

SOUND & COMMUNICATIONS

Volume 35 Number 3

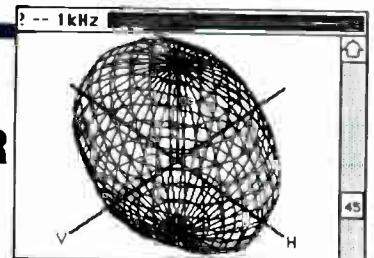
March 1989



RESIDENTIAL ENTERTAINMENT SYSTEMS

More than 80 loudspeakers, 14 power amps, a three-zone video system, seven independent zones overall plus a distributed system and a wireless mic system—a new night club, restaurant, or dance club? No, it's a private residence in Columbus, Ohio, and this is only a partial list of the equipment installed there recently by Newcome Electronic Systems. It's one of 20 such installations Newcome has done in the past several years, a profitable addition to their commercial business. A look at the special requirements of designing and installing a complete A/V system for the home. **40**

SOFTWARE REVIEW: THE BOSE MODELER DESIGN PROGRAM



Since its introduction in 1985, the Bose Modeler Design Program has evolved into a powerful and sophisticated design tool. We continue our comprehensive series reviewing sound system design software with the first of a two-part review of Modeler, detailing the history and development of this ambitious program. **30**

DISTRIBUTED SOUND SYSTEM STUMBLING BLOCKS

Background and foreground music, sound reinforcement, teleconferencing—whatever the application, the primary intent of a distributed sound system is to provide uniform, intelligible coverage to a listening audience. But good coverage is imperative, and there are some considerations to bear in mind. **23**



HOME INTERCOM SYSTEMS

Today's intercom systems can make our homes more secure and our lives more convenient, with lower costs and easier installation than ever before. And yet, the market for single-family home intercom systems remains relatively untapped in this country. Is this market poised for growth? **36**

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HME designs and manufactures 100% of our cabled and wireless intercom equipment, so custom designs and interfaces can be made much faster with the same high reliability as our standard products.

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World Radio History

Circle 215 on Reader Response Card

C O N T E N T S

Volume 35 Number 3

March 1989



FEATURES

23 Distributed Sound System Stumbling Blocks

By *Jesse Klapholz*

Good design is imperative if a distributed sound system is to provide uniform, intelligible coverage. Here are some considerations to bear in mind.

30 Software Review: The Bose Modeler Design Program

By *Mike Klasco*

We continue our comprehensive series reviewing sound system design software with the first of a two-part review of Modeler, detailing the development of this ambitious program.

36 State of the Market: Home Intercoms

By *Bill Intemann*

The market for single-family home intercom systems remains relatively untapped in this country. Is this market poised for growth?

40 A Residential A/V Installation

By *Stacey Zable*

Here's how one contractor handled the special requirements of designing and installing a complete A/V system for the home.

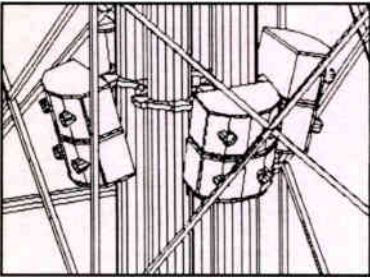
45 Electronic Patch Bays And Routing Switchers

By *Hannah Klapholz*

A look at the current generation of electronic and programmable systems.



40



30

COLUMNS

12 Theory & Applications

By *Mort Altshuler*

16 Consultant's Comments

By *Mike Klasco*

21 Ask Dr. Wokka

By *Dr. Wilhelm Wokka*

62 A Closer Look

By *Gary D. Davis*

70 Technically Speaking

By *Jesse Klapholz*

DEPARTMENTS

9 Newsletter

55 Update

Contracting Close-up 55

People 56

Products 58

A Closer Look 62

Literature 64

Calendar 64

69 Classifieds

SOUND COMMUNICATIONS

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Coming in April...

Our annual Sound Contracting Market Report, our fourth annual look at the sound contracting industry. And part two of our review of the Bose Modeler Design Program. Don't miss it!

THE NEXT STAGE IN WIRELESS

Stage 22: True Diversity Wireless With dbx* At A Price That Won't Hold You Back

Stage 22 is the first affordable *no compromise* true diversity wireless system for musical performance and sound reinforcement.

Samson True Diversity technology with built-in dbx Noise Reduction yields superb high-fidelity wireless sound in every application.

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Stage 22 is available with the Electro-Voice N/Dym 757 microphone sold exclusively in wireless by Samson.

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The Symetrix reputation for *reliability, versatility and ease of operation* continues in the SX200 Series. Backed by *fourteen years* of signal processing experience, Symetrix offers this solid approach to the half-rack format. Watch in '89 for the introduction of new SX200 Series products, which include the SX205 PRECISION AUDIO METER and the SX206 MULTI-DYNAMICS PROCESSOR.

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Editorial Director/Publisher
Vincent P. Testa

Managing Editor
Bill Intemann

Technical Editor
Jesse Klapholz

Assistant Editor
Stacey Zable

Contributors

**Mort Altshuler, Gary D. Davis,
Hannah Klapholz, Mike Klasco**

Consulting Editors
Jerome J. Brookman, Chris Foreman

Technical Council

Dr. Mort Altshuler
*Professor Audiology, Hahneman University,
Chief of Audiology, V.A. Hospital, Phila, PA*
Mike Biegel

EPD Technology Corporation

C. Leroy James

Rees Associates, Inc.

Richard N. Jamieson

Jamieson and Associates, Inc.

Russell Johnson

Artec Consultants, Inc.

Richard Negus

Purcell Noppe Associates, Inc.

William Parry

Maryland Sound Industries, Inc.

Daniel Queen

Daniel Queen Associates

Jon Sank

Cross Country Consultants

William R. Thornton
Phd, PE

Art Director

Gail Meyer

Assistant Art Director

Karen Waibel

Staff Artists

Gerard Caramannello

Steven Ingram

Typesetting

Leo Ancona

Circulation Director

Deborah A. Droge

Advertising Director

Thomas Soevyn

Vice President/Editorial

Judith Morrison

Editorial and Sales Office

Sound & Communications

25 Willowdale Avenue

Port Washington, New York 11050

(516) 767-2500

BPA MEMBERSHIP

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Home Entertainment

How to make your best church sound systems disappear from sight!

Actual Size
Model AT853 Unidirectional
Condenser Choir Microphone

Install Audio-Technica UniPoint® miniature studio-quality microphones

Every congregation deserves the best possible sound, whether at the service or listening to broadcasts or tape. Now you can install superior sound without bulky microphones and awkward microphone stands that intrude on the services.

New Directional Choir Microphone

Audio-Technica engineers have broken new ground with our UniPoint design that delivers studio-quality sound from tiny, inconspicuous *directional* microphones. Our new choir microphone is so small and light that it can be suspended by its own slim cable, making it virtually invisible. Yet it offers controlled pickup of only the choir, sharply reducing room noise and reverberation.

Directional models for altar, lectern, pulpit, plus lavaliers

Four other UniPoint models for use at the lectern or pulpit offer the same clarity, full range, and directional pickup control. Our comprehensive approach to church sound also includes a surface-mounted directional microphone that lies flat on altar, table, or floor. We round out the selection with directional lavalier microphones that solve acoustic problems other lavaliers can't handle. The entire line provides



Model AT871
UniPlate Boundary Cardioid

full freedom of movement to the participants, yet the microphone is almost unseen.

Better sound is now smaller, lighter, less visible

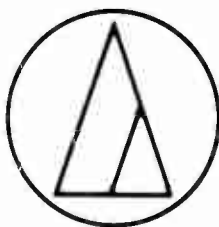
Whether your customer's sound system is solely for sound reinforcement, or is also used for radio/TV or tape recording of the service, UniPoint microphones improve the sound quality while remaining almost invisible.

Our experts are ready to help

If you ever need help with specific installations – whether large or small – our Audio-Technica church sound experts are ready with answers to your most difficult problems. To watch your toughest church sound installation problems disappear, call or write us today.



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Gauss.

The World's Greatest Woofers

At Gauss, we make low frequency transducers, not just bass guitar speakers. And we make them to be the best. Every Gauss loudspeaker is designed to perform at rated output levels where others *only survive*.

Gauss woofers are the greatest because they're *engineered* to be the best. They have the largest voice coil in the industry, 4.125 inches. It is directly wound on a unique metal former for maximum heat dissipation and efficiency. Our innovative double spider insures that the voice coil stays centered under high power operating conditions. Even our cast aluminum frames are thicker and heavier to make them more robust.

The result of these innovations is a line of woofers that are superior to all others. Bar none. Best of all, they're built to survive in the real world.

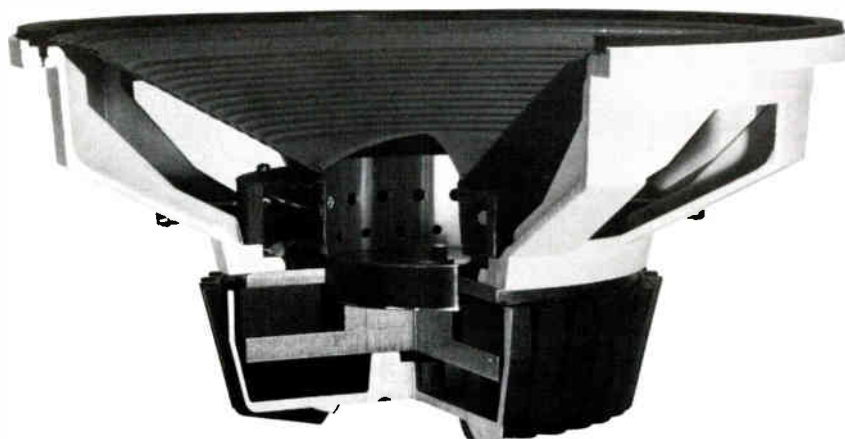
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NEWSLETTER

NEW OWNERSHIP FOR DOD ELECTRONICS

John Johnson, president and CEO of DOD Electronics, and three investors, Charles Chewning, Tom Henderson, and Robert Henderson, have purchased DOD Electronics, buying out the interests of David O. DiFrancesco, former partner with Johnson in the ownership of the company. DiFrancesco left the company January 1st, having co-founded DOD with Johnson over 15 years ago.

MCGEE RETIRES FROM ICIA

Harry R. McGee, executive vice president of the International Communications Association (ICIA), has announced his intention to retire effective June 30, 1989. McGee has been with ICIA for over twenty years and has successfully guided the association through the many technological changes that have affected the membership over the years. In addition, McGee has been instrumental in the success of ICIA's annual trade show, INFOCOMM International, according to ICIA.

RENKUS-HEINZ SOUND SYSTEM DESIGN SEMINAR

Renkus-Heinz, Inc., conducted its second Sound System Design Seminar in Irvine, CA, following the 1989 Winter NAMM convention. The event was attended by over 100 guests, including 18 major independent engineering consultants, 60 U.S. dealers, and more than 20 distributors from overseas. Industry experts presented papers and conducted workshops on such topics as: computer-assisted sound system design, array lobing, cluster design, rigging, and TEF measurement techniques.

TANNOY ACQUIRES AUDIX

TGI plc, the fully-listed holding company of Tannoy, Goodmans and Mordaunt-Short, has acquired the Audix Companies of Saffron Walden in Essex, England. On completion of the acquisition, the Systems Division of Tannoy Limited will be transferred to Audix and a new company—Tannoy-Audix Limited—will be formed. J.A. Billett, the present managing director, will manage the new company.

ANIXTER SIGNS \$3 MILLION INTERCABLE DEAL

Anixter Cable TV has signed a contract with Jones Intercable for the provision of fiber optic equipment in Jones' Augusta, GA system rebuild.

The value of the contract is approximately \$3 million, and includes six Synchronous FM laser transmitters with 32 optical receivers, 20 Anixter AM LaserLinks, 1200 miles of AT&T fiber optic cable, and all related apparatus and accessories, according to the company. Equipment deliveries are expected to be complete by July 1989.

SOLID STATE APPOINTS CEO

Solid State Logic has appointed Piers Plaskitt as chief executive officer of Solid State Logic Inc. In his new role, Plaskitt will take overall charge of the company's U.S. operations and will oversee the establishment of a central U.S. administration based at the east coast office. Plaskitt had formerly been vice president of SSL Inc. and had overseen the eastern sales and service operation in New York since 1984.

NEWSLETTER

HIGH PERFORMANCE FIBER OPTICS FROM GENERAL INSTRUMENT

General Instrument and Ortel Corporation have developed a joint program to develop high performance lasers for use in fiber optic cable TV distribution systems. The object of the program is to develop high power, low noise/distribution lasers which directly convert amplitude modulated (AM) cable TV signals to light. The work will be done in conjunction with General Instrument's Jerrold Division.

Comcast Cable Communications has selected the Jerrold Division of General Instrument to supply fiber optic and conventional cable television electronics for its West Palm Beach, Florida system rebuild. Total cost of the rebuild is expected to be \$25 million, with General Instrument supplying approximately \$10 million worth of equipment, according to General Instrument.

FULL SAIL NAMED OFFICIAL NEVE TRAINING CENTER

Neve has named Full Sail Center for Recording Arts in Altamonte Springs, FL, as its official training center. Full Sail will now become the only school in the world to offer specialized training on Neve products—including the Neve "Y" Series console and the Flying Faders Console Automation System.

REP NEWS:

RAMSA/Panasonic has awarded Michael Troke the "1987 to 1988 Dealer of the Year" award. Troke is the president of Micworks at 7398 Center Avenue, Huntington Beach, California 92647. At the Sonance rep meeting in Las Vegas, awards were given out to Rep of the Year John Tait of Morris-Tait Associates and to Most Improved Rep Candice and Peter Hru of Innovations, Ltd. Morris-Tait is located at 4260 Lankershim Boulevard, North Hollywood, California 91602. Innovations is located at P.O. Box 41665, Chicago, Illinois 60641.

Waldom Electronics has appointed New England Technical Associates (NETA) as its representative in the New England territory for Waldom and McKenzie loudspeaker products. NETA is a sales representative company specializing in professional audio products in the New England area. NETA is located at 27 Mansion Street, New Haven, Connecticut 06512.

Apogee Sound Inc. has named RPM Sales as its 1988 Representative of the Year. RPM Sales covers Texas, Oklahoma, Louisiana and Arkansas for the full line of Apogee microprocessor based loudspeakers.

Bose Professional Products has appointed two new rep firms for the professional products division. Silver Peak Marketing will cover the Rocky Mountain area and Joseph P. Mazzeo Associates, Inc. will cover upstate New York. Silver Peak is located at 6280 West 38th Avenue, Wheat Ridge, Colorado 80033. Joseph P. Mazzeo is located at 673 Lexington Avenue, Rochester, New York 14613.

McGohan Electronics, Inc. has appointed two new sales rep organizations. SRT Marketing will cover all of Florida and Admiral Sales Company will cover Texas, Arkansas, Louisiana and Oklahoma for McGohan. SRT is located at 7345 Jackson Springs Road, Suite A, Tampa, Florida 33634. Admiral is located at 2431 Shorecrest Drive, Suite C-7, Dallas, Texas 74235.

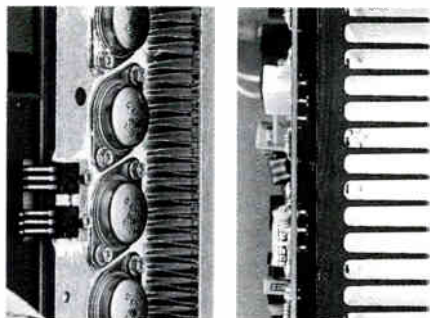
Aiphone Corporation has named Audio Marketing Associates manufacturer's representative for its line of intercom systems. The company will cover Ohio, West Virginia and western Pennsylvania. Audio Marketing is located at 9470 WhiteWood Road, Brecksville, Ohio.

Warning: To Avoid Risk Of Shock,

Ignore This Amp-To-Amp Confrontation.

Let's be frank. We're out to change your idea of what — and who — makes a professional power amplifier. So if you just bought a Crown MacroTech, turn the page — this comparison won't be a polite one. But it will stick to the facts.

A look inside these two amps will give you a better idea of why BGW amps like the GTB Grand Touring Amplifier are built like no others in the world. And raise some questions about Crown MacroTechs.



Left: The MacroTech uses mostly air to dissipate heat, not metal. The closely spaced fins are vulnerable to airborne dust and dirt.

Right: BGW uses ten pounds of aluminum to absorb thermal transients, extending power transistor life.

TAKING THE HEAT

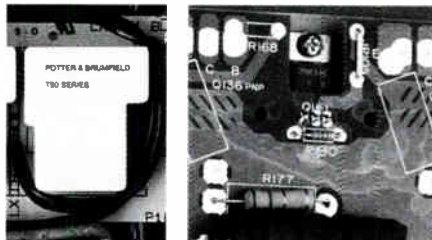
If the MacroTech heat exchanger reminds you of an air conditioner, you've grasped its design. This approach works, at least until dust and dirt clog the fins. But as soon as the air flow slows or stops, temperature rises. Soon after that, the Crown shuts off — it could even fail.

The GTB uses massive extruded aluminum heat sinks with widely spaced fins. The

mass of metal absorbs thermal transients without straining the fan. And without quick changes in transistor temperature. That's important: Transient musical loads put the worst kind of stress on power transistors. The effects of thermal cycling fatigue may not show up until after the warranty, but they can destroy lesser amps. Meanwhile, BGWs keep right on delivering clean, reliable power.

REAL SPEAKER PROTECTION

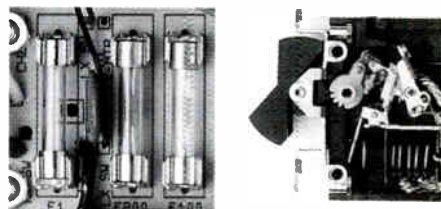
Most amps today are direct coupled, so a blown output transistor (the most common failure) connects the power supply directly to the speakers. Earlier MacroTechs had no protection against DC. Now Crown has learned their lesson — or have they? The sensing circuit and relay they now use shuts off the power transformer, but allows the filter capacitors to discharge stored DC energy directly into your drivers — risking real damage.



Left: Crown uses a slow-acting, less reliable relay. It can allow the filter capacitors to discharge stored energy directly into your drivers.

Right: BGW's modular power output section protects your speakers against DC damage with an instantaneous Thyristor Crow Bar. And the module is easily replaced in the unlikely event of failure.

BGW pioneered DC speaker protection in 1971. We stopped using relays years ago, when they no longer met our reliability standards for BGW amps. The GTB, like all BGWs over 200 Watts, uses solid-state Thyristor Crow Bars to keep DC from ever reaching your valuable speaker cones or compression drivers.



Left: Time is money, and with Crown's MacroTech you can lose plenty of both: You have to pull it out of the rack every time a fuse blows.

Right: The GTB's power switch is also a rocker-actuated magnetic circuit breaker. You can reset it in a second if power lines hiccup.

MAKE YOUR OWN COMPARISON

Before you buy or spec your next power amp, call us at **800-468-AMPS** (213-973-8090 in CA). We'll send you tech info on BGW amps and the name of your nearest dealer: He can arrange a demo of any BGW model against any amp you choose. Then you'll be able to appreciate the advantages of BGW engineering with your ears, as well as your eyes.



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Balanced Attenuation Ear Protection

by Mort Altshuler

When exposed to extreme sound levels, we can and should use earplugs as often as possible, for anything we can do to protect our ears from intense sound is worthwhile. Historically, anything from cotton, lambs-wool, (petrolatum-soaked or not), silicone-putty, foam, molded or store-purchased plugs, to sophisticated (and sometimes expensive ear-muffs) have been used. Properly fitted foam plugs and earmuffs offer the most attenuation. The key words here are *properly fitted*. Many people use these protective devices on a regular basis, but if the plugs or earmuffs are not properly fitted, any potential benefit can be lost.

