. Each now features a unique 3-position on/off switch so your customer can use the mic in high or low impedance applications without rewiring or opening the mic case. The new configuration also allows you to meet nearly any customer need with just two models versus the eleven old ones they replace.

The new 515SD-LC and 588SD-LC dual-Z mics give customers added flexibility to plug into any sound equipment from a sophisticated PA system to a guitar amp.

We've also made other improvements. A new platinum beige finish blends better with wood podiums and doesn't reflect lights. The 515SD-LC now comes with a 3-pin professional connector instead of an attached cable. And, of course, the 515 and 588 are both built to meet Shure's legendary requirements for ruggedness and reliability. All at a price competitive to off-shore models.

For more information, write or call Shure Brothers Inc., 222 Hartrey Ave., Evanston, IL 60202-3696 (312) 866-2553. G.S.A. approved.

SHURE

Breaking Sound Barriers for over 60 years™

PRODUCTS

(continued from page 52)

Bose Introduces Acoustimass™ System

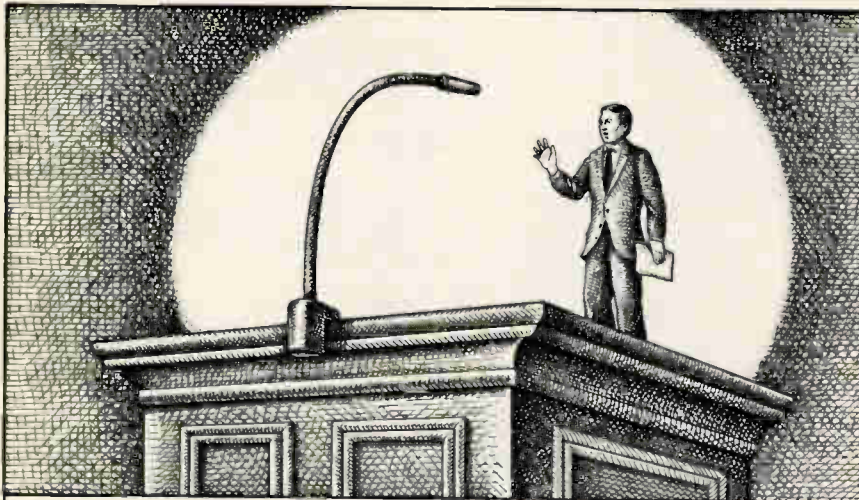
At a press conference at the Bose facility in Framingham, MA, last month, the company unveiled its Acoustimass™ professional powered speaker system.

The system is designed to simplify the audio reproduction process for professional musicians, sound contractors or anyone who needs top quality sound. The new Bose product combines new loudspeaker technology,

high-powered amplification and computer designed equalization in a single compact unit.

The Acoustimass™ Pro incorporates several patented technologies including: an Acoustimass™ bass reproduction system in which sound is launched into the room via two air masses rather than by a vibrating surface; a digital mode high power amplifier which uses two state modulation switching amplifier technology; and an ultra powerful low frequency transducer (woofer). ■

Circle 16 on Reader Response Card



Announcing the end of miniature mics that miniaturize sound.

The Shure SM98 is now available with gooseneck mount.

Building a small condenser lectern microphone isn't difficult. The challenge is building one that delivers low distortion, wide frequency response and the warmth and clarity of larger condenser mics.

The Shure SM98 does just that.

The secret is an innovative design that integrates the cartridge capsule with the outer case. It provides more uniform polar response for better isolation and smoother frequency response. The result—more natural sound.

The great sound of the SM98 is now available with a superior 18" gooseneck adapter, the new

A98-G18, that makes it ideal for use on lecterns and pulpits. To keep it looking better, longer (even after repeated adjustments), we've put the support tubing inside. The SM98 also includes a plug-in cable to speed setup, eliminate wiring and make it easy to detach the mic. An optional A98PF pop filter and mic locking collar are also available.

Nobody else builds a miniature condenser mic that sounds as good as the SM98. Or a gooseneck that works as well. But then, nobody has a reputation like ours to live up to.

For more information, write or call Shure Brothers Inc., 222 Hartrey Ave., Evanston, IL 60202-3696 (312) 866-2553. G.S.A. approved.

