

SOUND & COMMUNICATIONS

Volume 38 Number 10

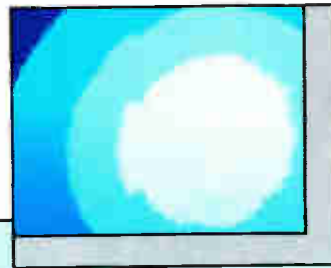
October 28, 1992



LANDSCAPE AUDIO

It's a jungle out there. Insects, plant balls, rain, sprinklers, ordinances, and the whim of the home owner all inhibit the design of the perfect "outdoor living room." Landscape architects and swimming pool builders have their own demands. What's a contractor to do? Among the options are knowing the product. Beyond that — knowledge of zoning, ordinances, and, most especially, the landscape designer's aesthetic. Read on. **40**

INTERIOR DESIGNERS AND YOU



IN THIS ISSUE

- **Data Projection**

Working towards a method of defining "Visual Intelligibility," several projectors were used to develop a scientific test design. How visibility analysis is developing; why a standard is needed. **57**

- **Residential Media Rooms**

Creating the noise-free environment in the home frequently means interrupting the flow of the customer's life: changing the lighting, moving the furniture, replacing the fixtures. **53**

- **Home Electronics in a Pro Future**

New formats in consumer electronics have implications in the pro and commercial fields. The new digital technologies make use of psychoacoustics to offer inexpensive playback — and recording. How do they work? **33**

Maybe they're the bane of your existence. But have you thought about what they think of you? We asked some of the leading residential interior designers for their thoughts on working with sound and communications designers and installers. We heard some harsh words — and also some supreme compliments. Interior designers, after all, don't have it easy. Your wires, your speakers, your tools don't necessarily add to the initial design. **28**



Is There A Point When Out Of Control Becomes Complete Control?



Yes. The Moment You Plug In The New CEX-4L™

From Peavey
Architectural Acoustics®

When we say complete control, we mean it. The CEX-4L from Peavey Architectural Acoustics is a totally programmable, all digital audio processor that redefines the role of a multi-way sound system controller. The CEX-4L provides ultimate control of even the most difficult rooms, with surprising options you never thought available in a crossover at this price — or any price, for that matter.

The versatility of the CEX-4L will amaze the most discriminating sound engineer. For example, the CEX-4L may be configured as a crossover — four-way, two-way stereo, three-way with a fourth full range (or band limited) delayed output — or it can become a one or two input multi-tap delay. In either application, each of the four outputs can be delayed, equalized, peak limited, and /or bandwidth limited with a choice of six filter selections, including eighth order Linkwitz-Riley filters with 48 dB per octave slopes. An adjustable horn EQ, a one band parametric EQ, or low and high frequency shelving filters can be selected for each output. Precise peak limiters provide driver protection while maintaining musicality to system performance. The selective "linking" feature allows the limiters to track, preserving the spectral balance. Set-up and functionality come quickly and intuitively. The control panel is simple and straightforward with labeled buttons for the various features and a 20 x 2 backlit LCD display. A "data entry wheel" has been included for rapid system calibration, plus a built-in security lock, selective polarity reversal, and muting on each of the four outputs. The totally software-based CEX-4L also allows for essentially effortless field upgradeability, meaning that the CEX-4L will never become obsolete. Yet, we saved the very best for last...audio integrity comparable to high performance DAT recorders. The new CEX-4L, all digital audio processor from Peavey Architectural Acoustics. The technology is here. The time is now. Experience the feeling of control...COMPLETE control!

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We see your home as more than just a good place to raise a family or build equity. We see it as the perfect speaker cabinet. And while some people may view this as extreme, those of us who are passionate about music and aesthetics have a slightly different way of looking at things.

And that's precisely why we've developed the Parasound Custom Series/Titanium line of in-wall speakers. Four remarkable two-way models and a thundering subwoofer. Each is built to rigorous high-end audio standards. And each is loaded with impressive features you'd expect to find on speakers costing much more.

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LETTER FROM THE EDITOR

Ten Years Ago Today . . .

Exactly ten years ago, in the fall of 1982, Testa Communications legitimized the residential custom installation market. That may sound melodramatic, certainly immodest.