However, properly fitted or not, it is a well-known fact that virtually all commercially available earplugs, as well as "home-made" types, cut out more high frequency than low frequency. Figure one illustrates the various attenuation afforded by properly fitted ear protection devices. The predominance of high frequency attenuation is clearly noted.

This lack of balanced attenuation is one of the many reasons given by musicians, sound engineers, sound-mixers, et al, for not using ear protection devices. They complain of a lack of clarity or an "untrue" sound received when using ear-plugs; it is most difficult to do a good job as a musician, sound engineer, or sound mixer if the sounds you hear are not true to the ear.

Altshuler is Professor, Audiology, at Hahnemann University, and Chief, Audiology/Speech Pathology, Veterans Administration, Philadelphia, PA, and is a member of the Sound & Communications Technical Council.

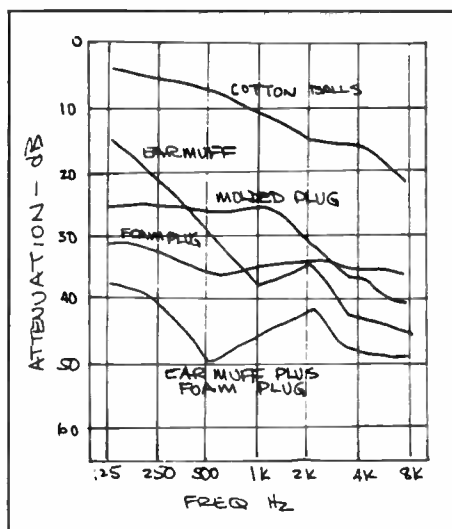


Figure 1. Attenuation afforded by various ear protection devices (after E.H. Berger, High Fidelity, July 1988).

This indictment is indeed a valid one — or I might report now — has been a valid reason.

Etymotic is a "new ancient Greek" word meaning "true to the ear." Mead C. Killion, Ph.D., president of Etymotic Research, Elk Grove, IL, reports that his company expects to be in full production by the fall of this year with what he refers to as the "Musician's Earplug," the ER-15. This new ear protector was developed several years ago by Elmer Carlson of Industrial Research Products, a Knowles Company. Ed DeVilbiss, who is vice president of Etymotic Research, reported that about 150 of their ear-protectors are currently in use, most of them in the ears of jazz, rock, and symphony musicians. Almost all report great success regarding reduction or elimination of acoustic trauma and the return to sensitive, "true" hearing.

The reason for the success of these ear protectors over those earlier described is based on the fact that the ER-15 earplug attenuates a uniform 15dB, allowing the user to hear accurately in high SPL environments. In a recent article Killion, DeVilbiss and Stewart stated the need for a "high fidelity" earplug with a uniform response. What good fidelity means, in essence, is proper spectral balance. They report that, "The trick to producing this high-fidelity response is to reproduce the shape of the natural frequency response of an open ear, but at a reduced level."

Figure 2 illustrates the open ear resonance with the usual peak at about 2700Hz and the ear with a well-made, properly fitted ER-15 earplug. The difference between the two is the real-ear attenuation of the earplug. One can clearly note the closely parallel curves.

The device is actually a small plastic acoustic sound chamber that is attached to a specially made earmold. Figure 3 is the cross section of the ER-15 earplug and the electrical analog equivalent circuit. Compliance is in the form of a flexible plastic diaphragm (C1) the sound channel (L1) is the acoustic mass. "... a Helmholtz resonator is formed between the inertance of the sound channel and the combined compliance of the flexible diaphragm and the ear-canal volume." The plastic sound chamber is affixed to a soft vinyl (or silicone) deep-canal ear mold fabricated from individual ear impressions of the users' ears. The material used and the insertion deep in the canal are necessary to avoid an occlusion effect (the hollow, in-a-barrel effect when we cup a hand over or ac-

It's Not Just A Phase We're Going Through.

The tremendous success of the Tannoy PBM series of reference monitors is by no means coincidental. Since the introduction of the world renowned NFM-8 nearfield monitor, much time and effort has been spent on discerning the needs of the mixing engineer and the applied requirements of "playback monitors". The PBM Line exemplifies this commitment to excellence in reference studio monitoring. These compact loudspeakers sport robust poly cone mid-bass transducers utilizing efficient long-throw, high power voice coils. The low frequencies are carefully controlled by optimum tuned ports located on the rear of the loudspeakers. Hi frequencies

are provided by Hi Power ferro fluid cooled polyamide dome tweeters which extend H.F. bandwidth beyond 20KHZ. The driver accompaniment is knitted together by means of a precision hardwired crossover unit, utilizing robust low loss components, and heavy-duty input terminals which will accept standard 3/4" spaced banana plugs and the majority of high quality, specialist audio cables. Transducers and crossover assemblies are neatly housed in a stylish, high density, partial wrap cabinet,

specially designed to minimize unwanted cabinet resonance, and high frequency reflection. In summarizing, we have left the best feature of all for last "price versus performance."

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TECHNICAL EXCELLENCE & CREATIVITY
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TECHNOLOGY**

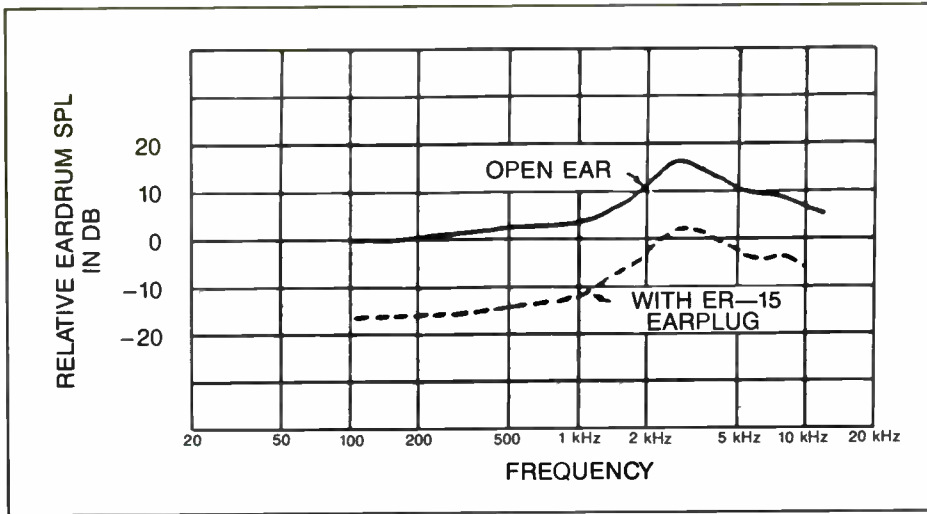


Figure 2. Normal open ear canal resonance and attenuation curve with the ER-15 (after Killion, DeVilbiss and Stewart, The Hearing Journal, May 1988).

tually close our ear with a finger and listen to our own voice). The length of the canal portion (ideally 10mm) and the diameter of the sound channel (L1), 4mm, are critical to insure the balanced attenuation that is sought. When worn, these devices sit well down in the concha (bowl) of the ear.

The author ordered a pair of these devices and had his own ear-canal plugs fabricated. I found the soft vinyl plugs easy to insert, comfortable to wear and easy to extract. Listening to very loud music pumped into one of my acoustic test booths at RMS 100 dB SPL was very comfortable, undistorted and it was immediately discernable that there was an unloading of pres-

(continued on page 66)



“...SOUNDSPHERE LOUDSPEAKERS ARE THE REASON FOR THE CLARITY OF SOUND”

Don Hartley/President • Dynamic Sound • Exeter, NH

Comments Mr. Hartley on the Sun Foods store, “The Lowell store has approximately 76,000 square feet and is the largest supermarket in New England. It contains 24 checkout counters. . .

. . . This store is owned by Hannaford Brothers and they basically have three or four names that they use for different stores. In 1984, they built a store similar to this, with a 22-foot ceiling and at that time we were just completing a new installation at their warehouse, which comprised of twelve 250-watt amplifiers and approximately 80 Soundspheres. Since the ceiling in their new store was going to be 22-feet high, we strongly recommended Soundsphere #110's and guaranteed equal sound in each and every part of the store. This installation was completed; and last year when another store was planned in Lowell, they called us for an installation similar to Keene. . .

. . . The size of the store and the use of Soundspheres have caused many supermarket competitors throughout the United States to evaluate this store, and we have received numerous phone calls about the sound system since it works so efficiently and about its clarity where you have all concrete walls, concrete floors and open girders in the ceiling. We have given all of them the same answer that it is very obvious the Soundspheres are the reason for the clarity of sound.”

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World Radio History



Speech Intelligibility: Expanding Our Perspective

by Mike Klasco

For years speech intelligibility has been one of the most controversial topics in audio engineering. The established standard, %ALcons is now considered to have questionable accuracy, both as a predictor and as a measurement technique. The other well-known techniques, STI and its derivative RASTI, are test procedures rather than predictors. "Look-up conversion tables" for %ALcons to RASTI used in some sound system design computer programs retain the limitations of the %ALcons procedure. Predictive RASTI computer modeling techniques that simulate test conditions are on the horizon, but have not yet been proven nor are they commercially available. Most disturbing is the conflicting results reported by researchers in our field. I sometimes wonder if we are not like the blind men touching different parts of an elephant, all reporting accurate, but incomplete observations.

While the author was researching his doctoral work he drifted into a parallel territory of audio engineering, the field of speech technology. Here exists a separate world of journals, exhibitions and conventions, and a whole foundation of knowledge, some of which should help explain the contradictory findings reported by workers in our field.

The transition from audio engineering into this alternative world is gradual. Certainly we all consider the Audio Engineering Society (and its journal) a primary source of reference

Klasco is president of Menlo Scientific, Berkeley, CA.

information for our field. The Acoustical Society of America is also an important, if somewhat more theoretical resource. And the Institute of Electrical and Electronic Engineers (IEEE) has their Acoustics, Speech and Signal Processing Group which publishes a journal and has a yearly conference. References cited in these journals show familiarity of the work between these organizations.

The real transition to the world of speech engineering is with a number of focused publications, with the magazine *Speech Technology* at the forefront. A core organization, AVIOS (American Voice Input/Output Society), publishes the *AVIOS Journal*. *International Voice Processing Review*, an applications newspaper, is published every two months by Media Dimensions. Another newsletter, *Voice Processing* is published twice a month by Probe Research. The focus of speech engineering is telecommunications, voice mail and response, voice recognition, speech synthesis, and related areas of speech processing such as audio time compression, speaker verification and identification, digital encoding and decoding, data reduction, and more.

If you have read this far, you may be wondering what this has to do with sound contracting, or more specifically, speech intelligibility. Perhaps the relevance can be shown by one article in *Speech Technology* which explored a military jet with a speech synthesis warning system (for incoming missiles or other emergencies). Not just the ar-

ticulation loss was measured, but the effort needed to comprehend the warning is critical. To measure this factor, the mental processing time is tested. From the time the warning message is generated to the time the corrective response is produced by the pilot, a measurement is taken. The more distorted the signal, the greater amount of time is required for the pilot to determine what is required, and the more distracted he has become from his other functions. Unlike %ALcons, not just intelligibility is being measured, but the more important criteria of comprehension and the "overhead" — the effort to comprehend.

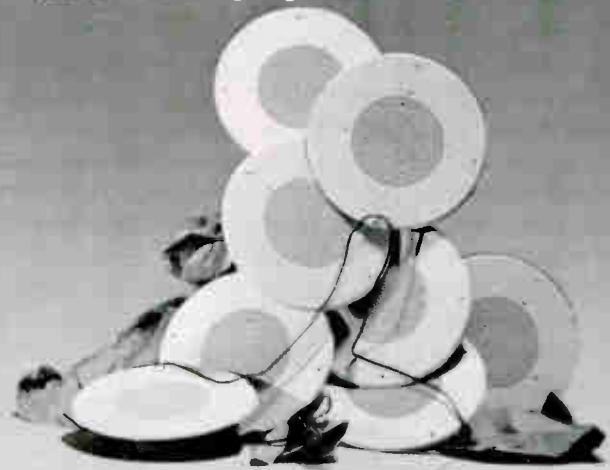
Another article in *Speech Technology* models speech understanding as a hierarchy of layers. The bottom is the acoustic structure, phonemes (the sounds of speech), moving up to the next layer is surface features, then syntax, deep structure, and semantics, and finally upward to concepts. Speech understanding can be bottom up, top down, or any other combination. For example, in a room with poor acoustics, even though not every word is understood, the listener is able to decipher the message through the overall content. The cost to the listener may be higher listening fatigue resulting in lower long term attention, degraded memory retention, and overall poorer comprehension. I found it intriguing that the specialists in this field were consultants to advertising agencies.

Conventional intelligibility tests do not indicate the long term fatigue effects, nor the increased mental over-

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CONSULTANT'S COMMENTS

head of blocking out hums, buzzes, and other anomalies of a communications system. The positive or negative factors of hard and soft pattern loudspeakers, early reflection characteristics, horn-throat distortion, IM and har-

monic distortion, and the effects of signal processors such as aural exciters, limiters/compressors, etc. are not measured fully by the intelligibility yardsticks in our field.

An excellent book that comprehen-

sively discusses many of these aspects and reviews many of the test procedures for determining speech quality after it has been processed is *Objective Measures of Speech Quality* by Quackenbush, Barnwell III, and Clements (published by Prentice Hall).

In addition to publishing magazines, journals, and newsletters, these organizations hold exhibitions and conferences. The convention "Speech

Conventional intelligibility tests do not indicate the long-term effects of fatigue, or the increased mental overhead of blocking out the hums, buzzes, and other anomalies.

Tech '88' was held at the Hilton Hotel in New York City last April. About 50 exhibitors and 2800 visitors attended. Two smaller speech technology conventions were held last fall in San Francisco. In September, Media Dimensions held four application speech engineering related conferences (telephony, industrial, military, and medical), with about 10 exhibitors and 100 participants. A few weeks later "AVIOS '88," a convention with similar attendance was held at the Hotel Nikko. "Voice '89 Conference and Exposition" is at the Santa Clara, California convention center March 6-8, 1989. Media Dimension's next convention is "Speech Tech '89" to be held at the New York Penta Hotel May 2-4 in New York. "AVIOS '89" will be held September 12-14 at the Four Seasons Hotel, Newport Beach, California. ■

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World Radio History

Ask Dr. Wokka

by Dr. Wilhelm Wokka

I warned you! Now we'll see who listens and who doesn't! Here is the quiz I've been threatening you with just to see if you learned anything over the last year. The answers will be shown on the following page, so no peeking — let your conscience be your guide. Those of you who fail this quiz know what you have to do, and let me remind you that it should be done in complete privacy; i.e., not in public where the media can get a hold of it and make a complete mockery of our *Great Society Of Audio Scientists*.

The quiz will cover the last year of

instruction in this journal; relevant back issues of S&C are allowable for reference (all answers to these questions can be found therein).

QUESTIONS

1. What is a "dB"?
2. What is an "mW"?
3. When is it permissible to touch the cone of a woofer with the bare hand, for purposes of furthering Audio Science?
4. What is the sound pressure level necessary to overcome or overpower the reverberant field?

5. What is the "Wokk-Ola"?
6. What is the RASTA measurement system?
7. What is the highest stiffness-to-noise material known to man, for use in loudspeaker diaphragms?
8. What is the proper setting of adjacent filter section gain controls on all equalizers, regardless of type, price or brand?
9. Where should equalizers not be used in audio systems?
10. Who is Dr. Wokka, really?

(Please turn page for answers.)



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Furthermore, the room acoustics (if there is excessive reverberation, for example) may preclude one from simply turning up those speakers which are further away. Anyway, many times deciding speaker quantity and location ends up being an ergonomic matter which can be decided upon empirically; or worse yet, by decorator's edict. Nonetheless, when we have decided how many and where, we come back to—what kind.

Since smooth loudspeaker-coverage is one of our objectives, the loudspeaker's coverage pattern should also be considered. As long as loudspeakers have been around, they have been analogized to a rigid piston in an infinite baffle. Figure 2 shows what happens to the dispersion and Q of a piston/loudspeaker as the frequency is increased in proportion to the speaker diameter. This is the main reason that 8-inch speakers use a high-frequency element—they try to maintain even coverage through a wide bandwidth. Nevertheless, this shows why 4-inch loudspeakers, provided they can deliver the required level, work nicely for speech systems. Using the -6 dB points, most loudspeakers' "nominal" dispersion fall between 60 to 120 degrees.

The topic of loudspeaker dispersion brings up an interesting, as well as controversial, subject—directional versus omni-type loudspeakers. Even if real-world loudspeakers truly approximated rigid pistons in an infinite baffle, they still would not have a Q of 2 throughout their used frequency range. In fact, even a 4-inch

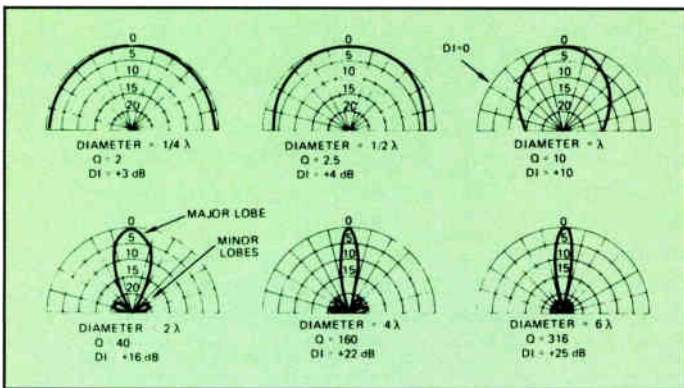


Figure 2. Directional characteristics of a circular-piston source mounted in an infinite baffle as a function of diameter and λ .

loudspeaker narrows to 30 degrees at 6 kHz (measured at its -3 dB points). Conventional cone-type loudspeakers have on-axis and off-axis characteristics; with omni-directional loudspeakers a listener is always "on-axis." Using omni-directional loudspeakers makes life easier since our tools can simply be a protractor and the inverse square law.

Beyond the concern for the sound pressure level uniformity and frequency response at any given point in the direct field is what happens in the reverberant field. Conventional cone-type loudspeakers inherently do not have smooth power response; that means that the total power they transfer to the space changes as a function of frequency and direction, along with the Q. On the other hand, omni-loudspeakers virtually maintain the same

Q over a wide band of frequencies, and therefore, maintain a constant power output characteristic as a function of frequency and direction. The frequency response of the reverberant field is important to us for two main reasons: first, in reinforcement situations it is the reverberant field that the microphone will "see," therefore, if the response is uniform and flat the gain-before-feedback can be optimized, predicted with greater accuracy, and be more stable with changing microphone positions; and second, the reverberant field also contributes to our overall psychoacoustic assessment of the quality of the sound presentation.

REVERBERATION

Excessive reverberation may also impede upon the understanding of speech. Beranek used the following formula to serve as a rough indicator of unintelligibility (if the number M is less than 20 dB):

$$M = 10 \log (QR/r^{2n})$$

where Q = directivity factor of a loudspeaker or the room-source combination, R = the room constant as described above, r = the distance from the loudspeaker (or talker if there is no system) and the listener, n = number of loudspeakers (for no sound system, n = 1).

This formula shows that if M is lower than 20 dB, it can be increased by increasing Q, or R. If the room constant cannot be modified, and the Q of the loudspeaker or the room cannot be increased, then a distributed system of n loudspeakers should be installed yielding a decreased r such that the product of nr⁻² is decreased. It should be noted that in some cases adding a single-loudspeaker in a reverberant room may make no noticeable improvement, since the ratio of Q/r may not change appreciably. This is one of the easiest mistakes to make in sound system design.