SHURE

Breaking Sound Barriers for over 60 years™

Circle 226 on Reader Response Card

Ad Index

RS#	Company	Page
	AKG Acoustics (203) 348-2121	13
224	ART (716) 436-2720	48
223	Atlas/Soundolier (314) 349-3110	56
231	Audio Digital (503) 687-8412	47
230	Audio Logic (801)268-8400	58
205	Audio Technica (216) 686-2600	23
216	BGW (213) 973-8090	15
222	Bogen (201) 934-8500	64
243	Bose (617) 879-7330	49
241	J.W. Davis & Company (214) 651-7341	10
215	DDA (516) 249-3660	30
201	Electro-Voice (616) 695-6831	C. II
214	Fanon-Courier (714) 669-9890	59
235	Fisher-Berkeley (415) 655-9696	60
233	Florence (312) 384-3310	46
220	Hill (404) 934-1851	57
213	HM Electronics (619) 578-8300	51
236	IED (502) 267-7436	52
202	IRP (312) 439-3600	C. III
207	JBL (818) 893-8411	5
228	MacKenzie (818) 579-0440	65
238	Multivox (514) 321-3131	66
219	Panasonic (201) 392-6688	1
204	Quam-Nichols (312) 488-5800	7
206	QSC (714) 645-2540	41
208	Rane Corp. (206) 774-7309	43
209	Samson (516) 489-2203	27
234	SCS (714) 554-0903	50
227, 226, 203	Shure (312) 866-2200	67, 68, C.IV
229	Sonic Systems (203) 356-1136	63
240	Tappan Wire & Cable (914) 359-9300	52
225	Tektone (305) 844-2383	16
218, 217	TOA (415) 588-2538	3, 54
212	University (616) 695-6831	45
221	West Penn Wire (412) 222-7060	22
211	Yamaha (714) 522-9011	29

CLASSIFIEDS

FREE 32pg Catalog & 50 Audio/Video Applic.

PHONO, MIC, TRANS, ACN, TAPE, VIDEO, LINE, OSC

Stereo/Mono Pwr Ampl.

8-in 2-out, 12-in 4-out, 16-in 4-out

Video & Audio Dist Amps. TV Audio & Recd Prod Consoles

OPAMP LABS INC (213) 934-3566
1033 N Sycamore Av LOS ANGELES CA, 90038

SESCOM INC.
"the audio source"

FOR ALL OF YOUR AUDIO NEEDS

2100 Ward Drive Henderson, NV 89015 U.S.A.

CALL TO RECEIVE A COPY OF OUR POCKET-SIZED CATALOG

CATALOGS & ORDERS: (800)634-3457

OTHER BUSINESS: (702)585-3400

TWX(910)397-6996

RJ31X JACKS & CORDS
WIRE & CABLE
UL-PLENUM-FIRE
"B" CONNECTORS, TIE WRAPS
DRIVE RINGS & PINS
ARROW STAPLERS
FASTENERS

CALL TOLL FREE

cabletronix

800-431-WIRE (USA)
800-942-WIRE (NY)

**PLEASE
SEND
all your
contracting
company's
news to :**

*Contracting Close-up
Sound & Communications
25 Willowdale Avenue
Port Washington, NY 11050*

**REGIONAL MANAGER /
PRODUCT SPECIALIST**
50K Opportunity

We are looking for two (2) experienced Regional Manager / Product Specialists with working knowledge of the MI-Pro and Commercial sound markets. Must have thorough knowledge of product applications in each market and the ability to effectively conduct product training seminars. Forward resume and salary history to:
Dept.S - P.O.Box 9944, Brea, California 92621

CUSTOM PANELS

Anodized aluminum, photo plastic, silk screened or engraved for control panels and connector termination. Rack rails, hardware and custom circuit cards.

PROTO-TEC - (815)744-7173
108 Fairlane Dr. Joliet, IL 60435

MANUFACTURER'S REP WANTED for our lines of telephone teleconferencing equipment, audio products and pre-wired patch panels. Technical background required. Send resume with current list of products represented to:

Gentner Electronics Corporation
P. O. Box 27647
Salt Lake City, Utah 84127-0647
(801) 268-1117

CLASSIFIEDS

- Regular Classified—\$52 per column inch.
- Marketplace Display—
25 percent off rate card (up to 1/3 page).

Classified listings are accepted up to the 25th of the month preceding publication.

Name _____
Address _____
City/State/Zip _____
Telephone _____
Credit Card # _____

Check Heading You Want

- SERVICES MISCELLANEOUS
- FOR SALE SITUATIONS WANTED
- FOR RENT HELP WANTED

Please send copy & payment to:

Sound & Communications Classifieds
25 Willowdale Avenue, Port Washington, NY 11050
TELEPHONE: (516) 767-2500

Coming in
January...

is Part II of the **Sound & Communications Loudspeaker special pull-out section. With so many types of loudspeakers on the market, it becomes difficult to select the right one for the job. This comprehensive, 16-page guide provides the sound contractor with a diverse selection of equipment to choose from. The guide, which includes such topics as loudspeaker components and paging horns, will come in handy for your everyday needs.**

Also look for articles on these topics in January:

Alarm Technology

The CCTV System Solution

Psychoacoustics, Part II

The Automatic Operation of a Cathedral Sound System

The January 1988 issue of Sound & Communications—Start Off the Year Right.

TECHNICALLY SPEAKING

Epilogue '87

Once again it is time to say good-bye to an old year, and welcome the new. As we leave '87 behind us, we reminisce on the epochal events marking their place in this one slice of history. It was a year of mergers, new startup companies, and strong growth in new technologies. It is hard to say where we are on the digital curve of the allied communications fields, but, one thing is for sure—digital technology is here to stay.