But if you remember 1982, the custom residential market was being spearheaded by a few installers, a very few manufacturers, and some interior designers who found to their dismay that their clients had heard of projection televisions and compact disk players and wanted them. And none of these people had a magazine in which to exchange information and ideas.

So we started one. It was called Home Entertainment. I won't bore you with the details of how Vinny Testa (whose brainchild Home Entertainment was) was the recipient of comments like, "What can you possibly write about?". We knew there was plenty to write about. And there still is.

Through the years, we've kept close to the home entertainment market, collecting information, and advising people when asked. Although Testa Communications gave up consumer magazine publishing to concentrate on business-to-business communications, other publishing companies appropriated the Home Entertainment format, and the concept lives on.

Now, there's CEDIA, begun by a group of installers some of whose work was first publicly recognized in Home Entertainment's pages.

Nothing stands still. Ten years later, great cataclysms have shaken the consumer electronics market. And within the next year, certainly within the next five years, the current long list of manufacturers who straddle the pro and consumer markets with separate divisions will be redefining those divisions. (I told you we keep close to that market.) As board room and office installations more closely resemble residential work — and vice versa — there is a similar redefining of the sound contractor's role in



the mix, and of the custom designer/installer.

While distribution doesn't change overnight, there is a roiling movement that can go in several directions. We're expecting to see a closer involvement of the sound contracting market in residential work.

This October issue of Sound & Communications brings to you considerations of some of the concerns of the residential installation community.

We said before that nothing stands still. But actually, some things do: for example, read the article herein on what interior designers think of you. And good luck.

Best regards,

Judith Morrison
Editor in Chief



SOUND & COMMUNICATIONS

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Positively Beryllium and Useful Products

ON BERYLLIUM

In regard to Mike Klasco's examination of loudspeaker system construction ("Back to Basics," July 1992), Klasco correctly points out that the extreme hardness of beryllium makes it an ideal material for use in a diaphragm. The combination of the material's slight weight and strength make beryllium the material of choice for applications from consumer electronics to aerospace.

We are extremely discouraged, however, by the possibility that a reader might infer that casual contact with beryllium could be fatal. The health risk associated with beryllium is directly attributed to the manufacturing process and poses no health threat to consumers in its finished form according to both the EPA and OSHA.

There are guidelines for the manufacture of the material designed to reduce the possibility of mishandling. Of course this is true of aluminum, titanium, plastics, fiberglass, paper and dozens more materials regularly handled by millions of people in their finished forms.

To suggest that beryllium poses any sort of health threat to the loudspeaker buyers would be incorrect. No additional precautions are necessary in the safe handling and/or disposal of a beryllium diaphragm than would normally be exercised when handling a diaphragm constructed of aluminum or titanium.

Sound & Communications should take the lead in correctly evaluating and advocating those technologies that best serve the interest of the audio community.

Leon Sievers
Senior Product Planner
Technical Audio Devices (TAD)
Long Beach, California

Mike Klasco stands by his comments — Ed.

ANSWERMAN ANSWERED

In the June Answerman column, Mark Visser inquired how he could get in touch with Lubell because of the company's underwater speakers. The last time our esteemed Answerman had heard of Lubell was about 20 years ago, that is, until Carolyn Davis sent him a fax.

Carolyn clued us into the whereabouts of Lubell Labs along with a copy of Syn-

Aud-Con's listing entitled Useful Products. With Carolyn's kind permission we turn the rest of this column over to Syn-Aud-Con (812-995-8212). As most of our readers know, Syn-Aud-Con offers excellent seminars on many different aspects of sound system engineering. Their Useful Products listing, shown below, includes all sorts of hard-to-find sources of software, testing devices, tools and other items.