GAIN BEFORE FEEDBACK

So often designers of distributed systems ignore the basic rules of talker, microphone, and listener distance limits. Even in small meeting rooms, especially when a lavalier is used, loudspeakers that may be overhead of the talker cannot be used. If the room changes configurations, then provisions must be made to turn off loudspeakers. In larger rooms attention must be paid to the distance at a podium for example, and the seated to loudspeaker height. In these large rooms where loudspeaker heights may reach 30+ feet, you had better get out your calculator.

SIGNAL PROCESSING

Our industry is rife with the misconception that poorly designed rooms, devices, and systems can be corrected for with equalization. An equalizer can surely change the frequency response of the loudspeaker. Many attempt to compensate a room's excessive reverberation with eq. Equalizing a loudspeaker

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changes its direct field response which does change the total level in the reverberant field. Unfortunately it does not change the ratio of early-to-late energy. This means that while the subjective character has changed, the intelligibility has not. However, most often the equalization is set to increase the signal-to-noise of the intelligibility-bands to the noise of the reverberation.

When eq is used for feedback control it is the reverberant-field that is generally being adjusted. This is most often true as the talker's microphone is in the reverberant-field, that is, not in the direct-field of a loudspeaker. Thus, what is actually being equalized is the off-axis response that may in fact be a direct-path, and all of the reflections of the direct-sound as modified by the absorption and diffusion of the room's surfaces. Sound complex? That's because it is. Since the direct-field is what we are attempting to deliver to the listener, we try to tailor its response for maximum fidelity and intelligibility. If the microphone position moves this complexity grows. If on the other hand the mic position is stationary, the complexity is somewhat more manageable.

Because of the dynamics of speech, music, and how they interact with the various aspects of a room's acoustics, dynamic processing can be helpful. Unfortunately, most of us do not have trained stage orators as talkers for the systems we design. Therefore, if the vowel-sounds can be compressed—*independent of the consonants*—the carrier-to-information ratio of speech can be improved. Simultaneously, the amount of energy accumulating in the reverberant-field will be minimized. While the selection and setup of compression is beyond the scope of this article, there are several factors of which you should be aware. Compressors have an attack-time, some units are fixed, and some are adjustable. Some units have a side-chain detector link which it uses to trigger itself independent of the signal. For example, a band-pass filter could be wired to only allow the compressor to trigger on low-frequency signals. This allows for band-dependent compression. Also, the background noise and its nature of change (whether its steady or dynamic as with crowds), and the dynamic range allowable by the system design will dictate if any wide-band compression is necessary or desirable.

Limiting usually refers to peak conditions that are very short in duration. Therefore, this indicates signals that are higher in frequency as is the case in the information-bearing elements of speech. Limiters—especially when used in conjunction with a compressed signal—can set a maximum level that the system will produce. This is useful from both loudspeaker and ear protection points of view. Of course intelligibility is also maximized.

SIGNAL ENHANCEMENT

As early as the 50s, peak-clipping of speech signals was used in an attempt to increase speech intelligibility in communications systems. Several companies, including Bogen, introduced units. This technique really never caught on. Later, Apex introduced

a more complex and comprehensive unit improving the intelligibility of many systems. More recently, Barcus Berry has introduced a dynamic high-frequency equalizer with phase-lag compensation. Both of these units can be used to dramatically increase intelligibility when reinforcement itself is inadequate.

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Assuring that we make the required power available to each loudspeaker is often overlooked by system installers. Nowadays, with everybody using solid-state power amplifiers, the specification of amplifier size is simple—just add up the transformer taps. Once the power input requirements at each speaker location have been established, and the transformer losses factored, a transformer with the appropriate tap is selected. Because of the higher-voltage and high-impedance characteristics of the constant-voltage system, the current is low and smaller-gauge speaker wire can be used and/or longer speaker lines can be run—both affording money and engineering savings.

The most common constant-voltage power amplifiers in use are 70.7-volt and 25-volt output types. Most of the time we use 70.7-volt systems for their higher output capabilities. But, in low-power systems, using the 25-volt line can offer economic advantages. There is a "stumbling block" in the effect of older techniques applied in current technology; these techniques are from the older constant-impedance system and tube amplifiers. In both of these systems, the amplifier(s) needed to be loaded to specified impedances in order to operate properly and deliver the appropriate power. This does not apply with constant-voltage systems. With a constant-voltage amplifier the output power is determined by the total load presented by the speakers through the transformers. This makes life real easy. In constant-voltage systems the only precaution is not to exceed the power amplifier rating by the total sum of transformer taps connected to its output.

The actual method behind the transformer taps is simply based on the number 5000. Using Ohms Law, take the number 5000 and divide it by the power amplifier output in watts and that will give you the impedance of the line. For example if you have a 200 watt amplifier, divide 5000 by 200 and that gives you 25 ohms. Or in other terms square the voltage (70.7 times 70.7 equals 4998.49) and divide that product by the impedance and the result will be the power (4998.49/25 equals 199.94). Using standard tables of wire resistance one can quickly see the effects of resistance when compared with the load as seen by the amplifier.

If a loudspeaker is tapped at five-watts, FIVE-WATTS is all the power it will get! So often people will expect a certain SPL figure from a loudspeaker when its maximum transformer tap will simply not allow it. Another aspect of this is that as often as designers under-power systems, they will design several 5-

(continued on page 66)

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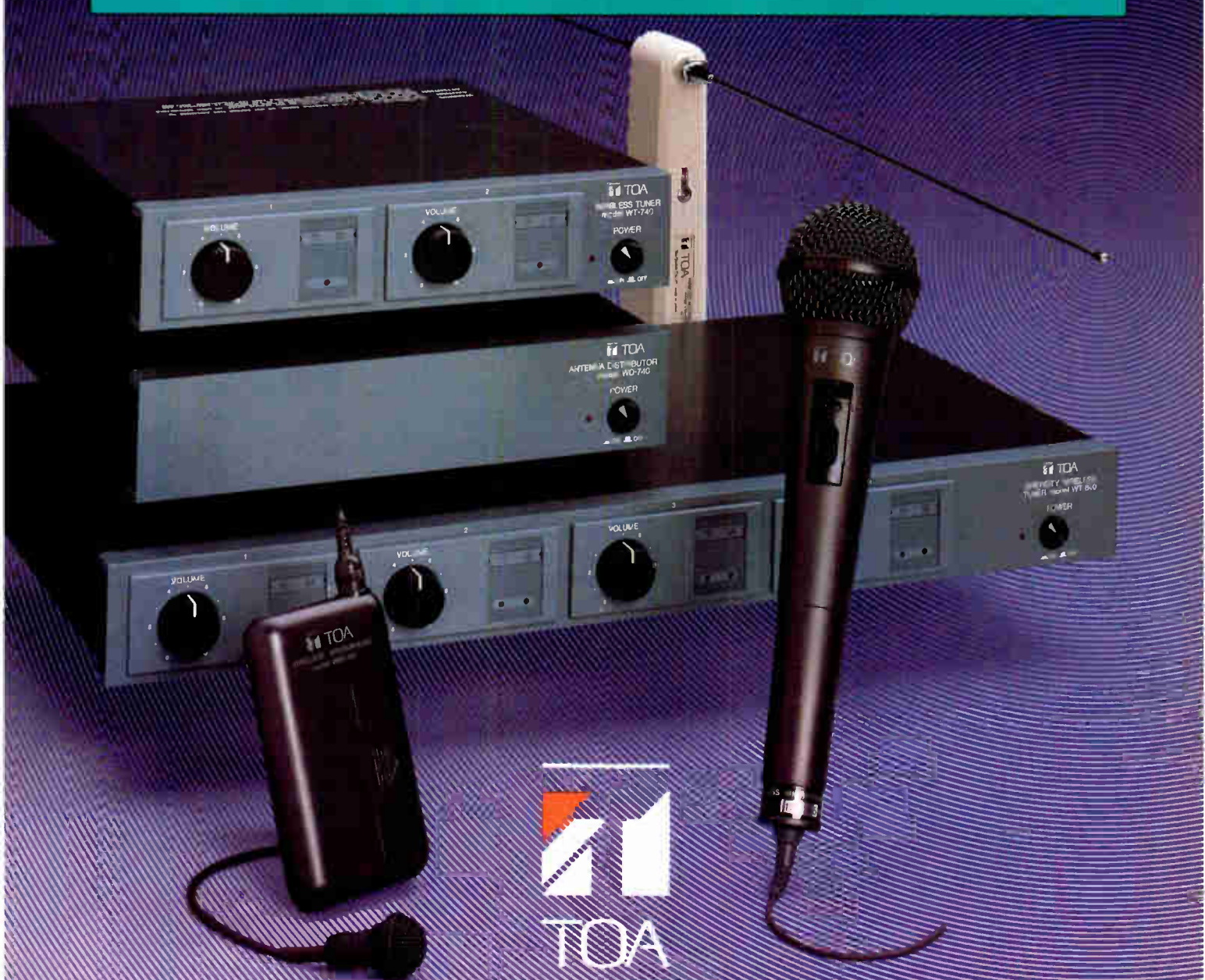
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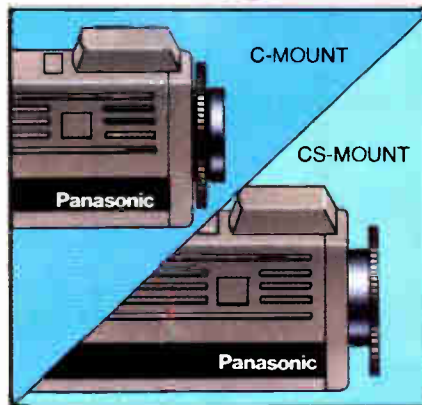
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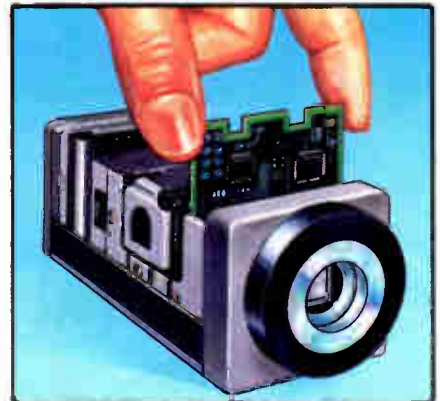
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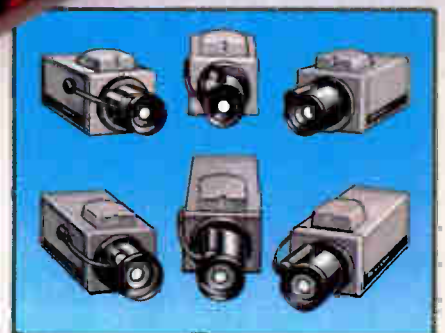


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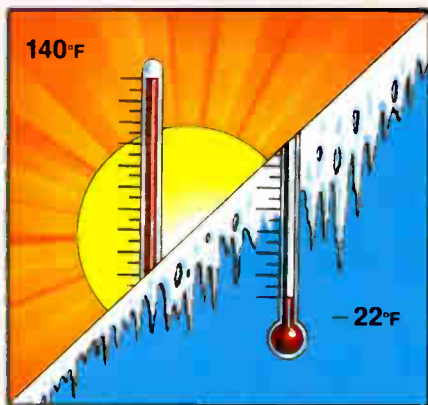
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product development and yearly license renewals. Bose has certainly demonstrated a clear commitment to research and has been constantly implementing new features that are electroacoustical, user-interface, mechanical design, and presentation oriented. The other aspect to consider is that (regardless of the abuse one finds in the general world of personal computer software), software is not something you purchase and own—it is an intellectual piece of property that the creator himself owns and simply licenses you the right to use for a specific time period. In the mainframe world software is licensed on a yearly basis. This concept is starting to catch on in the micro-world, with companies like Quark operating on a yearly licensing-renewal for their highly-acclaimed desktop publishing program Express. In order for Bose to provide the level of on-going support of and commitment to its family of software they maintain the yearly license renewal policy.

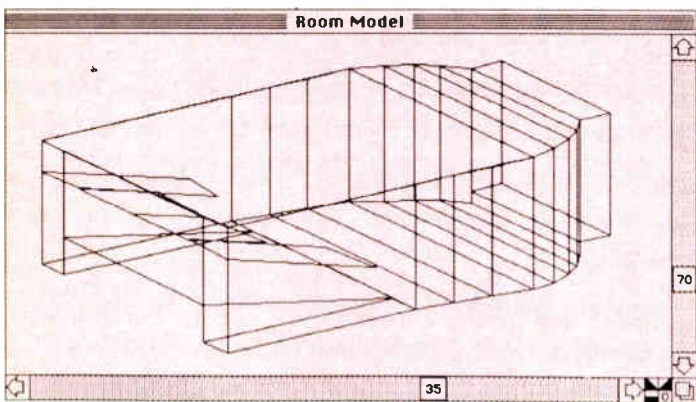


Figure 1. The Room Model window.

MODELER'S PROGRESS

Questions have been raised concerning why I have provided some historical background when I review software. I feel this serves two functions; the first and most important is that the degree a program has been expanded and debugged through its evolution is an indicator of the software publisher's ongoing commitment to the program. Secondly, all early releases of software for sound system design required serious revisions and refinement, and many sound contractors and consultants are either of the opinion that these programs are not valid tools and are not an efficient use of time, or they are intimidated by the prospect of using a computer. To a significant degree, this has been changing over the last few years, and these reviews are attempting to frankly discuss both the shortcomings and triumphs of these programs.

Modeler is a program which has undergone constant and significant improvement since its introduction in 1985. The developers have issued three revisions since then (V1.1, V1.2, and V2.0) each with substantial refinements and additions. With V3.0 being

shipped in July of this year, it is clear that Bose is in it for the long run with their commitment to software development, and are listening to the industry.

Modeler V1.0 was released at NSCA in 1985. Aside from the advanced graphics and multi-window/pull down menu operation, it was missing some of the meat and potatoes of sound system design. Functions such as mechanical design of the cluster, intelligibility, and gain-before-feedback were not supported. Some of these functions were not included because they were not finished, while functions such as intelligibility and gain-before-feedback were intentionally omitted because Bose engineers felt the existing formulas were inaccurate and did not therefore belong in the program (more on this later).

The following releases (1.1 and 1.2) got rid of some program bugs and increasingly conformed to the Mac interface conventions (which were still congealing at the time). The program offered unique functions such as spatial and temporal mapping of sound, without supporting discussion of prioritizing these factors, or what an acceptable range of performance should be expected. Nor were any references provided, not even suggested readings. You could master the program and user's manual, model a job, and not have an explicit indication from the program of whether the job would work. While I am a believer that the engineer should already "bring this to the table," earlier versions of Modeler provided less performance guidelines than some of its counterparts.

If a Modeler-licensed sound contractor requests additional help, Bose provides an 800 number hot-line. Bose intends to fill out the manual with more performance criteria and references in future releases. Also a very comprehensive engineering manual for sound system contractors is now being prepared.

The developers of Modeler have responded in Version 2.0 (released in July 1988) to many of the criticisms, and a more balanced program has resulted. Direct-to-reflected sound ratios are now supported, and an intelligibility estimating program is in development (probably ready for version 3.0 due to be released in July 1989). Additionally, a complete mechanical design program by Bose called SpeakerCAD Graphics Program as well as Rackmaker Layout Program, a rack layout program, have been released and will be reviewed next.

All data entry functions of Modeler now have an interactive graphics/spreadsheet approach to editing which is a pleasure to use. The training exercises in the manual have been rewritten and are now clearer and significantly faster to learn. The advanced simulations for spatial imaging, ray tracing (and the recent addition of statistical coverage) are fascinating, but still are not discussed in adequate detail. Modeler does not yet have "contextual on-line help," which is the capability of asking the program to explain what is going on at the moment. One of Bose's newer programs, Rackmaker has this feature, and future releases

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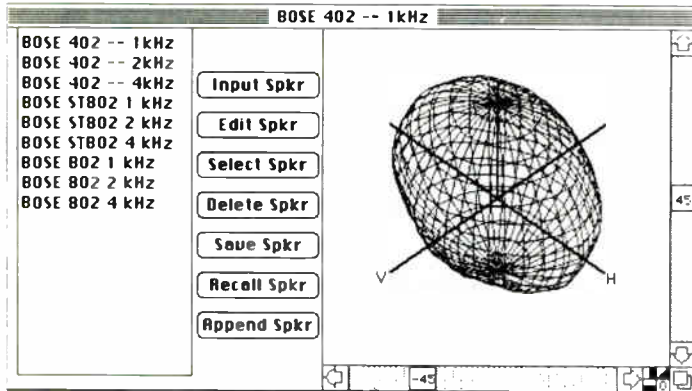


Figure 2. The Speaker Data window.

of Modeler will include on-line help.

Although some other programs have included PAG/NAG to predict gain-before-feedback, and %ALcons to predict intelligibility, Bose engineers (and others) feel that these simple formulae are too inaccurate as predictors to be included. Playing the devil's advocate, many sound systems have been successfully designed using PAG/NAG and %ALcons, and while not absolute, some feel they may indicate where a design will not work. Rather than misguide users, the program developers decided to leave these functions out. This is sort of a dilemma for sound system design software developers, as they will be criticized for including the currently used but questionable algorithms (as I did with CADP last month), or they will be cited for the omission (as in this review). Such are the advantages of being a reviewer!

Meanwhile, Bose engineers are researching new algorithms for intelligibility and gain-before-feedback—and have given a number of papers on intelligibility at recent AES conventions (resulting in much discussion and some controversy). The program developers believe that they will have convincing tests and measurements to back up their new intelligibility algorithms, and at that point, they will include the new intelligibility predictor in Modeler (hopefully, 3.0).

Bose engineers feel that it is beyond the scope of their project to tell engineers how to design sound systems, and that Modeler is a tool to be used by an artist, rather than a paint-by-numbers approach. Still, the literature on Modeler, and the presentations I have seen depict it as a comprehensive tool, rather than a supplementary tool that might be referred to during the course of the design. Nonetheless, I see the program as a comprehensive tool, missing a few functions. I see nothing wrong in this, except for the lack of discussion of these omissions in the promotional literature and the manual.

GETTING STARTED

Modeler consists of three overlapping windows. One is the Room Model window (shown in Figure 1), where the room is created, speaker locations selected, and sound system performance simulated. The second is the Speaker Data window (Figure 2), which contains the speaker library. The third window is called the Physical Data window (Figure 3), which con-

Speaker	Cluster	Height	Roll°	Pitch°	Yaw°	Power(W)	Time(sec)
1 BOSE 802 1 kHz	A	25.0	0.0	20.0	150.0	240.0	0
2 BOSE 802 1 kHz	B	25.0	0.0	20.0	30.0	240.0	0
3 BOSE 802 1 kHz	C	25.0	0.0	20.0	-30.0	240.0	0
4 BOSE 802 1 kHz	D	25.0	0.0	20.0	-150.0	240.0	0
5 BOSE 402 -- 1kHz	E	30.0	0.0	50.0	80.0	80.0	45
6 BOSE 402 -- 1kHz	F	30.0	0.0	50.0	60.0	100.0	70
7 BOSE 402 -- 1kHz	G	30.0	0.0	50.0	100.0	80.0	45
8 BOSE 402 -- 1kHz	H	30.0	0.0	50.0	120.0	80.0	70
9 BOSE 402 -- 1kHz	I	30.0	0.0	50.0	135.0	100.0	70
10 BOSE 402 -- 1kHz	J	30.0	0.0	50.0	45.0	125.0	70
11 BOSE 402 -- 1kHz	K	30.0	0.0	50.0	-80.0	80.0	45
12 BOSE 402 -- 1kHz	L	30.0	0.0	50.0	-60.0	100.0	70
13 BOSE 402 -- 1kHz	M	30.0	0.0	50.0	-45.0	125.0	70
14 BOSE 402 -- 1kHz	N	30.0	0.0	50.0	-100.0	80.0	50

Figure 3. The Physical Data window.

tains the surface material library and the speaker cluster(s) coordinate data.