Digital stories aside, we have seen many technologies enhanced by the use of the word 'smart.' Other industries have borrowed this term from our illustrious cadre of scientists with the introduction of smart windows, smart home appliances, smart auto suspensions, smart-smart-smart. I'm sure that when the engineers at Intel introduced us to the 4004, 4-bit μ -processor with its meager circuit of 2300 transistors, they never intended to say that every other circuit was dumb—well, maybe. This year has put at least several micro's at everybody's fingertips—even a digital Etch-A-Sketch. They're in everything!

While poking at the technoids only is not fair, how about those of us that do a little dabbling in technical writing? The abuse of the English language known as poetic license, grows each year proportionately with the information pollution rate. Rife are these infractions and audictic prose in many scientific papers, popular articles and editorials (such as this one), and in manufacturer's literature. Now, *Sound & Communications* magazine presents this year's Top Ten List of:

"Most Abused Scientific Usage of the English Language in 1987"¹

Phrase	Translation
1) It is generally believed that...	A couple of other guys think so too.
2) It has long been known...	I haven't found other references.
3) Presumably over longer periods...	I didn't have the time to find out.
4) Preliminary results show...	We did it once but couldn't repeat it.
5) ...within an order of magnitude	Not even close.
6) This is used for maximum effect.	A leftover science project.
7) Typical results are shown.	The best results ever obtained are shown.
8) The predictions are excellent.	Agreement with the predictions is fair.
9) Four samples were analyzed.	Others didn't pass marketing.
10) Thanks to Sosumi for assistance with the experiments, and to Hiram Levity for valuable discussions.	Sosumi did the work, and Levity explained what it meant.

Parody alone is not the only witness to the 'real world' outlook on tech-types. This year engineers were in the background of a nationally-televised commercial for a rather large communications company—can't imagine who this might be. The producers of the spot auditioned over 50 of the company's engineers and technicians, and were not satisfied that any of them looked like engineers. Actors were hired to play the part of engineers.

No matter how far we progress technically and culturally, there will always be a mysterious blend of science, magic, and art in this business. After all, that's what makes sound and communications so much fun. Right?

Have a Great '88!

Jesse Klapholz
Technical Editor

¹Adapt from "Why are you laughing? This is SCIENCE!" by George M. Bodner, in CHEMTECH, April, 1985.

TEQ™ EQUALIZER TECHNOLOGY



... now available
in 29 Band-
1/3 octave units

The benefits of transversal technology . . . Your choice of controls.

With a list of international installations to its credit, and praise from leading acoustical



TEQ™ with sliders

consultants, the TEQ™, Transversal Equalizer, is rapidly



TEQ™ with screwdriver slots

becoming the EQ of choice. TEQ™ eliminates unnecessary ringing and transient coloration of signals. While tuned filter equalizers respond

correctly at their control frequencies they often create response ripples between control frequencies, causing audible coloration. But the unique TEQ™ design produces frequency responses with a single filter. Its transient response is the weighted response of a single tapped delay chain, and is ripple free over the entire 20dB adjustment range.



TEQ™ with rotary knobs

The TEQ™ is now available with the standard ISO 29-band, 1/3 octave frequencies. Also, choose the controls that best fit your particular applications—rotary knobs, sliders or screwdriver slots. Get the benefits of what Don Davis referred to as,

“ . . . the first genuine step forward in equalizers since the original 1/3 octave units . . . ”



Expo '86 Vancouver

Discover for yourself how affordable state-of-the-art equalizer technology brings a transparent sound to your next installation. For more information, including technical data sheet, call or write:

**INDUSTRIAL
RESEARCH
PRODUCTS, INC.**

A Knowles® COMPANY

321 Bond Street • Elk Grove Village, IL 60007
(312) 439-3600
TELEX 701845



Now Shure can reveal the secret* behind the world's only Automatic Microphone System.

Most so-called automatic mixers use a predetermined threshold level to decide when to turn a microphone on or off. But when meeting participants or background noise change, these threshold levels must be readjusted for proper operation.

Shure's AMS eliminates threshold adjustments for truly automatic operation; faster set up.

Shure's patented Automatic Microphone System provides unique direction sensitive gating by continually "reading" and comparing the separate audio signals provided by two matched unidirectional capsules placed back-to-back in each AMS microphone.

The rear capsule provides an instantaneous point-of-reference, continuously monitoring ambient noise. Whenever the output of the front capsule exceeds the rear capsule by at least 9.5 dB, the mic gates "on."

A person must speak within a unique 120° "window of acceptance" to activate an AMS mic. Sounds originating from the side or rear will never cause an AMS mic to gate "on."

Greater user flexibility.

TTL level logic terminals on the AMS mixer provide unprecedented design flexibility including chairman muting, video switcher control, zone loudspeaker muting and more.

The easiest to use automatic mic mixer you can buy.

Thousands of installations throughout the world, from courtrooms, conference rooms and churches...to broadcast studios and state legislatures, attest to its superiority.

To find out how this revolutionary system can solve your audio problems, write or call Shure Brothers Inc., 222 Hartrey Ave., Evanston, IL 60202-3696 (312) 866-2553. G.S.A. Approved.

*Patent No. 4,489,442



SHURE
Breaking Sound Barriers
for over 60 years

Circle 203 on Reader Response Card