—Mike Klasco

- | | |
|---|--|
| <p>1. Adaptive Filters
Digital Audio Corporation
6512 Six Forks Road, Ste. 203B
Raleigh, NC 27615
919-848-0845
Fax: 919-848-9034</p> | <p>6. Chemically Charged Rod Electrode
XIT Grounding Systems
22412 South Normandie Ave.
Torrance, CA 90502
213-320-8000</p> |
| <p>2. All Weather Speakers
Rockustics
15400 E. Batavia Dr.
Aurora, CO 80011-4608</p> | <p>7. Computer Operated Sound System
IED Inc.
9701 Taylorsville Rd.
Louisville, KY 40299
502-267-7436</p> |
| <p>3. Audio Monitoring & VI Panel Ceiling Microphone
TSI
393 Jericho Tpke.
Mineola, NY 11501
516-294-5390</p> | <p>8. Computer Programs
EASE Program
Renkus-Heinz Inc.
17191 Armstrong Ave.
Irvine, CA 92714
714-250-0166

PHD Systems & Software
Richard C. Heyser Foundation
10415 Fairgrove Avenue
Tujunga, CA 91042</p> |
| <p>4. Auralization Software
Signalogic
9704 Skillman #111
Dallas, TX 75243
214-343-0069

Ariel Corp.
433 River Road
Highland Park, NJ 08904
201-249-2900
Fax: 201-249-2123</p> | <p>9. Custom Audio/Video Switching
FSR Inc.
220 Little Falls Rd.
Cedar Grove, NJ 07009
616-695-6831</p> |
| <p>5. Bessel Line Array Handset Line Tester Pataxial Loudspeakers
J. W. Davis & Co.
P.O. Box 26177
Dallas, TX 75226</p> | <p>10. Diffusors
Dr. Peter D'Antonio
RPG Diffusor Systems, Inc.
12003 Wimbledon St.
Largo, MD 20772
301-249-5647</p> |

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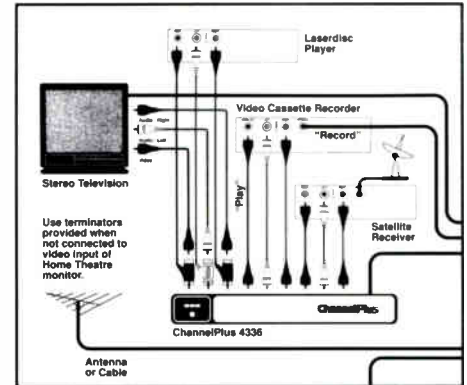
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By Kathleen Lander

Reconciling the demands of audio and video performance with design requirements often leads to a love-hate relationship between installers, architects and interior designers. How can they work together?

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By Edward J. Foster

The recent developments of DCC and MiniDisc formats and technology may offer a peek at the future for sound and communications professionals. How can you get in on the immediate future.

40 CHALLENGING THE GREAT OUTDOORS

By Alan Gable

Residential landscape audio installation poses obstacles seldom encountered within four walls. But most consider patios, verandas, and swimming pools to be another zone of a multiroom system.

53 VIRTUALLY NOISE-FREE

By George Schulson

A noise-free media room is of prime concern to the residential customer. The two areas that are of major concern in order to achieve this are the acoustical aspect and the electrical aspect.

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IF ALL ROOMS WERE ALIKE, YOU WOULDN'T NEED A BRAIN.



Although the room looks familiar, it's suddenly very different. This time, your high-end sound reinforcement set up has to optimize the room for speech. And you have to add speakers. And you have to add more mics. And, and, and.

Now before you agitate your gray matter, consider the YST system. With a very intelligent digital controller, a servo-processor for tight, well-damped low end, plus a family of loudspeakers, you can set up a room quickly with more control than Big Brother.

Boasting an incredibly high IQ, or should we say EQ, is the C20 Digital System Controller. Along with EQ, it stores and recalls precise settings for crossover, limiting, time



alignment, offset and delay—all in a single box. Enough said.

You'll never meet a closer bunch than the YST speaker family. The popular 1520—with its medium format horn in 60 or 105 degree versions—can be used in an array or individually for superb pattern control and smooth response in the vocal region. The S1525S is an extremely compact, high-output front-of-house speaker. The SM1525 15" coaxial stage monitor has a smaller profile than most 12" monitors (yes, we think that's incredible, too). And the SW1820S dual 18" sub-woofer gets down to fundamentals.

Whether it's for a portable or fixed installation, using the YST system is just plain smart. So before you go to your room, call 1-800-937-7171 extension 90A. That's the only thing you'll need to remember.

YAMAHA®

See what you've been missing.



This motorized, infrared CCD door camera can pan 122° and tilt 76°.

If you think you've seen everything, wait until you see the Video Sentry PanTilt from Aiphone.