THE ROOM MODEL WINDOW

The floor plan window is the hub of Modeler and the user is constantly returning to this window. The first step in using Modeler is to create the 3-dimensional room model. The floor is entered first, then the walls, and finally the ceiling. The program can be switched from metric to English at will. The room window provides such amenities as a grid and digital readout of the coordinates as you move the mouse about. The standard Mac scroll bars are used for rotating the model to check for errors. The mouse is clicked to enter corner points. A preliminary hand sketch is necessary for all but the simplest rooms. The room must then be "assembled" following a pre-defined plan, using four-sided planes. In building room models, minor alignment errors of the edges of the planes can be automatically corrected by the "clean up room" function. This is a real nice touch.

When windows and other openings become acoustically significant, as in the case of a church, Modeler's limitation of four corners to a plane can become unwieldy. Complicated floor and ceiling areas may also become tedious to enter. None of the currently available programs (including Modeler) can depict curved walls, requiring the creation of a number of approximated planes. Therefore, this limitation of four-sided planes in acoustically complex models is a problem Bose is looking into to. Even with these complaints, I still must say that compared to the other currently available sound system design programs, Bose offers the most sophisticated drawing/modeling tools. In fact, it is the only program that models the entire room, using a combination of statistical and geometrical acoustics techniques. Sure, compared to any personal computer 3-D drawing program Modeler may seem somewhat limited (at least until the next release). But remember, you can't do sound system design on drawing programs.

Relative rather than absolute coordinates are used, so when you divide up the architectural floor plan, you are only interested in the size of each plane, rather than its absolute location in the facility. Each plane is given a number, and up to 100 can be used to define a model. While 100 planes at first may seem boundless, the four-sided plane limitation requires many planes to model a complex room and may require careful plane rationing. With some experience, simpler room model approximations can be devised that conserve the number of planes needed.

The program noticeably slows down as the number of planes in the model increases (which is to be expected with programs that have sophisticated room models). If you find yourself at this point, it means you are doing big jobs and it may be time to save your money to buy a co-processor and switch-over to FastModeler (which is included with Modeler, and runs 25 times faster).

THE SPEAKER DATA WINDOW

This is where speaker libraries may be called up. The program comes with data files which contain JBL, EV, Altec, Community, Renkus-Heinz, Bose (of course), co-axial, and omni sources. Data is filed by product model and frequency-band specific dispersion characteristics. New files can be entered, or files can be edited by the user. However, a word of caution, just because there is a spreadsheet doesn't mean that one can simply start plugging in numbers from manufacturer's data sheets. The necessary data acquisition for creating speaker directional pattern files for any program is a major project requiring sophisticated instrumentation.

Within the Speaker Data window is the Loudspeaker Directivity Display. The display shows a three dimensional polar plot ("directivity balloon") in frequency-bands. The plot can be rotated and viewed to your heart's desire. Anomalies can be visually discerned. I think the real potential here is just starting to be exploited. One pos-

sibility is a three dimensional directivity balloon of the entire cluster. Bose presently includes in the speaker library a balloon of a stacked pair of 802s.

Other manufacturers should consider providing directivity data of their horns configured into the more typical layouts. Spurious effects of complex clusters such

as lobing, diffraction, interference, and comb filter effects that cannot yet be accurately modeled, but certainly can be measured (off a real world cluster) would become predictable, and steps could be taken by the sound contractor and/or consultant to resolve problems in the design

(continued on page 68)

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STATE OF THE MARKET: HOME INTERCOMS

BY BILL INTEMANN



Home security concerns are fueling market growth for home intercom systems.

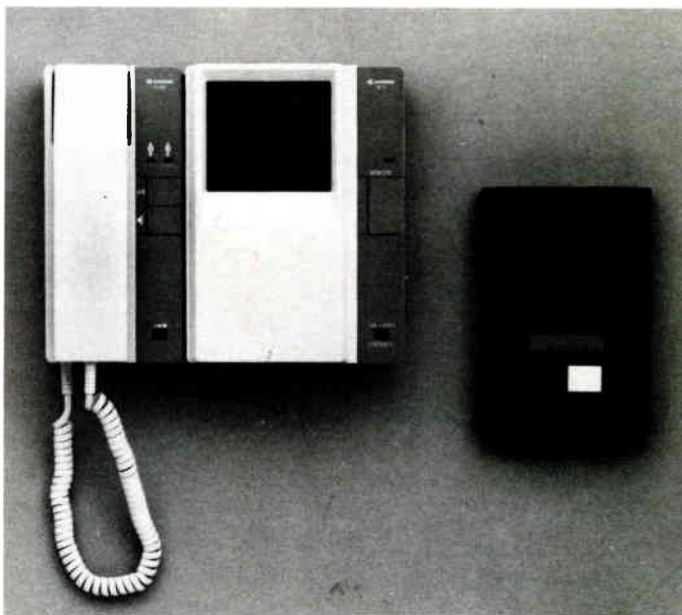
Access control, infant or child monitoring, invalid monitoring, paging, music programming—today's intercom systems can make our homes more secure and our lives more convenient, with lower costs and easier installation than ever before. And yet, the market for single-family home intercom systems remains relatively untapped in this country.

Private homes in Europe and the Orient have long been the primary markets for these systems. Some manufacturers feel that the market in this country is poised for growth, and that while convenience and entertainment are important factors, it is the intercom's capacity for enhancing home security that will fuel this growth. As people in this country are becoming increasingly concerned about home security, they are becoming increasingly aware of the added security a home intercom system

can provide.

"We see this market as having tremendous growth potential, and security is the most important factor in this market," said Harry Quanz, advertising and marketing director for Aiphone Intercom Systems, Bellevue, WA. "Right now, only two or three percent of the new homes being built in this country have intercom systems; in Japan, almost 90 percent of all new homes are constructed with some type of intercom system installed."

Consumer education is one of the keys to promoting growth in this market, according to Quanz. "The Japanese have always been more 'gadget-conscious'; educating the consumer in this



The M-Series video intercom system for the home, from Aiphone.

country to the potential benefits of an intercom system is definitely a priority."

Fully one-third of Aiphone's product line is targeted towards this market. And that line is not restricted to voice-only products—video intercoms are "very hot right now," Quanz reported: "Video is definitely growing. The quality is increasing, the cost is decreasing, and installation is becoming easier. It's still a high-end item, though—probably not the system you'd

Intemann is managing editor of this magazine.



The model CM-810 master intercom station from Bogen.

put in a starter home.' Among Aiphone's entries in this field is their M-Series video intercom, with two-way voice communications and door-release capability.

Education is a priority for Lee Dan Communications, Hauppauge, NY, as well—but not consumer education. "We don't sell directly to the consumer, so for us it's a question of educating our dealers and installers, getting them interested in offering these products to the end-user," said David Goldberg, the company's vice president.

Considered purely as an "upgrade" when buying a new home, the consumer sees an intercom system as only one of a number of options available, according to Goldberg. If the dealer/installer is not able to point out the benefits of a home intercom system, that system may lose out to other choices whose benefits are already known to the consumer. "Intercom systems are generally fairly low on a list of priorities when new home buyers are considering upgrades," explained Goldberg. "If offered the choice between a central vacuum system, a jacuzzi, or an intercom system, very often it's the intercom system that loses out."

However, when viewed as a security feature, the home intercom system is seen in a different light. Goldberg feels that "inevitably, as people become more security conscious, they become more interested in that aspect of an intercom system, particularly when there are children in the home."

Lee Dan's home intercom line includes a system that can monitor up to 15 rooms in a home; when not in use, music can be programmed through the system. For access control, the company offers its EnterLok system.

Peter MacLean, president of Ring Communications, Hauppauge, NY, also feels that this market is poised for growth: "The percentage of homes in the U.S. with intercom systems is definitely low compared to Japan or Scandinavia. But it is definitely growing."

MacLean feels that security features will definitely be an

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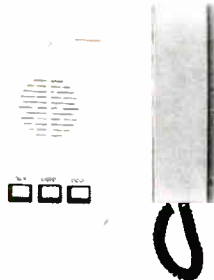
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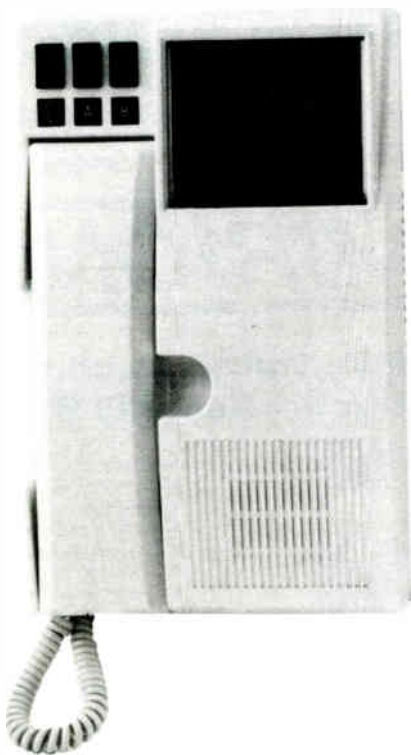
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Elvox, a division of Paso, is introducing the 3000 series residential video entry panel.

important part of that growth: "Security is number one. I feel better knowing my kids won't answer the door until they've seen who's there on the video screen."

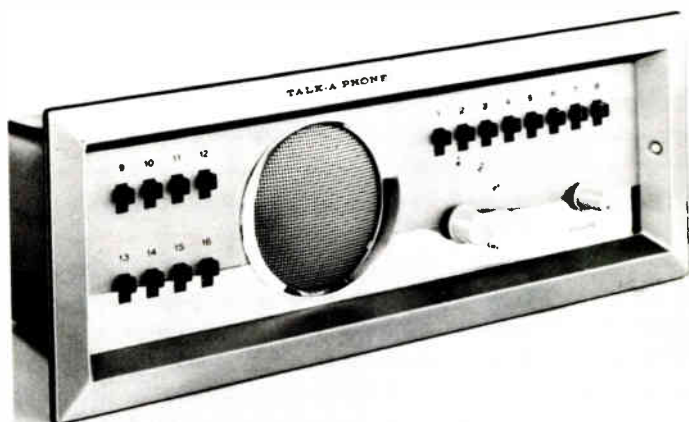
But security isn't the whole story, according to MacLean: "After we've addressed the security aspects, convenience becomes a factor. The question becomes, 'What else do you want?' We can do it all; wireless controls, telephone interface—we



Siedle's video intercom for the home—the HT 511 system telephone and Siedle-Watchman.

hooked one guy's system up to control his living room drapes, his stereo, his sauna, his garage door opener—what do you want the system to do?"

"The home intercom system is no longer viewed as just a security system; convenience is becoming more of a factor," agreed Tom Hendricks, marketing director for TekTone Sound & Signal, Lake Park, FL. "That's where I see the growth, in the more convenience-oriented features—monitoring of children's rooms, the ability to page or play music throughout the house—it may take a little time, but I think the American market will eventually catch up to the European and Japanese markets."



Talk-A-Phone's HI-17 central master station.

TekTone features its TekSound 704A system, with AM/FM programming capacity.

Ease of installation is an added benefit for many of these systems, and the ability to connect to existing wiring can be a prime selling point when a retrofit is called for. Bogen Communications, Inc., Ramsey, NJ, offers such a system, the CM Series. "In fact, our RF-1 loudspeaker can be mounted at the front door, and the existing doorbell button can be used for two-way communication," said David E. Pear, director of communications for the company.

Also making use of existing wiring is the Model 894 two-wire retrofit system from Elvox, a division of PASO Sound Products, Pelham, NY. The 894 can be connected to existing doorbell wires, and features a lighted outdoor station, two-way communication, and door release. The 3000 Series Residential Video Entry Panel and 5401 Video Monitor is Elvox's entry in the video intercom field.

Ken O'Brien, product manager for Elvox, feels the market in America has nowhere to go but up: "The European market has always been much more important, partly as a result of the difference in life-style. In Italy, for example, homes tend to be set back from the street, with walls or fences and front gates. Intercoms are a necessity; we sell more video intercoms in Italy

(continued on page 67)

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A RESIDENTIAL A/V INSTALLATION

BY STACEY ZABLE

Newcome Electronic Systems in Columbus, OH, recently designed and installed an audio and video system for a private residence, also in Columbus, that involved seven independent zones, one distributed system (including an outdoor area), and a client who liked things simple. No technical jargon. No talk of subwoofers and tweeters. Newcome's client demanded only two things of his video and audio system: it had to be multi-functional, and it had to be simple to operate. He was not interested in how Timothy Newcome, president of Newcome Electronic Systems, achieved this; he was interested only in the finished product.

The challenge was intensified by the fact that the system had to be as unobtrusive as possible, with all "devices" appropriately hidden from view.

"My client is not a mechanically-minded person—and he now operates the system with finesse," said Tim Newcome. "None of my [residential installation] customers are technically-inclined. The customer is interested in convenience."

The performance of the system has added "a new dimension to [the customer's] home," according to Newcome. "My client is now a hi-fi addict."

THE BEGINNINGS

The original system in the ten-year-old house was rarely used and was poor in quality. Newcome was originally called in last spring to put an audio and video system together for only a few rooms in the house. Newcome finished the original project, and was called in again when remodeling was started on the house that fall. His budget was placed at \$100,000 for the entire system.

The system is designed around two of Newcome's NC-4000 command computers which permit remote control operation of all audio and video system functions from numerous locations via an infra-red receiver. Newcome's NC-4000 is the third generation of its type and is only available with Newcome's own system set-ups. The home was divided into seven independent zones of operation (plus a distributed system) which use remote and manual control features.

Newcome worked with architect Jim Monsul of James Monsul and Associates in Westerville, OH, and interior designer Rosalie Greenberg of Centners Interior Designers in Columbus, OH, during the installation and the remodeling.

Zable is an assistant editor for this magazine.



The outdoor loudspeakers: effective yet unobtrusive.

"The interior designer is most important—you have to please the customer and the interior designer when placing or hiding objects," Newcome explained. "We easily interfaced with the designer and architect."

THE MAIN EQUIPMENT CABINET

The main equipment cabinet is located in the family room in an existing equipment closet. Sources include an AM/FM broadcast, cassette tapes, compact discs, video sources, and a wireless microphone announcing system shared by all zones.

The compact disc system consists of three Sony CDP-C10 ten-disc players attached to a control computer that allows for choosing from 30 separate disc selections. Newcome is currently waiting for another unit from Audio Access that can access 240 discs.

Six ADS R-4 receivers and one ADS CC-4 control center with associated power amplifiers serve seven "independent" zones and one ADS CC-4 control center with associated power amplifiers serves the remaining "manual" zones throughout the house. An infra-red remote control receiver in each of the rooms with independent zones accepts commands from a remote control wand. The kitchen and garage each have two infra-red remote control receivers.

The CD players, cassette decks, and other support equipment are automatically powered when any of the receivers or control



The complex A/V installation at this private home in Columbus, OH, includes an outdoor zone featuring 10 Bose 102 loudspeakers.

centers are activated. It is not necessary to activate more than one switch to power this equipment.

THE INDEPENDENT ZONES

The seven independent zones in the house are in the family room, the living room, the wine cellar, the master bedroom, the remote garage, the study and the kitchen. An independent zone allows that room's system to be turned on and operated independent of any other zone.

The family room, in addition to housing the source equipment, has one ADS R-4 receiver that powers four Sonance IV wall- or ceiling-mounted loudspeakers and one M&K V1B subwoofer. The living room has one ADS R-4 receiver that powers six ADS 300 loudspeakers and two M&K V1B subwoofers. The wine cellar has one ADS R-4 receiver that powers two Sonance IV ceiling-



The design intent called for all hardware to be as unobtrusive as possible. Nearly invisible in the main living room are six ADS 300 loudspeakers, two M&K V1B subwoofers, and two Newcome IFR-200 infra-red command receivers.

mounted loudspeakers and one M&K V1B subwoofer.

"The master bedroom is the best sounding room—it's really strong," said Newcome. The room has one ADS R-4 receiver that powers four Sonance IV ceiling-mounted loudspeakers and one M&K V1B subwoofer.

Also in the master bedroom is the master video system. The video equipment consists of a 26-inch television receiver, a VHS hi-fi VCR and an 8mm VCR housed in an existing cabinet. The video system operates via the same remote control wand as the audio system. The VHS VCR signal is modulated onto an unused channel of the CATV distribution for viewing in the kitchen



A closer inspection reveals one of the six ADS 300 loudspeakers in the living room.



The family room, an independant zone, serves as the primary equipment location (housing the centralized equipment rack) and features four ceiling-mounted Sonance IV loudspeakers, with one M&K V1B subwoofer.

and study. If desired, the program audio from the video sources can be routed through the room audio system for enhanced listening.

The remote garage has one ADS CC-4 control center that provides the line level audio signals to two power amplifiers located in the garage equipment room. The power amplifiers drive eight Sonance IV loudspeakers and two M&K V1B subwoofers to sound pressure levels suitable for entertaining large groups of guests.

The study has one ADS R-4 receiver that powers two Sonance IV ceiling-mounted loudspeakers. The ADS R-4 receiver in the kitchen powers four Sonance IV ceiling-mounted loudspeakers and one M&K V1B subwoofer.

THE HOUSEWIDE/DISTRIBUTED SYSTEM

The housewide/distributed system provides a common audio program to all other treated locations. Each of these locations has a local manual volume control to adjust the program to the desired level, including turning the volume off. The ADS CC-4 control center that sources this system can be controlled at the source equipment location or via a remote control receiver located at the lower deck location.



The centralized equipment rack in its own closet in the family room.

The distributed system is composed of two primary zones: outdoor zones and indoor zones. The indoor zones include two guest bedrooms, the sitting room, the dining room, the stairwell, the attached garage, the greenhouse, the kitchen terrace, the hot-tub deck, the master bath terrace, and the driveway. The outdoor zones, which use Bose 102 loudspeakers, are the deck with bar, the lower deck, and the pond deck.

If the system is activated from the equipment cabinet in the family room, only the indoor zone loudspeakers are activated. The operator can override this default condition and activate the outdoor zones by pressing the button that activates output #2 on the CC-4. If the system is activated by a remote control command from the lower deck, then both outdoor and indoor zone loudspeakers are activated.



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cameras and a time/date generator.

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When it comes to keeping tabs on retail outlets, jewelry stores and supermarkets, the AG-6010S fits the bill nicely. It features a recording time of up to 120 hours. And an RF output,

so you get the added economy of being able to use any standard monitor or TV.

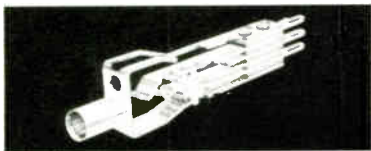
For areas that require "on demand" recording like ATM's, cash registers and card access entrances, the AG-1050 has what you need. You can even use it for intermittent time lapse recording.

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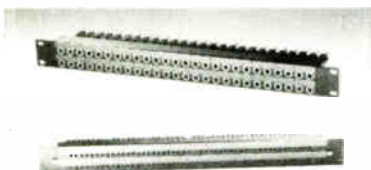
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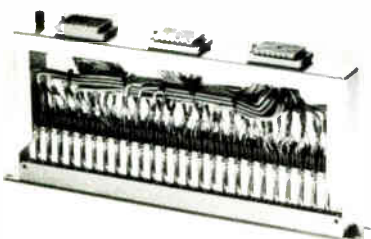
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Circle 231 on Reader Response Card

RESIDENTIAL A/V

TECHNICAL PROBLEMS

The big problem in this installation involved integrating the equipment with the ADS receiver, according to Newcome.

"We were trying to use tape outputs as pre-fader outputs to drive the power amps at a constant level, and the tape outputs on the ADS R-4 did not want to cooperate," Newcome said. "The solution was using CC-4 preamps, with some manufacturer modifications, instead of the R-4 receiver, and it worked out better."

The cabling for the existing sound system was totally unusable, Newcome said. Separate cabling systems were put in the house for loudspeakers, controls and infra-red receivers, line-level signal distribution, and R.F.

An important consideration was the aesthetics of the residence, so concealing the wire was another problem Newcome had to face.

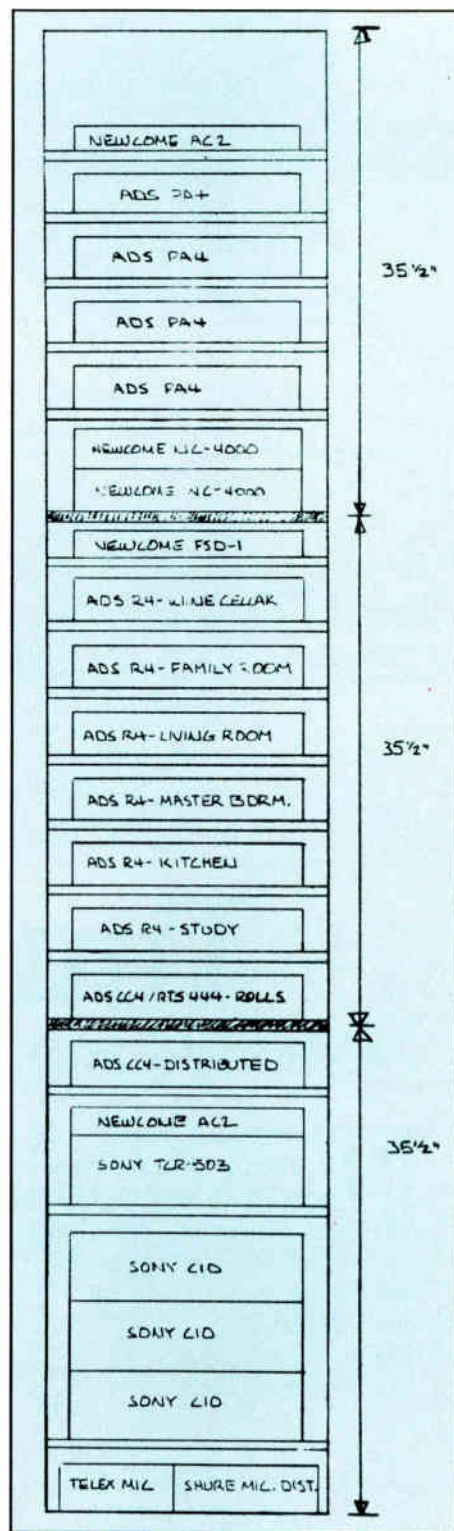
"It was difficult concealing all wiring," said Newcome. "It involved unusual techniques—we had to drop the ceiling fixtures and remove them to get access to the wires."

The outdoor system was another challenge. Newcome needed a good environmental loudspeaker for the outdoor elements and chose the Bose 102. The natural sunlight interfered with the infrared at first, and the receiver was eventually placed in a shaded location.

Maintenance for the entire audio and video system is "not too expensive," according to Newcome. The company has given this client one year maintenance-free because they are using the NC-4000 for the first time, and the client has agreed to be a "guinea pig," Newcome said.

POTENTIAL MARKET

The installation in this residence was a negotiated sale for Newcome. He sees these types of installations as a customer buying his concept—actually as "selling on the conceptual level." In the past two to (continued on page 65)



This rack diagram illustrates the complexity of this system. In addition to the units from Newcome, ADS, and Sony (and certainly unusual for a private residence) is a Telex wireless mic system with two Shure distribution amps.

ELECTRONIC PATCH-BAYS AND ROUTING SWITCHERS

BY HANNAH KLAPHOLZ

Hello, Mabel? Get me Doctor Smith!" This was typical of the first transmissions through plugs, jacks, and bays; these devices as we know and use them today are almost exactly the same as the ones small town switchboard operators like Mabel used around the turn of the century. When Bell Labs began building systems to address masses of people they naturally used interconnecting parts borrowed from their telephone exchanges. With a single microphone, a signal still had to be interconnected through many stages of discrete amplification. This complexity brought over the patch bays to sound reinforcement and broadcast systems from the world's largest system—the telephone system.

Because of the size and manufacturing power of AT&T, the entire industry adopted the standardized 0.25-inch "phone-plug." When longer lines became a necessity for the growth of an international network, amplification and balanced lines became integrated into the patch bay architecture. An entire family of plugs and jacks developed to meet the requirements of telephone, broadcast, and sound industries. The construction and design of all the basic components used in hard-wire systems today are essentially unchanged.

However, new technology has made possible a new generation of systems for the patching and routing of signals. The following is a look at this new generation of electronic patch bays and routing switchers.

AKAI

The DP Series Patchbays can be thought of as a combination distribution and patchbay system. There are two models: DP-3200 with 32 inputs and 32 outputs used only for audio signals, and DP2000 used simultaneously to patch both audio and video signals (16 pairs audio and 16 pairs video). They patch and distribute one source to many destinations controlled by the PG-1000 Programmer which can handle up to four (4) DP units at a time. Both complete systems include a PG-1000 Patchbay programmer and MZ-1000 12 Color monitor display. The audio system includes DP-3200 Audio digital matrix patchbay, and can be expanded by additional DP-3200 units. The audio/video system includes DP-2000 Audio/visual digital matrix patchbay, but can



Akai's digital patch bay programmer—the PG1000.

be expanded by additional DP-2000 units. The DP-3200 and DP-2000 can also be combined together in one system.

The PG-1000 is a patchbay programmer for use with the DP-2000/DP-3200 and can control up to four DP-2000s or four DP-3200s. Programming is easy through screen editing. All inputs and outputs can be named on screen, and it is a simple operation to connect between them. The screen displays a graphic illustration of all inputs and outputs and the connections made between them. It also represents a complete patchbay set-up, and the PG-1000 can store 640 such set-ups for instant recall. All functions are easily accessible by one button/one function operation. The PG-1000 will retain all 640 set-ups in memory when switched off. An optional disk drive is available with storage space for up to 12,800 set-ups per disk. Programmed set-ups can be switched by MIDI, audio trigger, SMPTE time code, computer, or manually by pressing the STEP button when you need to advance to the next set-up. Synchronization is made possible with a SMPTE time code generator with five types of SMPTE time codes—drop-frame, non-drop frame, 30-frame, 25-frame and 24-frame.

The DP-2000 is an audio/visual digital matrix patchbay consisting of 16 audio inputs and outputs, and 16 video inputs and outputs. The video section comes with a blanking switcher, external sync and Gen Lock In jack, suppressing noise and distorted pictures upon set-up switching. Applications include switching connections of video effectors, VTRs and cameras for video

Klapholz is a frequent contributor to this magazine.

editing, to screen layout for multi-screen visual events. Each input/output system uses high performance buffer amps.

The DP-3200 is an audio digital matrix patchbay consisting of 32 balanced type/line level inputs and outputs. Each input can be patched to each output or any number of outputs. Each input/output system uses high performance buffer amps. With bridge connections between a maximum of four DP-3200s using the AUX-CH jacks, a larger integrated patchbay system. Connections can be made directly via Amphenol connections or by optional multi-junction boxes (stereo jack/XLR).

The Akai Audio visual digital matrix patchbay can be used for video or audio sources, and video or audio effectors for video editing. The use of multi-video sources in audio visual presentations allows the entire presentation to be set-up beforehand and also become centrally controlled.

360 SYSTEMS

Audio Matrix 16 is a programmable audio patch bay which provides centralized control and instant selection of any audio configuration. The unit allows connection of 16 inputs and 16 outputs from any audio sources, with front panel controls to program audio path routing. Audio can be instantly directed to any desired location via one input, which can drive from 1-16 outputs simultaneously.



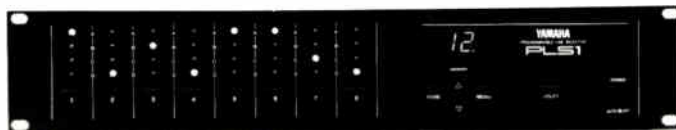
The Audio Matrix 16 switcher from 360 Systems.

Once audio routings are programmed, they can be saved as individual "patches." At the touch of a button, one hundred different patches can be stored, and you can queue any of the 100 preset patches into performance chains. By using the front panel controls or any normal open/close foot switch, patches may be recalled and sequenced. Audio Matrix 16 will store 27 different chains of up to 32 steps each. For a particular application, bypass may be programmed by the user to "normal" the system.

Patch Maps can be stored on each preset consisting of eight separate patch change commands and recalled instantly, using either front panel controls or remote MIDI patch change commands. The MIDI receive function allows the Audio Matrix 16 to switch between configurations when it receives patch change commands from any MIDI sequencer, keyboard, patch transmitter or other controller. Transmission of patch changes from a device locked to MIDI time code or any other synchronization format enables automation of routing, muting, and signal processing functions.

YAMAHA

The Yamaha PLS1 Programmable Line Selector features 8 channels of 4- in/1-out line selection with front panel switching and LED line status indication. It can store up to 99 different patch configurations in internal memory for instant recall. The PLS1 offers remote program selection capability via MIDI, so that patch configurations can be remotely selected from any MIDI device. Actual signal selection is handled by electromechanical relays for low-noise, distortion-free operation. Input and output connections are by 0.25-inch jacks. The PLS1 mounts in a standard two EIA-rack unit space. Channels can be combined to create more complex switching systems. The outputs from four



The Yamaha PLS1 programmable line selector.

channels can be patched to the A, B, C, D inputs of a fifth channel permitting selection of 16 different inputs to a single output.

By pressing a single key, the status of all eight of the PSLs line-selection channels can be stored in any of 99 memory locations. A memory protect function is provided to prevent accidental overwriting of previously stored configurations. When you need a stored patch configuration, simply recall the appropriate memory location. For easy identification, the selected memory location number is shown on a large, LED numeric display. An internal memory backup battery is included which retains the memory contents even when the power is turned off.

The PSL1 MIDI receive channel is fully programmable for compatibility with all MIDI equipment. A MIDI bulk out utility function can be used to transmit the contents of all 99 memory locations to a second PSL1 or to a MIDI recorder or similar bulk storage device.

AUDSCO/Audio Systems Company

Lynn Mader's goal at AUDSCO is to, "Use solid state switching to complement or even replace the jack panel." His company provides custom systems that (by combining preamplifiers and switching on the same card) allow microphone level inputs to be switched "live" without the noise and interface often associated with a mechanical patch bay. Because all switching is done at the same level, any problems caused by connecting different levels are eliminated. Since the control circuits do not carry audio, they can be mounted anywhere and do not necessarily have to be near the equipment room. Standard configurations can be pre-programmed by the use of diode matrix or computer allowing a setup to be as simple as one push-button.

Refined.

MA/MR Series mixer/amps put style in sound reinforcement. The MA/MR Series mixer/amps look right in any setting. Clean lines and a modern black finish add to their attractive, professional appearance.

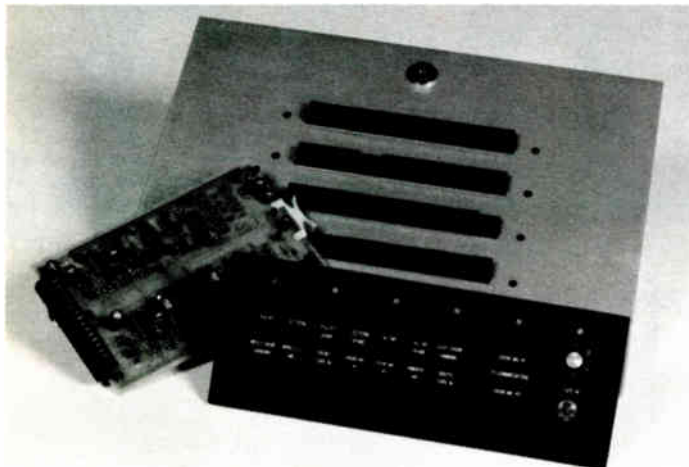
And behind the styling is pure practicality. The first of the new University Sound electronic products line, the MA/MR Series offers conservatively-rated outputs of 35, 60 and 100 watts, with the features you asked for. Two balanced mic inputs, two auxiliary source inputs and a switch-selectable mic or magnetic phono input are standard, as well as a rear panel "paging" input with automatic muting. The MR-355 model (35 watts) includes an AM-FM tuner for background music applications.

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An example of AUDSCO's custom-configured panels.

BSM

The 10x1 audio routing switcher can be used to switch various audio sources. A front panel momentary pushbutton switch drives solid state FET IC switching. In the front panel switches, LCD indicators show crosspoint status. By installing a second PCB, stereo is easily added in the field.

The 10x1 video routing switcher can be used to switch various video and audio sources. One can switch any one of 10 video inputs to the video output and any single or paired stereo audio input to the audio output—either together or independently—as an audio breakaway system. LED indicators show which video path and which audio path has been selected.

The Modula is software-based and may be easily customized before and after installation to accommodate changes in the system requirements. Matrix expansion occurs by installing circuit cards for additional inputs and linking matrix modules for additional outputs. The Modula remote network is based upon a software driven Collision Detection system, with practically instant response to routing changes entered from remote control units, regardless of matrix size or number of remotes. The sixteen level software security system provides access to sensitive material routed through the modula matrix.

An optional enhancement to the standard Modula processor module is the IBM Personal Computer. Since the matrix and the remote network are handled by the processor module, the IBM PC does not need to remain constantly connected to the Modula system. Modula's 30 MHz video bandwidth supports component video, high definition television (HDTV), digital imaging, and other critical applications. The Modula system matrix module backplane design eliminates coaxial and twisted pair signal wiring.

MiniModula is a miniature version of Modula system routing switcher. All audio and video performance parameters of the Modula system apply to the Mini switcher. Although physically smaller, MiniModula uses standard Modula system crosspoint and output cards.

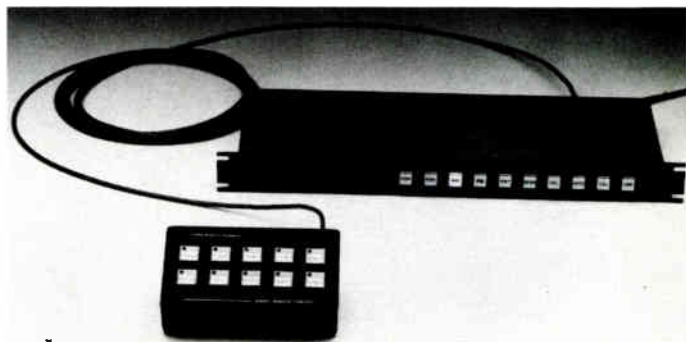
The BSM Cluster Series is a modular rack unit with the ability to install 11 different modules in any configuration the specifier

desires. The power/signal bus is a 12-pin motherboard. Various controls and communications signals to each module in the cluster frame consist of RS232C TX/RX, the BSM Modula processor/remote LAN, and 3 industrial control units (ICU) which are bi-directional serial pulse width modulated signals. A mixer can be assembled using the C250 microphone amplifier with a 4-input card. A full stereo system can be designed by duplicating the modules in the system and paralleling the control lines at the rack frame.

An 8x4 routing switcher with remote gain control and mix down in an 8x1 channel select/master gain unit can be assembled. The system allows for control in a manual mode or by using a computer or custom-designed control panels. A full 8x8 routing switcher with remote gain control can be setup by adding 4 more C230 ARS modules, a 4x4 C225 VCA module, and a 8 pot remote gain panel.

CONEX

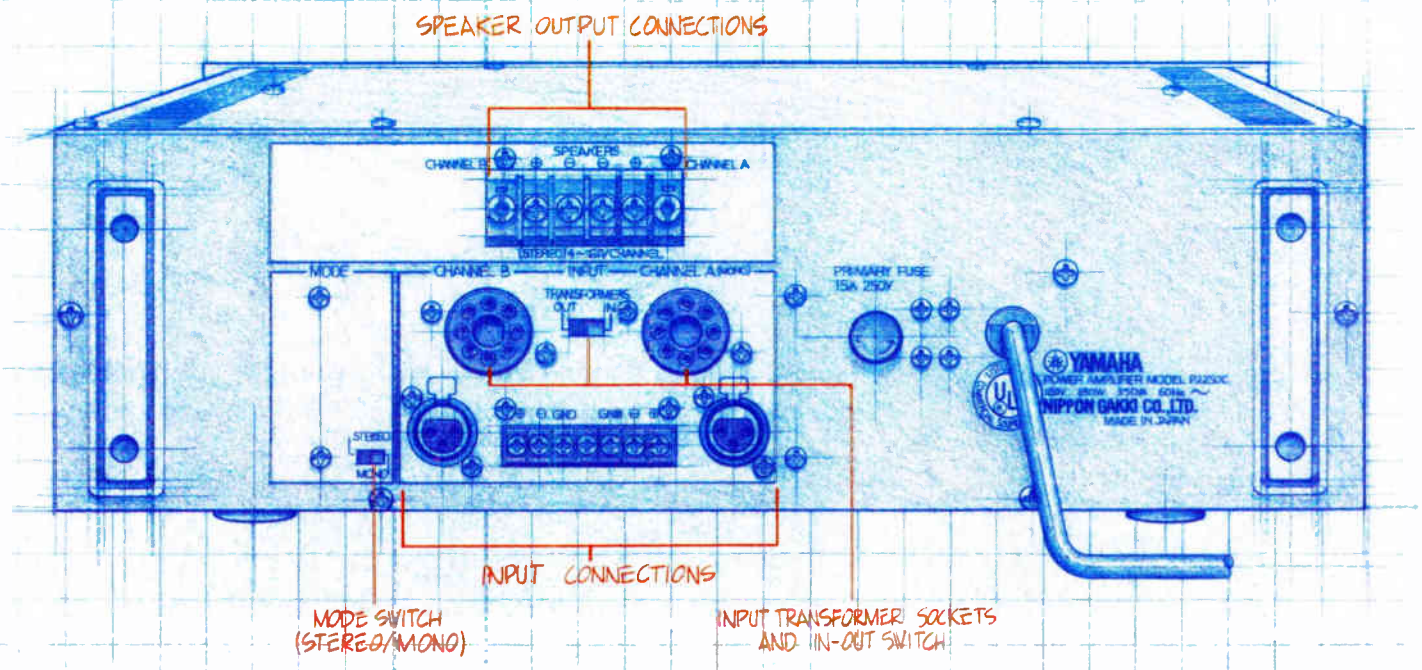
The Conex AS-101 audio switcher allows each of 10 stereo sources to be switched to a stereo output channel. Switching is accomplished by pressing an illuminated button on the front panel or remotely by a remote-control connector on the rear-panel. Several remote controls may be connected in parallel and each will indicate the selected channel. A single-space rack-mount auxiliary package houses a variety of optional boards including



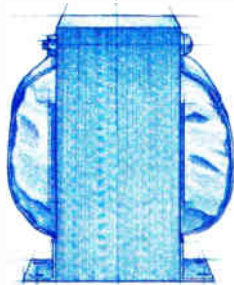
Conex Electro-Systems' AS101 audio switcher and AS401 remote control.

the RS-232/422 interface, a relay board making possible tape deck control, and a system board allowing the AS-101 to be transformed into a simple automation system, under the control of any inexpensive personal computer.