The PanTilt boasts the world's first motorized door camera allowing you to see in places never attainable with a fixed lens camera.

Since it lets you see and hear who's at the door, it's equally at home in residential or business settings – wherever you need to limit access there are literally hundreds of potential applications. And because it operates on 2 simple wires, it's easy to install in both remodels or new construction.

With the touch of a button, you can see up to 5 times the area of a fixed lens camera.

↑
Tilt up



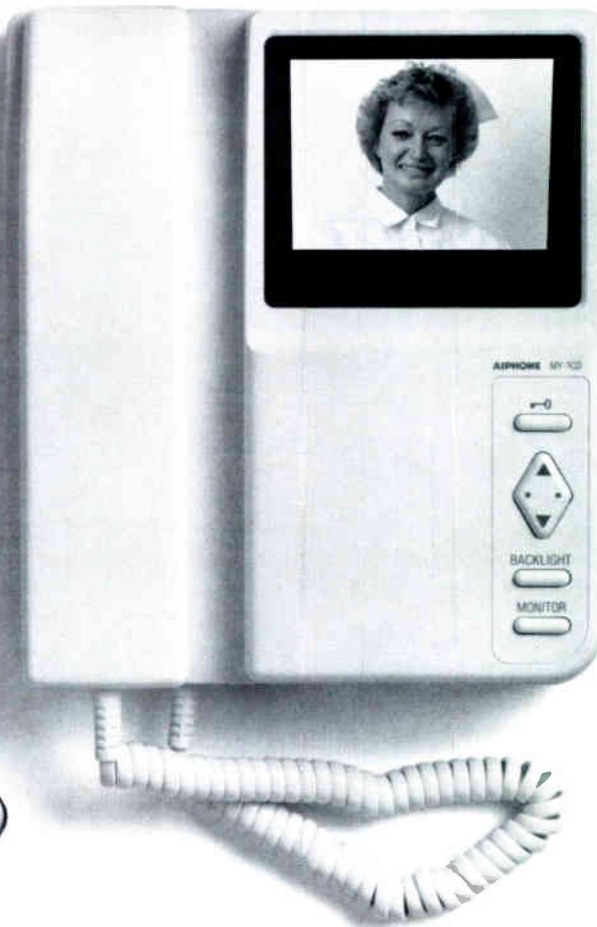
← Pan left



Tilt down



Pan right →



The inside monitor features a 4" CRT black and white screen that displays a crystal clear picture.

Plus if you'd like to expand the system, the PanTilt 10 can accommodate both additional cameras and inside monitors.

To see what this revolutionary new entry security system can do, call us at (206) 455-0510 for a free brochure or the distributor nearest you.

The Video Sentry PanTilt. Simply, amazing.

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World Radio History

NEWSLETTER

AES CONVENTION IN BERLIN

The 94th AES Convention is scheduled for March 16 through 19 in Berlin at the International Congress Center, which is also the site of the biannual Funkausstellung Audio/Video Fair. Reinhard O. Sahr is the convention chairman. A call for papers has been issued.

BEC TECHNOLOGIES IN TEMPLE

BEC Technologies has announced that it has been chosen to supply a multi-channel digital fiberoptic audio transmission and distribution system for the new World Headquarters Complex of the Reorganized Church of Jesus Christ of Latter Day Saints in Independence, Missouri. The BEC ProLine system will connect the Temple sanctuary to the broadcast center with 32 input channels and 16 return lines, and will provide interfacing for ClearCom's Matrix Plus digital intercom system. The BEC Technologies system was specified by designer Lee Ritterbush of Kirkegaard and Associates. Operations are supervised by Robert Haworth, audio engineer for the Electronic Media Services of the RLDS.

SOUND REINFORCEMENT WORKSHOP

The 1993 Live Sound Reinforcement Workshop will be held January 12 through 14, preceding the NAMM Winter Market, at Chapman University Campus in Orange, California. The event is cosponsored by Synergetic Audio Concepts (Syn-Aud-Con) and Pro Sound News. The theme will be "Mixing Art with Science." Will Parry, of Signal Perfection, Ltd., is the program chairman and David Scheirman, of Concert Sound Consultants, is the facilities coordinator. The instructional staff will be drawn from Audio Analysts, Clair Brothers, Electrotec, Maryland Sound, and Showco.

WHJW PROJECTS

Wrightson, Johnson, Haddon & Williams in Dallas has announced its selection as the acoustical consultant for the following new projects: Hong Kong Stadium, Meadowlands Racetrack, Cleveland Indians Stadium, Texas Rangers Ballpark, Oregon Arena, National Institutes of Health, Anaheim Arena, Joe Robbie Stadium, Florida Aquarium, Giants Stadium, Brendan Byrne Arena, Central and Southwest Services, and Covenant Life Church.

KEF AMERICA RESTRUCTURES MANAGEMENT

Following its acquisition by Kinergetics Holdings (U.K.), KEF Audio (UK) Ltd. has emerged from receivership in the United Kingdom. A management restructuring has been instituted in its U.S. subsidiary, KEF Electronics of America. Ray Lepper, who has been with the company for four years, has been confirmed as Managing Director, with responsibility for all of KEF's U.S. activities. Ed Gardner continues his role as KEF America's Sales Director. Peter Hoagland, who was Marketing Director, is leaving the company. Speaking of Hoagland, Ray Lepper said, "Peter has been a loyal member of the KEF team for eight years, and we wish him every success in the future." Kinergetics Holdings has also acquired speaker manufacturer Celestion.

VIDEOCONFERENCING FOR SOCIAL SECURITY

Videoconferencing Systems Inc. has installed its Omega series videoconferencing systems at two offices of the U.S. Social Security Administration, linking the headquarters office in Baltimore with the Health and Human Services offices in Washington. The Omega line features rollabout cabinets, single or dual color monitors, cover video cameras, the control system, audio system, switcher, infrared system controller and keyboard controls.

NEWSLETTER

VENEKLASSEN APPOINTMENT

Paul S. Veneklasen and Associates has announced Timothy S. Hart's appointment as Senior Associate to head the audio-visual design department. Hart holds a masters degree in Acoustics from the University of Texas at Austin and has specialized in sound reinforcement and audio-visual system design in his five years with the firm. Currently, he is the project manager for the design of the audio-visual systems for the Beverly Hills Hotel Renovation, the Orange County Transit Authority Headquarters and the Moore Lab presentation theaters at Caltech. He is also responsible for the paging system design for Guam International Airport, Lindbergh Field in San Diego and the American Airlines Terminal in the Los Angeles International Airport.

NILES RECOVERS FROM HURRICANE

Niles Audio Corporation, located in Miami, has returned to full production, with final restoration nearly complete to the damages inflicted by Hurricane Andrew. Niles has expressed gratitude for the support they received from their dealers during the recovery period. Some phone lines to Miami are still undergoing repair.

PROMIX MOVES

ProMix Inc., the sound reinforcement company, has moved to a new larger facility at 40 Hartford Avenue, Mount Vernon NY 10550. The telephone number is (914) 668-8886. The fax number is (914) 668-6844.

WALDOM AUDIO DIVISION

Waldom Electronics has given its audio products division a new name — Image Communications, chartered to distribute and manufacture professional audio and video products. Waldom Audio Products is best known for its international network of speaker repair centers, and for its distribution of Acoustician horns and drivers, Eminence speakers, and the Eminence speaker repair kits. Waldom Electronics is a large manufacturer of voice coils, and Waldom/Image has become the exclusive supplier of the Alcatel professional sound audio connector line in North America. Company president Roger Engle said, "Waldom has really been two companies in one for years. One side is a master distributor of electronic hardware and components; the other side pro audio. We felt the Audio products deserved their own identity.

CHRISTOPHER MOORE FORMS SEVEN WOODS

Christopher Moore has formed Seven Woods Audio, Inc. to provide consulting services to manufacturers of professional audio, consumer audio, broadcast, telecommunications, and computer equipment. Moore's background includes experience with firms such as KLH, Lexicon, Ursa Major, and AKG Acoustics.

FOSTEX FORMS R&D DIVISION

Fostex Corporation of Japan has announced the formation of Fostex Research and Development, Inc. to conduct future research to "maintain Fostex at the forefront of digital recording technology. The new division is based out of Hanover, New Hampshire. Sources indicate that the location is a result of the planned assumption by Fostex of some of the talent pool available after the demise of New England Digital.