Features of the AS-101 include: 10 stereo inputs switchable to one stereo output; all audio and remote control connections are made with plug-in screw-clamp terminal blocks; transformerless balanced inputs and outputs; and multiple remote controls may be connected to the 7 wire remote control bus. The AS-202 expander board has up to 10 audio switchers which may



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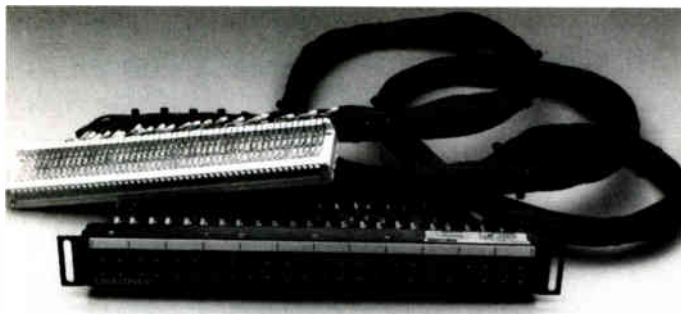
Circle 206 on Reader Response Card

be controlled by one RS-232 port by adding an expander board for each unit after the first.

The AS-501 intelligent relay board provides SPDT contact closures from 10 DIP-sized plug in relays. This board can be used for a variety of tasks such as tape deck start, screen up/down, or control of any external device. The ASA-501 can operate in three basic modes, stand alone operation, follow selected device and independent relay control. It is also microprocessor based. Another switch determines whether or not the relays are all turned off on a power-up reset. If not, they are left in their magnetically latched states. The relay board can operate by itself by adding the RS-232 serial interface board and a power supply module. This would allow computer control applications not related to the audio switcher.

GENTNER

Gentner has passive audio routing switchers with quick, easy selection of sources to a destination. Rather than "crosspoint" switchers, they are input selection devices that use magnetically latched relays. The 10A switcher allows selection of any ten stereo inputs to a stereo output. If power should fail, the source will remain selected due to a relay switch. These switchers can be used to route audio, data, and control signals. The routing distribution amplifier is neither a patchbay or a routing switcher, although used in similar applications. The RDA can be connected with up to eight inputs, any of the inputs, or any combination of inputs, can be routed to any of the 28 outputs.



One of the pre-wired patch panels offered by GENTNER.

GRASS VALLEY GROUP

The TEN-XL Series routing switcher system is modular. Options can be added, and modules are easily removable with a screwdriver. The basic chassis is one rack unit high and has module slots for a video/controller module, one or two audio modules, and power supply module. On the bottom of the video crosspoint/controller module, an optional serial interface module or tally relay can be mounted. The TEN-20 has 10 inputs and 20 outputs within a compact matrix routing switcher system. The 20-TEN has 20 inputs and 10 outputs within a compact matrix

routing switching system. Up to 4 control levels are selectable on video and/or audio matrices, which can be controlled together or separately. Also available are optional control panels, serial interface and redundant dual power supplies.

The Horizon family has sizes ranging from 16x16 to 128x128 and the ability to handle analog, digital, and data signals. Horizon's applications include component video, parallel digital video, analog audio, time code and data. Matrices are available in a wide range of frame sizes. Features include: reprogramming in the field; reassign inputs; change transcoding, set and cancel source inhibits; and partition into smaller switchers. Any combination of video and audio can be configured with a variety of control levels. Level refers to the matrix, or group of matrices, which can be controlled separately. More than one matrix can constitute a level. The system can switch signals with non-standard scan rates like x-ray and computer display/graphics. It uses an eight-input-by-sixteen-output crosspoint module making the Horizon a "matrix" switcher rather than a destination oriented switcher.

The HX-RS relay matrix permits switching of any data or signals compatible with two-, four-, six-, or eight-wire applications. It can be installed as an independent level in an existing Horizon system or installed as a "free-standing", relay-only system.

The Horizon routing systems can be controlled either by external computers or dedicated control panels. The control system will accommodate up to 240 separate control devices. The Horizon HX-48 and larger analog systems have single plug-in video and single plug-in audio monitor circuit boards as options.

HEDCO

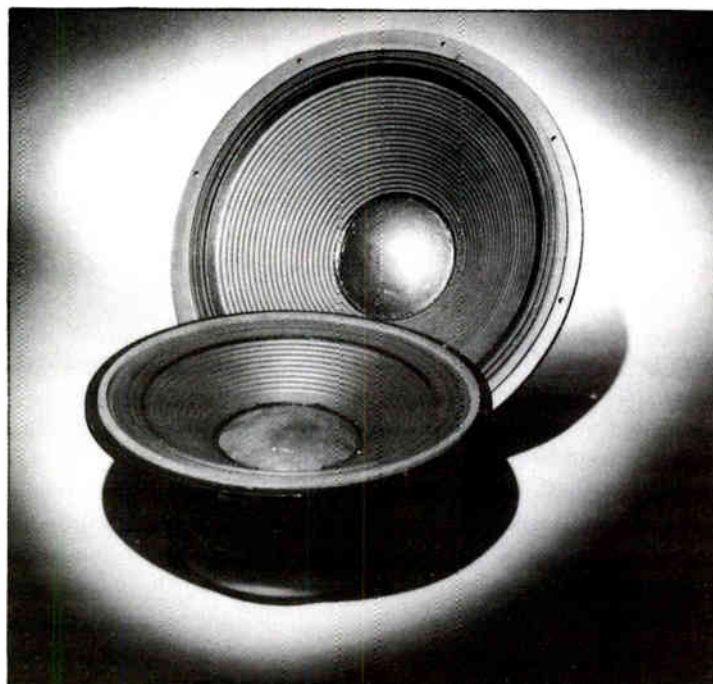
The Hedco 1600 Series data router has a four wire operationally transparent regenerative digital system providing 16x16 2-way digital paths for data routing. Control is by RS-422/RS-485 W-Y communication bus. This router can be controlled alone, or with a companion video and/or audio router. Local and remote control panels are available. An SCE-101, RS-232 serial interface card provides alpha-numeric labels. The switcher pin out is standard for TV digital control interface ANSI/SMPTE. The router configuration is two black planes, one for tributary pin out and one for bus controller pin out. The units include 16 each of input and output receiver and transmitter pairs.

Hedco carries a full line of routing switchers, terminations,



The HD-1600 data router from Hedco.

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audio/video distribution amplifiers, and NTSC source synchronizing pulse generator. The Hedline Series includes AVM 16x1 video and stereo audio switchers, SAB 8x1 single bus switchers, component switchers, IRS Series intermediate routing switcher, TWS Series 12x1 single bus switchers, multibus switchers, and HD 12x12 switching.

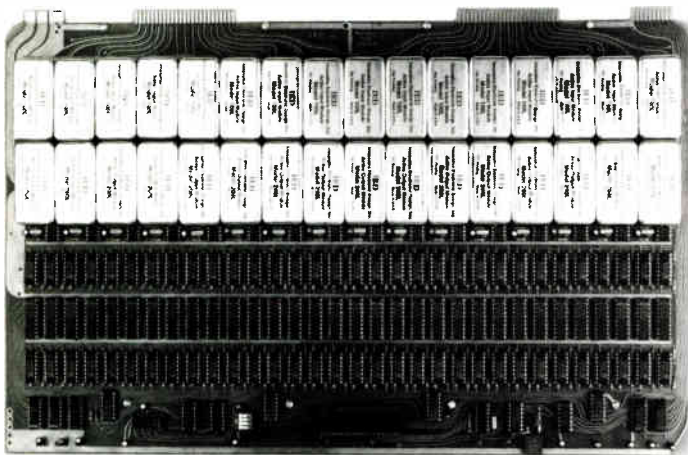
The Hedline 4x1 audio video switchers are self-contained including on-board power supply. The SVS-345 video switcher is a vertical interval switcher with full broadcast specifications offering a 30 MHz bandwidth. The SAS-345 audio switcher has two balanced outputs plus a monitoring phone jack on the front panel. They are available as stand-alone units or rack mounted with three or ten to a frame with any of the HEDLINE products. Audio and video switchers both have looping inputs for output expansion up to 4x4, and audio can be married to video for AFV operation.

The TWS has a twelve input, single bus switcher available in either video or stereo audio configurations. Looped together, the units can be controlled in parallel for stereo AFV operation. The front local control panel plugs into the main circuit board and can be extended up to 300 feet for use as a remote panel.

The AVM series can be configured as video only, stereo audio only, or video with stereo audio AFV-16 input, single bus switchers. Input connectors can be any of three types: RCA phono plugs, miniature XLR or barrier strips and either terminating or looping video inputs.

IED

The IED Model 516 switch matrix contains up to six 516 switch cards in a single, rack-mountable housing. This system includes power, cooling, the physical mount, and method of connection for 96 inputs and 96 outputs available to the user. The switch matrix includes a switching card which performs the function of an audio mixer and switcher having 16 balanced, isolated, differential amplifiers on the input (IED Model 100L) and 16

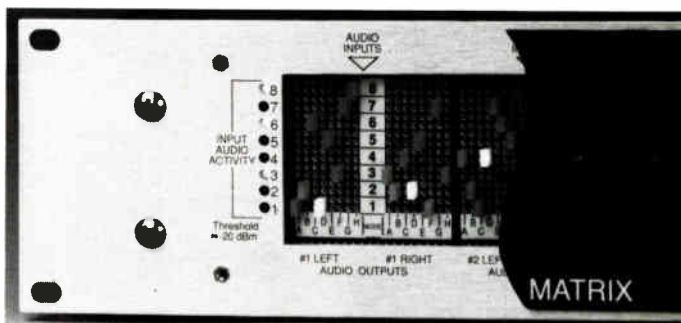


The IED model 516 switch matrix.

balanced, floating isolated line drivers (IED Model 200L) on the output. The RS422 serial interface from a computer can remotely select 16 inputs to any, all, or a combination of the 16 outputs. A gain resistor on each of the 16 line input amps allows anything from -20dB to +24dB with the appropriate resistor. The output amplifiers are completely independent 600 ohm line drivers with a +24dB output capability. The Model 516 card can interface, decode, store and switch all the information sent to it from the computer which selects any or all of the 256 analog switches on the card. Multiple units may be ganged together to form larger matrices.

LYNTEC

The Lyntec matrix audio switcher, a line level audio switching system, may be field pre-programmed for 8 different MODES or room configurations. Eight input channels are routed to up to 10 transformer isolated output channels by a solid state audio



The Lyntec Matrix audio switcher, showing cutaway view behind the plexiglass security cover.

switch. This switch is controlled by a matrix, programmed by installing LEDs in matrix sockets which are located behind a front panel plexiglass security cover.

The output priority encoder provides priority programming. Commanded by a priority encoder, the solid-state switch connects the audio input to the output. The encoder forces the solid-state switch to connect the output to the highest number LED lit in the matrix. The output priority allows the user to put higher priority on one particular input over other inputs. For example, suppose one needs two levels of priority paging—a local priority mode which overrides the regular program and an emergency page mode which will override local paging.

ROH

The ROH division of Anchor Audio recently introduced an audio routing switcher, the ARMS7000. The ARMS7000 allows input signals to be mixed in any combination, and assigned to any output. It is available in mono, stereo, or a mixture of both. The switcher is capable of handling 16 inputs by 16 outputs to over
(continued on page 66)

U P D A T E



Contracting Close-up

Reports From Rosner Custom Sound, DM Audio.

Recent Installations By Rosner Custom Sound

Rosner Custom Sound of Long Island City, NY, has been busy lately with a number of installations in the New York area.

Rosner installed a sound system for Indigo Blues, a jazz club in Manhattan, in just four weeks from proposal to opening night in December. The system was designed by Alex Rosner, using JBLs for the midrange and high frequencies and Klipsch bass horns for the bottom, the company said. Eight two-way custom made midrange cabinets cover the rest of the room in two time delayed zones. Two omnidirectional tweeter arrays are suspended over the dance floor and three bass horns are recessed under the stage.

Ten Biamp stereo amplifiers with built-in limiters power the entire system in Indigo Blues. A 24-channel Soundcraft control console plus a Rane disco mixer are used with the various microphones, tape decks, compact disc changer, disco turntables, plus stage and control room monitor loudspeakers.

Another installation by Rosner Sound is a Klepper, Marshall and King design for the First Presbyterian Church in Greenwich, Connecticut in November. A JBL4660 loudspeaker system was suspended 30 feet up, with help from an additional pair of horns splayed sideways into the transepts. A large Tascam board, together with an Industrial Research Products auto-

matic mixer were used, with power by a four-channel Altec amplifier. Three 1/3 octave Industrial Research Products equalizers and a couple of UREI LA-4A limiters are part of the system. Klepper's acoustic redesign of the Church improved the intelligibility of speech as well as the quality of or-

private passenger ship in Athens, Greece, named the M/V Emma, and a similar disco sound system built in one of the Royal residences in Saudi Arabia were first built in New York and then sent to the sites to be installed by two Rosner contractors and local staff.

In late December, Rosner finished a system for the Deeper Life Christian Fellowship Church in Richmond Hill, New York. In 1984, the company installed a JBL 4660 loudspeaker system there, which worked fine until the chapel was enlarged. The company designed a central cluster, partially



Indigo Blues

chestral sound, according to Rosner.

Other systems the company designed and installed include the Seventh Day Adventist Church of Corona, New York. Rosner built a horizontal loudspeaker column, angled and partially recessed in the ceiling, using 24 JBL LE8TH full-range loudspeakers in the Church.

A disco sound system aboard a

recessed in the ceiling, consisting of three 2380A horns with 2450J drivers and two 2225H bass drivers in a pair of 4560A bass horns, behind the high frequency units. Eleven small full-range ceiling-mounted loudspeakers, on time-delay help out in the mezzanine, Rosner said. The sound reinforcement system is controlled from a RAMSA 20 channel console at the

back of the room. Recording will be controlled from an isolated recording control room in the mezzanine. Video recording is set up in an adjacent room.

DM Audio Supplies Sound To Globe Arena in Stockholm

DM Audio of Stockholm, Sweden, has installed a sound system in Stockholm's Globe Arena. The installation, completed in February, was headed by Lars Wern and Jan Petersson of DM Audio. DM Audio is owned by Englund Music who represent QSC, Rane, DigiTech, Korg and other brands of equipment for the Swedish market. Acoustics for the Arena were handled by Tunemalm Acoustics, Umea, Sweden.

The Arena, "the biggest building of its kind in the world," is housed in a spherical building with a diameter of 110 meters, and a height of 85 meters from the "icefloor" to the ceiling, according to Petersson. The audience, with a maximum of 16,000, can be seated up to the equator level. Above this level, the inside walls are covered with acoustic absorption material with a white surface making it possible to project pictures and laser effects.

The sound system for the Arena includes a mixer from which the signal passes through an Aphex Compellor 301. The output is split to four Rane GE30 EQs, each one followed by a LAB SPL loudspeaker processor. The LAB SPL, manufactured in Sweden, is a X-over with built-in RMS and Peak limiters, phase delays and horn power response EQ. All parameters are user-set to optimize the speaker system.

The low and high outputs are fed to a modified Rane HC6. The left channel of each channel is phase-reversed, and the HC6 is used as a balanced driver to send the signals to 40 pcs of QSC MX 1500 amplifiers. The amps are mounted in six racks inside the

loudspeaker cluster.

The loudspeaker system is a central cluster design with 16 Bass-reflex boxes, each containing 3 JBL 2240s and 2 JBL 2445/2386s, and in some boxes 2 2445/2385s. The loudspeakers cover the main galleries in two levels around the Arena. The boxes are mounted in two rings of eight in the cluster and the amplifiers are mounted in racks "inside" the cluster. For downfill on the "icefloor" there are six loudspeakers. Henrik Staffeldt, of JBL Professional, helped design the loudspeaker cluster. The loudspeaker boxes were built by Septon Electronics, the JBL agent for Sweden.

The central cluster is positioned 20 meters above the floor and below is a

Sony Jumbotron with four screens. The loudspeaker cluster passes through the Jumbotron on its way up and down.

The public area outside the arena contains a distributed sound system. The support and operational areas of the Arena include approximately 650 JBL 8140 loudspeakers and 90 Atlas/Soundolier AP15T environment-resistant loudspeakers.

The Arena is part of Hovet, a new city district in Stockholm, that will include ten office buildings, a 300-room hotel and a shopping center. The Arena will be used for entertainment shows, such as the circus and rock concerts, and major sports events, including the World Ice Hockey Championships in April 1989. ■

People

Roudebush Moves to Orban Associates; New Sales managers at Sonance, JBL

Sonance Names Assistant National Sales Manager

Sonance has named Caroline Kelley assistant national sales manager, a newly created position. Kelley joins Sonance from the banking industry, where she was a preferred banking officer with the Bank of America.



Caroline Kelley

Kelley will be responsible for maintaining communication with the company's rep network and will be actively involved with dealers, according to the company. She will also be responsible for the creation and administration of Sonance sales programs.

Orban Appoints Roudebush

Orban Associates has appointed David Roudebush to the position of marketing and sales manager for Orban's Professional Products "Blue Panel" line.

Roudebush will be responsible for worldwide marketing and distribution of Orban's "existing and upcoming" products, excluding the OPTIMOD and broadcast transmission products, which will continue to be managed by Howard Mullinack. Roudebush had most recently been sales manager at Otari Corporation, where he was responsible for domestic and Latin American sales of all Otari products.

Cornell Adds to Engineering Staff

Cornell Electronic Products, Inc. has added Bill Ubert to its engineering



staff. Ubert will be responsible for the development and promotion of the firm's new prison security systems product line.

Ubert has held engineering positions with Allen Bradley, Collins Radio and General Electric Company. Prior to joining Cornell in January, Bradley was a corporate engineer for the Miller Brewing Company, where he accepted early retirement in December of last year.

Fuji Appoints New Account Rep

The magnetic products division of Fuji Photo Film U.S.A., Inc. has appointed Barbara Nason to the position of account representative, consumer products, in the Midwest region. Nason will be responsible for sales of Fuji's consumer audio and videocassettes in

Illinois and Wisconsin.

Prior to joining Fuji, Nason was Midwest regional sales manager for Home Video at Urban Classics Video. She worked for Hal Roach Studios as a sales representative before her position with Urban Classics.

Linsenmayer Joins TCI as C.O.O.

Paul Linsenmayer has joined TCI as Chief Operating Officer (C.O.O.). As Northern Telecom's director of service, Linsenmayer was responsible for overseeing the operations portion of the joint venture between Northern Telecom and Pacific Telesis which became known as PacTel Meridian Systems, where he assumed the title of vice president of PacTel. Linsenmayer comes to TCI with over ten years experience at both Northern Telecom and

PacTel where he was directly responsible for growing sales from \$30 million to \$100 million, according to TCI.

New Managers at JBL Professional

JBL Professional has appointed Neil Conley to the new position of sales manager for JBL and UREI Electronics products. Conley has been with JBL Professional for eight years as the regional manager for JBL's south central region, which includes the southwestern United States and Mexico.



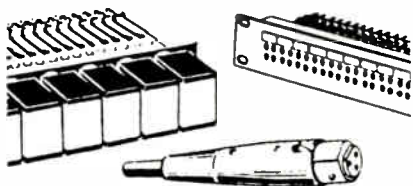
Neil Conley

Conley will directly be involved in the forecasting, planning and implement-

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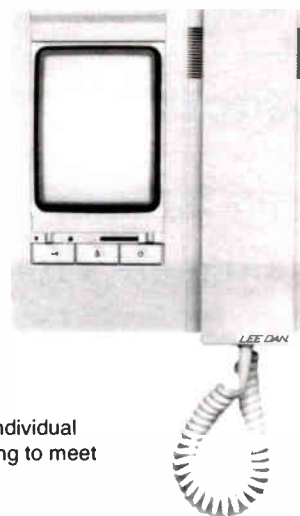
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Circle 232 on Reader Response Card

ing of sales and distribution policies for JBL and UREI Electronics products. As sales manager, Conley will be a direct link in the line of communication between JBL's representatives and corporate headquarters, helping to coordinate an "efficient, effective flow of information and communication between

the two," according to the company.