{ How the world's favorite amps keep you flying high. }

IT'S BLACK!



I'M ABOUT TO LAND THE AIRPORT JOB... AND TOA CHANGES MY AMP!?!

"I'm right in the middle of the new terminal spec and TOA sends me an amp that not only looks different ... it looks like it may lock the job.

For starters, there are eight inputs, up from six, so I can add optional program sources instead of another mixer. And all my old modules still fit — everything's interchangeable, old model to new!

The new 900 Series Mark 2 is also just two rack spaces instead of three, for more flexibility, more room in the rack. On this job, where I've got three types of background music, programmed messaging, two paging sources, all-call and

You talked, we listened and now the world's favorite amp is even better.



zones activated by the paging source— this amp is just the ticket!

The specs call for global paging, plus a second priority for zone paging from the departure gate intercom station. And these amps, with two levels of priority and TOA's new muting modules, let me plug in an edge that just may clinch the bid.

There are new terminals for remote volume, front panel LED's, locking control knobs and switches for Tone/EQ Defeat and Low Cut.

TOA's also installed a new 3-year warranty, so the amp that I can spec in my sleep still lets

me sleep well. That's why I've built this job, not to mention my business, around TOA reliability."

Someday, others may offer this type of innovation, reliability and service. The point is, why wait? At this moment, as always, we're standing by the phone ready to assist you in any way possible. Even if it's just to assure you that the only changes we've made are for the better.



Need one tomorrow? Consider it done. Questions? We've got answers. Just ask, TOA delivers.

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In Canada: 416/564-3570.



Thirty seven (and counting) plug-in modules mean that change outs, change ups and change overs won't ground you.



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THREE YEAR WARRANTY

On Redundant Potentiometers

Dear Answerman,

I have seen, on several projects that I have bid on, the symbol for a locking potentiometer at the input to the power amplifiers. Most power amplifiers available today have either detented input attenuators or input potentiometers. Why do the various consultants add what seems to be a redundant potentiometer, with its added material and labor costs?

Jim Heart
Austin, Texas

Dear Jim,

Your question is not as simple as it may seem. No, system designers are not duplicating the already present amplifier input attenuator/potentiometer. (Why some power amplifier manufacturers use attenuators (detented or not) versus potentiometers at the input of their equipment is a whole another Answerman column.) System designers are indicating that they want you to insert a fixed level of attenuation prior to the power amplifier. This attenuation serves at least two purposes.

One, this locking potentiometer allows rapid removal of malfunctioning amplifiers and the insertion of replacement amplifiers without the need to "re-

align" or "reset" the system. (Only if the replacement amplifier is of the same make and model as the broken amplifier, or, if the replacement amplifier has the same gain and input sensitivity). This is due to all amplifiers being installed with the amplifiers' internal attenuator/potentiometer full on, with the "secret hidden non-end-user adjustable and junior telephone-man findable" lock-

ANSWERMAN

ing input potentiometer being safely hidden, secret, etc., and not able to be tampered with.

Two, when set properly, this "secret hidden . . ." potentiometer is used to attenuate the level of the signal feeding the amplifier so that they *both* clip at the same time. Whoa, you say, why do you want them to clip at the same time? Good question, and the answer has to do with what is known as System Level Alignment. A short description follows.

Referring to Figure 1, we see a simple sound system. The microphone is connected to a preamplifier, which for this example has a gain of 50 dBV. Here dBV means $20 \log V_{out}/V_{ref}$, and to keep it simple, $V_{ref} = 1.0$ Volt. The preamplifier

Whoa, you say, why do you want them to clip at the same time?

is connected to a line amplifier with 0 dBV gain, and the line amplifier is connected to a power amplifier whose gain is 30 dBV. Let's assume that the power amplifier is rated at 100 Watts rms, into 8 Ohms, with a sine wave input. The peak voltage output from the amplifier, since the peak power is 200 Watts, is found:

$$V = \sqrt{(P \cdot R)} = \sqrt{(200 \cdot 8)} = \sqrt{(1600)} = 40 \text{ Volts}$$

To drive this amplifier to its clip point we need an input voltage that is 30 dB down from 40 Volts. From

$$-30\text{dB} = 20 \log(V_{INPUT}/V_{OUTPUT})$$

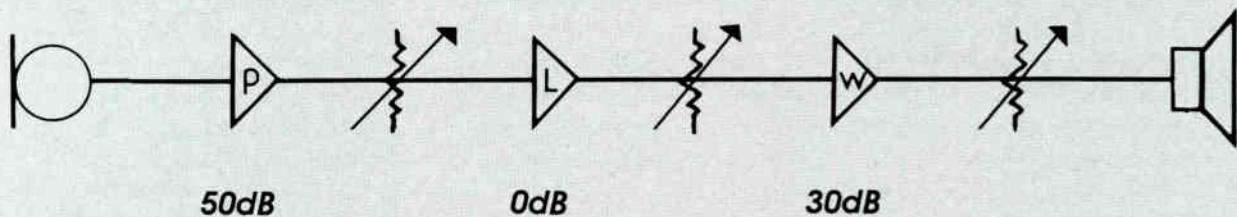
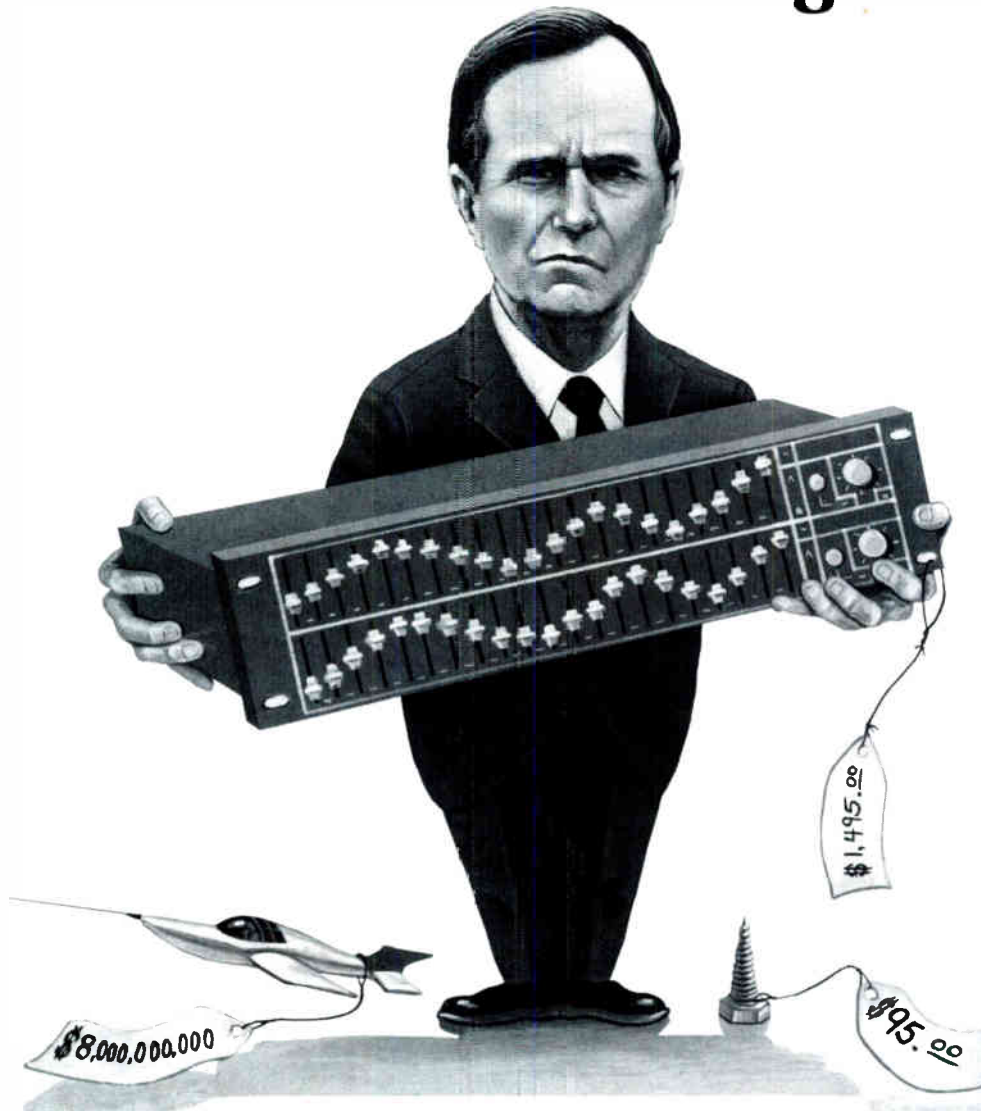


Figure 1.