Bill Schuermann

Bill Schuermann replaces Conley as regional manager for JBL's south central U.S. territories and Mexico. Schuermann's most recent position was with

Antech Labs as vice president of sales. He also has experience in the pro audio industry as a sound contractor and as a manufacturer's representative.

Ortel Names Director of Sales

Ortel Corporation has named William J. Moore as director of sales.

In charge of Ortel's worldwide sales, Moore's primary responsibilities include sales development, on-line sales

support and training for customers and representatives. Along with expanding Ortel's product representatives program, Moore is developing the CATV and broadband area network markets for Ortel.

Before joining Ortel, Moore was the major accounts marketing manager for Hewlett-Packard.

Phoenix Promotes Barron

The Phoenix Company has promoted Tom Barron to national accounts manager. Barron, formerly Midwest sales representative, is now directly responsible for overseeing Phoenix's large scale and direct national accounts.

Cote Joins The Enright Company

Diane Cote has joined The Enright Company as sales manager for northern California. Cote was previously with Sony in its broadcast video and pro audio divisions.



Diane Cote



EMX2300, with 12 inputs. Suggested retail prices for the series are \$1795 for the EMX2150, \$1995 for the EMX2200, and \$2195 for the EMX2300.

The RTC1 remote control unit is a MIDI-based control unit that adds new features and advanced capabilities to the DMP7, DMP7D and DMP11 digital mixing processors. It allows centralized control of up to four DMP mixers and adds "analog-like" control of EQ, pan and special effect settings.

Circle 1 on Reader Response Card

HME Systems For Power

HM Electronics, Inc. 700 series of cabled intercom products include the RP743 four-channel power station, which allows two headsets to have communication access to any of the four independent channels. The RP743 features interruptible fold-back (IFB), which allows a program being fed to an intercom channel via the auxiliary input to be replaced by the headset mic audio.



The RP753 four-channel matrix power station is rack-mountable and has a panel of matrix switches which assign twelve stations or groups to one of four independent channels or two private lines.

Products

Yamaha Introduces New Consoles; New Monitors From Peavey, JBL

Yamaha's New Consoles

Yamaha's PM2800M professional audio mixing console is available in 32 and 40-channel configurations. Each console features eight mix busses and a stereo master buss, eight different monitor mixes and four additional busses from the auxiliary sends.

The MR series of professional mixing consoles has four mixing busses and a stereo master buss. It is available as the MR842 with eight inputs, the

MR1242 12-input model and as the MR1642 with 16 inputs. Suggested retail prices for the consoles are \$1295 for the MR842, \$1595 for the MR1242 and \$1895 for the MR1642.

The EMX series of stereo powered mixers feature a built-in digital signal processor, dual graphic equalizers and built-in high-power stereo power amplifiers. The series consists of the EMX2150, with six inputs, the EMX2200, with eight inputs, and the



The RP735 adds the feature of a speaker to the RP733 two-channel power station. The RP755 adds a speaker to the RP753 power station. This allows the user to walk around without wearing a headset and be able to respond.

The PD100 Power Distribution System operates any combination of up to eight units in the Series 50 line of wireless microphones. The Series includes the RX520 Switching Diversity Receiver, the RX522 Portable Receiver and the DN100 Antenna Distribution System. The PD100 speeds up the set-up time of multi-compatible systems, according to the company.

Circle 2 on Reader Response Card

Carver Magnetic Field Power Amp

Carver Corporation has introduced the PM-100 single rack space magnetic



field power amplifier. The PM-100 features a high efficiency linear tracking fully complimentary output stage, Carver's exclusive clipping eliminator circuitry, series/parallel mono capability, barrier strip inputs, front panel metering and a headphone jack. It has a suggested retail price of \$629 and will be available in April 1989.

Circle 3 on Reader Response Card

BGW Introduces New Power Amplifier

BGW Systems has introduced the

BGW Tri-Amp Grand Touring Amplifier, an advanced amplification system that can power a three-way loudspeaker setup in a compact package only two rack spaces high. The Tri-amp's electronics include three separate power amplifiers with a total of one thousand watts, plus 24 dB/octave Linkwitz-Riley crossovers and a 12 dB/octave high pass filter.

Circle 4 on Reader Response Card

New Loudspeaker Systems From JBL Professional

JBL Professional has added the Control 10 and the Control 12 SR to its Control Series line of monitors. The Control 10 features a 12-inch low frequency transducer, five-inch cone midrange and a one-inch titanium dome tweeter. The Control 12 SR features a 12-inch low frequency trans-

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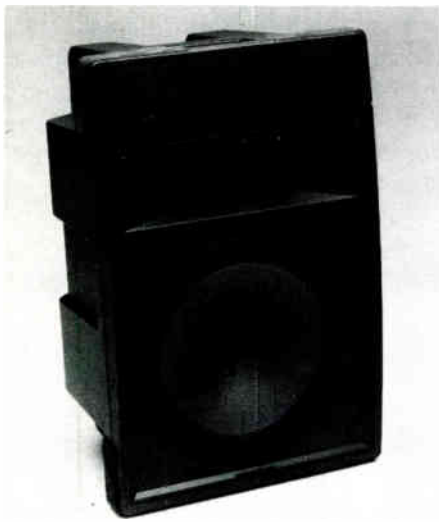
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Circle 236 on Reader Response Card

ducer and a one-inch exit compression driver on a Flat-Front Bi-Radial horn.



JBL's Performance Series protective covers are the latest addition to the line of speaker systems. Made of heavy duty naugahyde, Performance Series covers are custom tailored to fit all models and protect the speakers during transit, storage or other situations, according to the company.

Circle 5 on Reader Response Card

Peavey 112HS Monitor and The Gatekeeper

Peavey Electronics 112HS Powered Monitor is a self-powered wedge-shaped enclosure that changes the stage foldback picture radically, as it delivers an alternative dimension in performance monitoring. It is designed for performers who need a number of medium-power monitor enclosures on stage. The 112HS has a suggested retail price of \$299.99.



Peavey's Gatekeeper is a five channel noise gate with one channel dedicated to vocal use. This channel

automatically opens when absence of signal is detected by the other four channels. This enables conversational level announcements to be made without readjusting thresholds from live performance levels, according to the company. The Gatekeeper has a suggested retail price of \$299.99.

Circle 6 on Reader Response Card

Bose 302 Series II Acoustimass Bass System

Bose's 302 Series II Acoustimass Bass System is designed for use as bass reinforcement with the Bose 802 II loudspeaker. It features the Bose-patented "Acoustimass" speaker technology and a revolutionary new woofer.



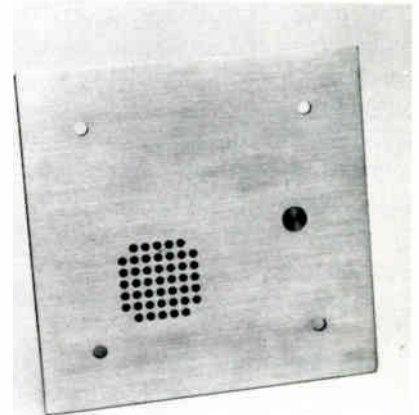
Circle 7 on Reader Response Card

Atlas/Soundolier Remote Loudspeakers

Atlas/Soundolier has introduced Series VPCS and VPVT remote loudspeakers/signalling stations. Both Series combine mechanical construction, heavy duty electroacoustic components and an 11 gauge steel face plate with vandal proof hardware for protection in "the most abusive or demanding installation environments."

Series VPCS models, supplied with a five watt resin-impregnated phenolic

cone loudspeaker, provides voice and signal transmission in law enforcement and detention facilities, fast food drive-ups, classrooms and workshops and emergency and diagnostic care centers, according to the company.



Series VPVT models, with 15 watt Voice/Tone compression driver, are designed for installation within individual jail cells and correctional facilities and for use in public access area communications as in lobbies or entranceways and in a number of other places, according to the company.

Circle 8 on Reader Response Card

Apogee Expanded Hanging Hardware

Apogee Sound Inc. has expanded hanging hardware for its full line of microprocessor controlled loudspeaker systems. The line of hardware consists of accessories to make hanging both easier and safer, according to the company. All eight of the company's speaker enclosures can use the hardware.

Circle 9 on Reader Response Card

Bruel & Kjaer's Head & Torso Simulator

Bruel & Kjaer's Head & Torso Simulator (HATS), type 4128, has been developed for research and evaluation of a variety of electroacoustic and acoustic devices, such as telephones, head-



sets, group audio terminals (GATs), microphones, headphones, hearing aids and hearing protectors, according to the company. The type 4128 also has applications in the evaluation of room acoustics, vehicle audio systems and noise control measures in vehicles.



Circle 10 on Reader Response Card

Connectronics Patch Bay System

Connectronics Corporation has introduced a Patch Bay System which provides for complete flexibility of connectors, according to the company. The "J" Bay is a circuit card based system comprised of two rows of 22 (44 in all) 1/4-inch jack sockets. The KV (Kit Version) format enables the hardware (panel and fixings) to be supplied together with any combination of wide range of connectors.



Circle 11 on Reader Response Card

Community Light & Sound M4 CoAx

Community Light & Sound's M4 CoAx has been designed for the sound contractor and sound installation market, the company says. The M4 CoAx allows any of the company's PC 400 Series high frequency horns to be coaxially mounted directly in the center



of a matching M4 PC 1500 Series horn with a PCMX mouth extension.

Circle 12 on Reader Response Card

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A Closer Look

The Ghielmetti Crossbar Distributor

by Gary D. Davis

When I first saw this product at the Audio Engineering Society Convention last November, I was at once taken by the elegance and power of the concept, the ease of use, and the relative difficulty of explaining it in print. That is why we have reproduced the accompanying illustrations, taken from the manufacturer's literature. What is it? The *Ghielmetti Crossbar Distributor* is a system of connecting audio signals which acts something like a patch bay, but does not use patch cords. Instead, special multi-pin plugs are inserted into a flat panel to connect two or more circuits. This system of cross-connection, through-connection, and signal distribution is useful with audio signals in that leakage is minimized, and the connections are easy to verify visually (unlike the typical spider web of cords on a crowded patch bay).

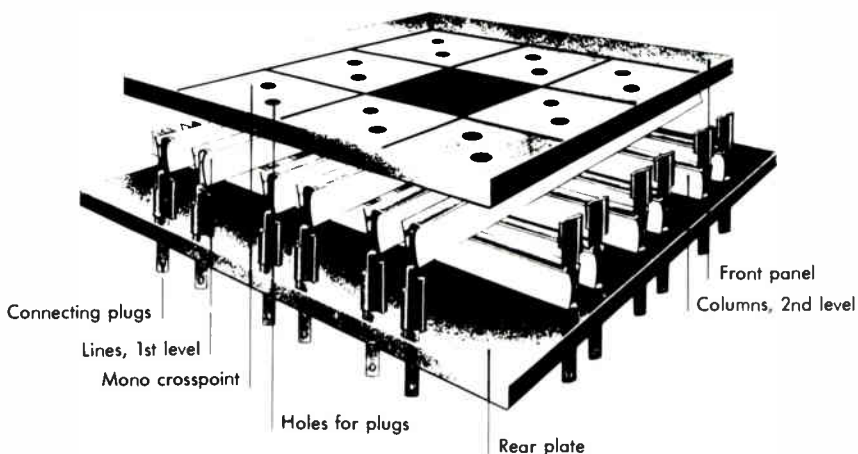
Crossbar distributors are available in a variety of standard configurations for two, three or more wire circuits. The front panels are color-coded, making it easy to segregate related points. The standard distance between adjacent holes for some of the systems is 3mm (about an eighth of an inch). These connections can handle signal levels up to 50 volts, or plus 36 dBm, and have about 0.8 to 1 milli-ohm contact resistance, or half that per pair of contact bars per hole pitch. Insulation resistance of a parallel pair of contact bars across 10 plug positions (at 80 to

90 percent relative humidity) is 5 times 10 to the third power Megohms. Capacitance between two parallel pairs of bars across 10 plug positions is about 5 picofarads, or 3.1 pf for two crossed pairs of bars.

Still other Ghielmetti systems use a 6mm (about 0.25 inches) grid, and are

suitable for loudspeaker lines; their maximum voltage is 220, or the 100 volts at 300 watts. These larger contacts have about 0.5 to 0.7 milli-ohm contact resistance, or half that per pair possible to connect several jack sockets in series without having to use patch cables.

The crossbar distributor system is created internally in layers, which enables Ghielmetti to provide multiple functions at a single connection point on certain models. Patch plugs are available (in mono or stereo) in the following configurations: an access jack socket (to which it is possible to



of contact bars per hole pitch. Insulation resistance of a parallel pair of contact bars across 10 plug positions is about 6 picofarads, or 4 pf for two crossed pairs of bars.

The space required for a jack socket in a balanced circuit is only 12 times 12mm, so up to 32 sockets can be accommodated across a 19-inch crossbar front panel. By arranging the contact bars in tiers, Ghielmetti makes it

connect either the input or output of a piece of equipment, or a modulation line), a parallel jack socket (which is inserted in modulation paths and makes it possible to tap off the signal, or to form an independent unit if several are wired together), or a connecting jack socket (which is inserted in modulation paths to create an open-circuit, or which connects the output of a piece of equipment with the input of the next

Gary D. Davis of Topanga, CA, has been a technical writer and audio consultant since 1974. Along with his associate Ralph Jones, he authored the Yamaha Sound reinforcement Handbook.

piece of equipment). Special double jack-socket combinations enable the plug to open-circuit the jack or connect a path while simultaneously tapping off the incoming signal. Triple jack-socket combinations further provide a parallel jack so that a path can be open-circuited or connected while simultaneously tapping off the incoming and outgoing signals; its combination is suitable for hookup of external equipment or in the event of equipment failure, for patching in measurement and test equipment.

Special shielding (*crosspoint screening* is the term Ghilmetti uses) minimizes crosstalk between lines in a given area. They do recommend, however, that additional shielding be in-

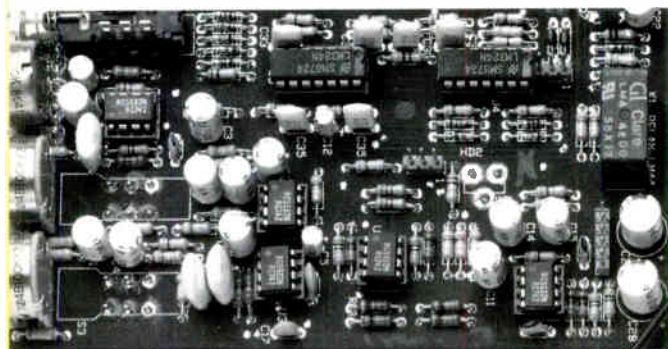
stalled between high-level and low-level lines when several very large crossbar distributors are connected.

Interface of the crossbar distributor to the rest of the sound system can be accomplished in one of several ways, depending on the model selected and the system requirement. Connections are made via loop-end solder posts, square wire-wrap pins, or round pins that mate to a printed circuit board. The panels typically mount in a standard equipment rack.

The contact bars are made of beryllium bronze strips which are hardened, nickel-plated, and then gold-plated. This provides a good combination of corrosion resistance (gold), electrical conductivity (copper), and springiness

(beryllium) to maintain proper contact pressure. The various layers of the system are comprised of polycarbonate (which is a good insulator and a strong substrate), with metal shielding plates, and a laminated front panel which can be painted in a variety of standard colors or custom-colored to match the customer's requirements.

As we stated up front, it is difficult to present a cohesive discussion of the Ghilmetti crossbar system (really multiple systems) in print — given the limited space in this column. If you ever need to install a patch bay or distribute signals in a fixed sound installation, we definitely believe that Ghilmetti deserves your *Closer Look*. ■

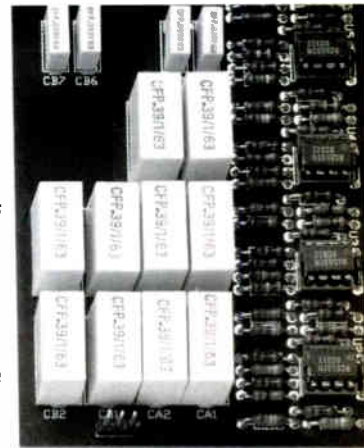


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Maximum Output	+27 dBm	+24 dBm	+22 dBm	+22 dBm
Dynamic Range	+117 dBm	+114 dBm	+112 dBm	+112 dBm
Frequency Response	18 Hz to 30 kHz +/-0.5 dB	10 Hz to 40 kHz +0/-3 dB	20 Hz to 20 kHz +1/-2 dB	20 Hz to 20 kHz +/-0.5 dB
Number of Bands	31	30	30	30
THD plus noise	Less than .005% @ +22 dBm @ 1 kHz	Less than .01% @ +4 dBm	Less than .5% @ +22 dBm	Less than .01% @ +4 @ 1 kHz
Suggested Retail Price	\$550.00	\$749.00	\$849.00	\$1,050.00

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*All specs taken from manufacturers' published literature.



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Circle 224 on Reader Response Card

World Radio History

Literature

Catalogs From AMP, Jensen Tools

Catalogs From AMP

AMP's 44-page catalog covers the AMP multiple COAXICON coaxial connector family, which incorporates a variety of male and female contacts into plastic rectangular housings or inserts with metal shells. Catalog 74-286 provides information to aid in the selection of primary units and optional hardware.



Circle 13 on Reader Response Card

AMP's catalog 75-338 provides details on the range of standard solderless terminals and splices available from AMP. The 64-page catalog covers more than 1,200 products, including hand tools and high-speed automatic machinery.

Electronic Components Publishes Switch Catalog

Electronic Components Groupe has published a new product catalog featuring its line of switches. The 50-page full color catalog contains product descriptions, technical information, package dimensions and special features for a variety of switch product types. The catalog also incorporates a com-

plete list of authorized Electronic Components Groupe distributors.

Circle 14 on Reader Response Card

Auditex/Voice Processing Sourcebook

The Auditex Directory & Buyer's Guide, from ADBG Publishing, outlines the products and services in the voice processing and auditex field. The Fall/Winter 1988-89 104-page sourcebook lists 649 voice processing hardware and software vendors, telephone companies, voice service bureaus, auditex program producers, publications, trade associations and professional firms. The Guide is priced at \$25 and is available from ADBG Publishing. Circle 15 on Reader Response Card

Jensen Tools Catalog Supplement Names Tools

Jensen Tools' 96-page catalog supplement details major brand name tools, tool kits and test equipment for service of computer/electronic equipment.



Circle 16 on Reader Response Card

Illustrated in full color, the catalog introduces new diagnostic software and other field service systems.

Calendar

Upcoming Events

APRIL

National Relay Conference: Stillwater, OK. Contact: 219-264-9421. April 17-19.

International Security Conference (ISC): Anaheim, CA. Contact: 312-299-9311. April 25-27.

National Association of Broadcasters (NAB): Las Vegas, NV. Contact: 202-429-5300. April 29 -May 2.

MAY

Electronic Distribution Show (EDS): Las Vegas, NV. Contact: 312-648-1140. May 9-11.

National Fire Protection Conference: Washington, DC. Contact: 617-770-3000. May 15-16.

National Council of Acoustical Consultants (NCAC): Toronto, Canada. Contact: 201-379-1100. May 20-22.

National Sound and Communications Association Expo and Conference '89: Nashville, TN. Contact: 312-593-8360. May 25-27.

JUNE

National Association of Music Merchants (NAMM): Chicago, IL. Contact: 619-438-8001. June 17-20.

RESIDENTIAL A/V

(continued from page 44)

three years the company has done approximately 20 similar installations in homes across the country, in New York, Boston, Aspen, and Pittsburgh.

"It's a growth market—but not an opportunity for everybody," Newcome explains. "The ability to sell to people with a lot of money takes a unique blend of skills—I call it 'Top-Down Selling'. [The client] wants to feel that he's dealing with a peer."

Simple convenience for the client is the key to this market, Newcome insists: "The market involves people who want things to work without the tech bullshit. If I do my job correctly, as an electrical engineer, then you don't have to be an electrical engineer to work [the system]. It should be simple."

Equipment List

Residence, Columbus, OH

ADS

- 2 CC-4 Stereo Control Centers
- 12 L-300 2-way Loudspeakers

4 PA-4 Power Amplifiers

6 R-4 Stereo Receivers

Blonder-Tongue

1 450-50 RF Distribution Amplifier

1 FAVM-450 Frequency Agile A/V Modulator

Bose

2 101 Environmental Loudspeakers

22 102-25V Environmental Loudspeakers

1 102-C Audio Controller/Equalizers

Electro-Voice

4 AT-100 Audio Autoformers

JBL

2 6260 Power Amplifiers

M&K

8 V-1B Powered Sub-woofer Modules

NEC

3 PR-2600A Televised Receiver/ Monitors

1 DX-5000 VHS HiFi VCR

Newcome

3 AC-2 AC Controls

1 FSD-1 Subwoofer Filter/Line Driver

11 IRR-200 Infra-red Command

Receivers

2 NC-4000 Command Computers

8 RM-1000 Remote Control

Transmitters

1 CD-1000 30-disc Controller

Niles Audio

18 SCW-1 Autoformer Level Controls

3 ADA-6 Audio Distribution Amplifiers

1 VDA-6 Video Distribution Amplifier

RTS

2 444 Audio Buffer Amplifier

Shure

1 FP-16 Audio Distribution Amplifier

Sonance

5 Sonance III 2-way Flush Mount Loudspeakers

30 Sonance IV 2-way Flush Mount Loudspeakers

2 M-30 2-way Flush Mount Loudspeakers

Sony

3 CDP-C10 10-disc CD Players

1 EV-700U 8mm Video Cassette Recorder

1 TCR-503 Auto-reverse Cassette Deck

Telex

1 FMR-50 Wireless Microphone System

Visonik

4 David 2-way Loudspeakers ■

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DISTRIBUTED SOUND

(continued from page 26)

watt taps for a 200-watt amplifier when a 25-watt amplifier would have been perfect.

WHY NOT 140 & 280?

This brings us to the technique of using higher-voltage systems. Again looking at Ohms Law, one can see that when the impedance and voltage increase and the power stays the same, the current stays the same too. This is what the Europeans use to advantage with 50- and 100-volt lines. There are some manufacturers selling loudspeaker transformers with 100-volt primaries. Another tack is to use any of the several available auto-transformers to step-up a line to a higher voltage and then another as a step-down at the end of a long run. This has been applied recently in airports, where the runs can exceed several thousand feet and the number of zones can quickly add up.

The author has designed such a system for the Philadelphia Airport that uses a 280-volt system. Using an off-the-shelf 1:4 auto-transformer, several thousand feet of loudspeaker runs are being installed with 18-gauge wire. This offers significant savings in copper, conduit sizing, and labor costs.

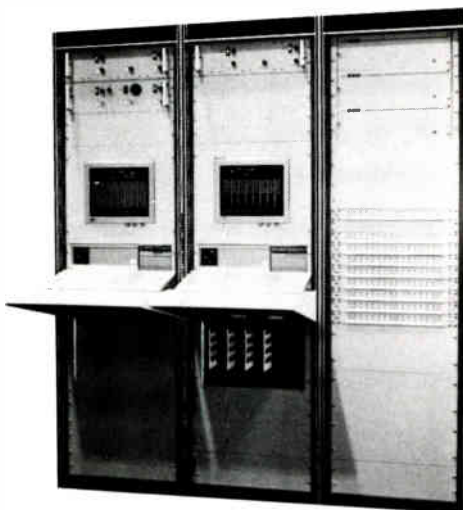
Knowing when you need a distributed system is the first step. But making sure that the system fulfils its guiding parameters is the real solution. The whole intent of using a distributed system is to place the listener in the direct-field. Upon reviewing the guidelines of basic distributed system design one will be able to apply these parameters in more acoustically difficult rooms. ■

PATCH BAYS

(continued from page 52)

1000 inputs and outputs. Programmable relays may be included for tallies and remote control of external devices.

PC controlled, the ARMS7000 instantaneously salvos more than 100 presets with up to 6 priority levels. Automatically stored on hard disks, the presets can be archived on floppy disk for future use. Switching is accomplished by user-friendly, menu-driven software. Serial and parallel data ports for printer and control interfaces are included. Also available, optional remote control panels with complete or limited access. According to the manufacturer, careful design considerations have eliminated any possibility of digital noise



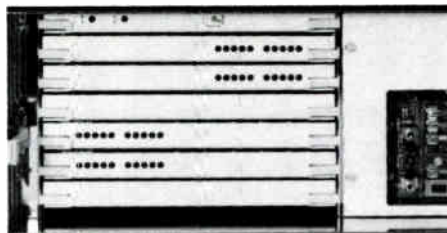
The ROH ARMS-7000 audio routing switcher.

interfering with the audio signals, which results in audio specifications that greatly exceed broadcast standards.

UTAH SCIENTIFIC

The AVS-1B switching system is designed with signal transparency, video bandwidth, maximum matrix size, a number of individually-addressable switching levels and control flexibility improvement, while maintaining maximum compatibility with AVS-1 switchers. Up to eight separate addressable switching levels of up to 320 inputs by unlimited outputs are accommodated while maintaining compatibility with an existing AVS-1 system. Four RS-232/RS-422 user ports, and four separate control panel party lines (coax) provide automatic control card switchover in systems equipped with redundant cards. User-programmable control panels provide change source and destination names and bus assignments. Reprogrammability is standard, and requires only a "dumb" terminal connected to a system user port.

The CAA/CAV series switchers use the same circuit cards as AVS-1B series routers, including control and memory cards facilitating multi-level addressing, control panel programming, and salvo switching. The two level (AV or AA) 20x10



Salvo switching is offered by the CAA/CAV-20/10 switchers from Utah Scientific.

system includes a full matrix control panel which occupies only seven inches of rack space. The four-level system requires only 14 inches. Also included is breakaway switching and statusing of each of four levels. A separate control bus connector allows these matrices to be slaved to AVS-1 or AVS-1B systems. The party line ports allow standard AVS-1 control panels to be added for control of individual or multiple busses. ■

THEORY & APPLICATIONS

(continued from page 14)

sure in my ears. (I had listened to 3 minutes of the music without the devices about 20 minutes prior to wearing the plugs.) It was clear that the high frequencies were coming through in a normal relationship with the lows.

Appropriate testing before and during use of the devices revealed, as claimed, a uniform attenuation. ■

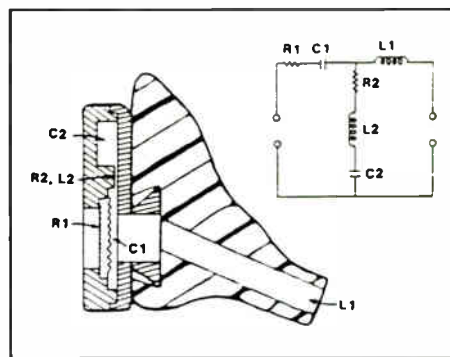


Figure 3. The 15 dB Earplug (after Killion, DeVilbiss & Stewart, The Hearing Journal, May 1988).

DeVilbiss informed me that there are about seven labs in this country and in Canada that are able to fabricate the ear canal plugs. It is further reported that local suppliers who are able to make ear impressions of the required (high) quality are growing in numbers throughout North America. DeVilbiss reported that a pair of attenuators and plugs would retail for approximately \$100.00 to \$125.00.

The devices would be a boon to others who must attend a large number of loud concerts (journalists, reviewers, security personnel, and the like). Other loud/noise environment workers would appreciate these also, wherever the need for "balanced" hearing exists.

I don't know about any of you out there, but I intend to wear mine the next time out. ■

HOME INTERCOMS

(continued from page 38)

alone than we do in the entire U.S.”

“As the American consumer becomes more security conscious, we’ll see more and more intercoms installed in single-family homes,” said O’Brien.

Fences and front gates are not found exclusively overseas; many homes in this country are modelled on European-style estates, country homes, and town houses. “It’s an upscale market, and security is of course the primary concern; the more that people have, the more they want to protect what they have,” said Andy Greenthal, sales manager for Sentex Systems, Chatsworth, CA. “Here in L.A., we’re doing a lot of estate installations,” he reported.

Greenthal feels that current estimates of the market size in this country may be on the high side, “but it’s a market we’re very interested in pursuing.” While the company does not currently manufacture any products specifically targeted to single-family homes, their multiple-residence systems are being used for single-residence applications, and according to Greenthal the company is planning to introduce some product lines geared specifically to this market in the future.

“Video will be more and more prevalent,” added Greenthal. “And the guy who invents a way to transmit both audio and video over [standard] telephone lines is going to clean up.”

“The trend is definitely toward video,” agreed Earl Zausmer, president of Siedle Intercom USA, Broomall, PA. “The intercom market as a whole is upscale, so [video intercom] price point should not be an inhibiting factor.”

Zausmer shares the generally optimistic outlook for the single-family home market in this country: “It’s a market with tremendous growth potential. Apartment building installations have flattened out. If

you look at the latest Dodge Report, you’ll see that apartment building is down by around three percent this year, while new housing starts are up.”

Is there a possibility that sound contractors are missing out on this potentially lucrative market? Zausmer feels they may be: “We find that the sound contractor has moved more and more towards high-end commercial installations and away from sales and installation of intercom systems. And the alarm and security installers are moving right in.”

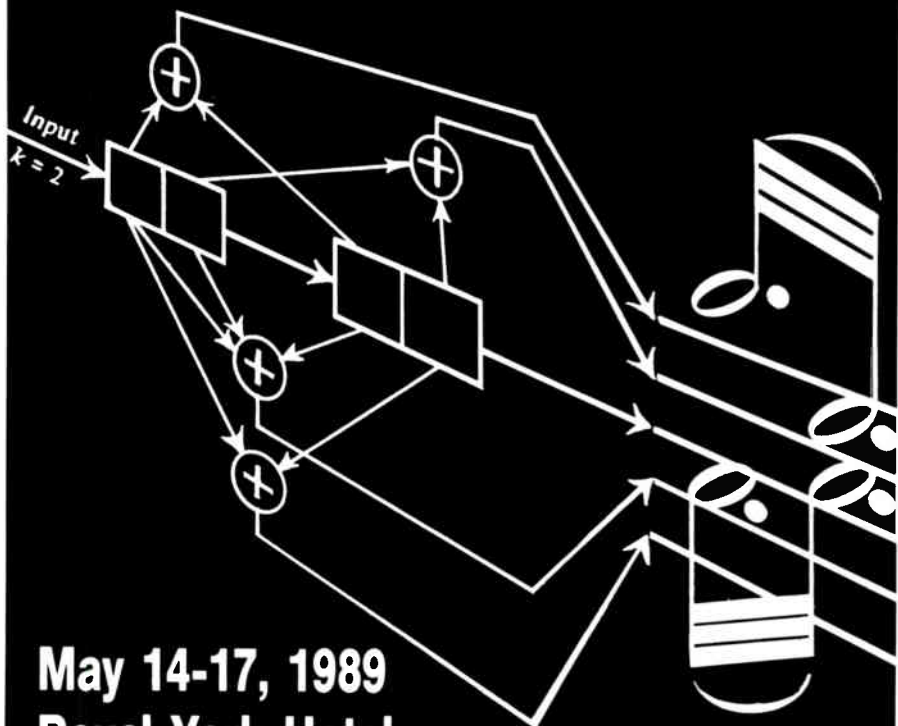
Siedle markets an extensive line of

home intercom systems, including the HT 511 series, which connects to its Siedle-Watchman, providing wall-mounted or desktop video intercommunications.

David Ito, product manager for Mirtone, Toronto, Canada, has seen “a dramatic increase in the demand for single-family home intercoms.” Ito feels that intercoms offered as upgrades do give added perceived value to a new home. The company works very closely with housing developers in their market, and as a result have seen their systems being offered as an upgrade for almost 50 percent of the new

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AD INDEX

Company	Page	RS #
Aiphone Intercom Systems (206) 455-0510	33	219
AKG Acoustics (203) 348-2121	39	
Architectural Acoustics (601) 483-5365	15	220
Audio Accessories (603) 446-3335	44	231
Audio Logic Electronics (801) 268-8400	63	224
Audio-Technica (216) 686-2600	7	205
B.E.S.T. (213) 926-0201	17	217
BGW Systems (213) 973-8090	11	212
Cal-Switch (800) CAL-SWCH	57	235
Electro-Voice (616) 695-6031	CII	201
Fischer/Berkeley Corp. (415) 655-9696	35	225
Frazier (800) 643-8747	59	236
Gauss (213) 875-1900	8	214
GNWC (800) 468-2121	18	226
HM Electronics Inc. (619) 535-6092	3	215
Industrial Research Products (312) 439-3600	CIII	202
JBL Professional (818) 893-8411	CIV	203
Lee Dan (516) 231-1414	57	232
Mackenzie Loudspeakers (312) 585-1212	51	221
Mirtone (416) 667-1211	37	230
OAP Audio Products (404) 945-1028	61	234
Panasonic Closed Circuit Video Equipment Div. (201) 392-6688	28-29 43	208
Rane Corporation (206) 774-7309	25	210
Samson Technologies Corp. (516) 932-3810	5	213
Sonic Systems Inc. (203) 356-1136	14	223
Symetrix Inc. (206) 282-2555	6	222
Tannoy North America, Inc. (519) 745-1158	13	218
Tektone Sound & Signal (407) 844-2383	21	227
TOA Electronics Inc. (800) 843-4753	27	216
University Sound (616) 695-6031	47	211
Yamaha Pro Audio (714) 522-9011	49	206

HOME INTERCOMS

(continued from page 67)

homes being built.

"I think the growth potential for this market is very strong. We've always been involved in apartment building and commercial installations, and for over 15 years we've been producing products specifically for the residential market." But the company has recently intensified its marketing efforts in that area: "There's a housing boom right now, and for the last year and a half or so we've been really targeting the residential marketplace."

Talk-A-Phone, Chicago, IL, has been in the home intercom business for many years, and according to Sam Shanes, marketing director, "this market is solid."

And Shanes agreed that providing the foundation for this solid market are concerns about security: "Americans have historically been more open [than the Europeans], possibly because of our agrarian background. But as we've moved into the cities, we've become more and more security conscious."

The company's HI series of voice-only intercoms are used either alone or in conjunction with video systems. As Shanes commented, "For security it's important to have both, but in certain situations it is the ability to hear an intruder that provides more security."

It is clear that this country has a long way to go to catch up with overseas markets. Yet, these intercom systems do provide added security, added convenience, and added value to our single-family homes. Informing both contractor and end-user about these benefits would seem to be the key to tapping into the potential of this dormant market.

BOSE MODELER

(continued from page 35)

stage. About five years ago Electro-Voice published composite polar plots for some of their components configured in commonly used arrays. It would be a logical step to include this data in the speaker libraries.

Another interesting development is the average directivity balloon for the 1 kHz to 4 kHz bands that Bose is providing on some of their speakers. Version 2.0 also allows the user to display the individual polar plots that make up the entire directivity balloon.

PHYSICAL DATA WINDOW

The Physical Data window maintains and displays the loudspeaker aiming angles, cluster designations, speaker heights, power levels, and time delays for each loudspeaker currently used in the design (Figure 3). A second spreadsheet, with a scrollable data-base list of materials and their octave-band absorption coefficients are available here. The program comes with 30 commonly found materials, and the user may add as many materials as he wishes.

BACK TO THE ROOM MODEL WINDOW

Modeler uses powerful room modeling techniques which allow the program to recognize the absorption characteristics of each section (plane), and the effect on reflecting sound, reverberation characteristic, as well as account for shadowing and obstructions. The Bose Modeler is unique in these capabilities.

Rooms can be edited using a pop-up type spreadsheet. In this spreadsheet surface materials can be assigned to each plane. Also assigned is a priority which lets Modeler recognize obstructions (overlapping planes). Surface materials and priorities can easily be selected using the mouse.

After a loudspeaker has been selected from the speaker library, the user returns to the Room Model window and selects AIM from the pull-down menu. The approximate location of the speaker is controlled by moving the mouse and watching the cursor on the screen. When the desired spot is found the mouse is clicked. "Aiming" angle counters turn on and show the real-time aiming coordinates of the speaker as the mouse is manipulated. I found the accuracy and control of this method less than ideal, but not a problem as the exact intended coordinates are easily edited in the Physical Data window.

Modeler accommodates single clusters, split clusters, and distributed systems. Up to 100 speakers in 100 clusters can be accommodated. This is the largest quantity allowed by any of the currently available programs. ■

Next month we will talk about the Preferences window and how its many parameters can be set to change both the resolution/computation time and the resultant types of information that can then be calculated, displayed, and printed.

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Minority Set-Asides

This business has been torn for some time now with the much-debated issue of the so-called Division 17 Proposal. There are definitely two camps in this issue—those with close relationships with electrical contractors and those with relationships with the architects and consultants. Now a new issue has come before the public eye—minority set-asides in publicly-funded projects.

Recently, there has been wide publicity of the Supreme Court ruling at a trial in Richmond, VA, where it was decided that prejudice must be proven on an individual, case-by-case basis, not in an across-the-board sweep. Subsequently, other municipalities have dropped their quest of these quotas.

The minority set-aside has nurtured a new generation and infra-structure in our business. This is how the new system works in our field. Each prime contractor must meet a specified minority set-aside quota. A minority-owned special systems contractor becomes a sub-contractor to the electrical contractor. The electrical contractor fulfills his quota requirements in the bid by using the minority contractor. Typically, the bid is not strictly awarded on a lowest-price merit.

However, the award of any bid has been—and still remains—subject to meeting the specifications of the bid. The Supreme Court has already defined the lowest “responsible” bidder: “The statute provides that municipal contracts be let to the lowest responsible bidder, but the courts have uniformly held that the question of who is the lowest responsible bidder is one for the sound discretion of the proper municipal authority, and does not necessarily mean the one whose bid on its face is lowest in dollars, but includes financial responsibility, also integrity, efficiency, industry, experience,

Every effort should be made to give each qualified business a fair and equal chance.

promptness, and ability to successfully carry out the particular undertaking, and that a bond will not supply the lack of these characteristics.”

It is up to those issuing the specification and bid to spell out what the requirements of the contractor must be.

These requirements must be reasonable qualifications within legal guidelines, as mentioned in the above Supreme Court quote. This is simply to say, as always competitive bidding must be performed on a qualified basis—each bidder must meet the identical requirements. Neither the letter nor the spirit of the law provides for abuse or prejudicial preference. The spirit of the law is that every effort should be made to give each qualified business a fair and equal chance.

However, there are abuses. There are some companies that specialize in negotiating with electrical contractors to fulfill minority quotas. Once the bid is awarded, the sub-contractor subs out the contract to a non-minority contractor, and the sub earns a publicly subsidized pass-through profit. This is certainly the exception rather than the rule. But it does happen, and this does lead to a more confused public bidding marketplace. Therefore, the specifier must very carefully assess and write, on a spec-by-spec basis, the quality assurance section of the bid—and may the best “responsible” bidder win.

*Jesse Klapholz
Technical Editor*

Coming Next Month . . .

Our annual Sound Contracting Market Report, in which we survey sound contractors about the facts, figures, attitudes, and opinions relating to the markets they serve. And we present the second part of our review of the Bose Modeler Design Program.

And look for articles on these topics:

- Industrial Paging Systems
- Wire and Cable

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