You could spend more and get less, but let's leave that to the government



If you were a congressman you might not care about cost. But you're an audio professional so chances are you think more wisely before you spend.

When it comes to graphic equalizers, AB International's line is the wisest choice you can make. Our graphic EQs offer professional features you need such as range, voltage, ground/lift and passive bypass switches, and XLR, phone and RCA inputs and outputs. Best of all, our prices are more competitive than those at the pentagon.



The Model 231. At \$599 it's the next best thing to voting your own pay raise.

Since sound quality is your primary consideration we've made it ours also. Our equalizers are transparent, quiet and clean. And like great political speeches, our EQs let you hear exactly what you want.

But the best way to find out about our graphic EQs is to try them yourself. Visit your pro audio dealer and make the AB comparison. Wouldn't you rather spend a little extra time instead of a lot of extra cash?



AB International Electronics, Inc.
1830-6 Vernon St., P.O. Box 1105
Roseville, CA 95678
(916) 783-7800 FAX (714) 777-3067

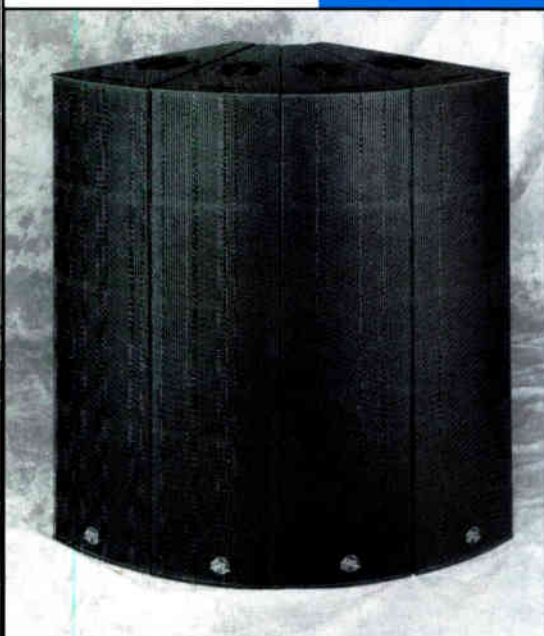
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PISTON POWER

The Clair Brothers P-4 Piston box represents a major breakthrough in speaker design with the world's first truly arrayable system. No other enclosure can match the size advantages and performance characteristics of the P-4 Piston.

The P-4 is the product of years of research and experience combined with the most advanced design technologies. The net result is a speaker system with remarkable



intelligibility that virtually eliminates the problems associated with multiple loudspeaker pattern overlap.

The unique shape of the P-4 provides the perfect element for tightly wrapped arrays. It can also be utilized in a variety of applications from systems requiring a single enclosure to arrays configured as large as 360 degrees.

Clair Brothers Audio, shaping the future of speaker system design.

For additional product and dealer information, contact Gene Pelland at 1-717-665-4000.



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Audio Systems, Inc.
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- Three-way Active
- Infrastructure Rigging and Handles
- Dimensions (H x W x D)
Front - 48.5" x 13.25" x 27"
Rear - 48.5" x 2.75" x 27"
- Coverage Angles: 38° x 60°
- Operating Range: 38Hz to 20kHz

We see that $V_{input} = 1.26$ Volts. All this is pretty straightforward. Now what is the peak voltage output before clipping from the line amplifier? For this example let's assume it's 12.0 Volts. If we just connect the output of the line amplifier to the power amplifier, the power amplifier will clip when the line amplifier output voltage is only 1.26 Volts. We have just thrown away 12.0 Volts - 1.26 volts = 10.74 Volts or 20.62 dB of dynamic range available from the line amp. To get this back, we need to set the "secret hidden..." potentiometer R2 so that we have 20.62 dB of attenuation.

Now looking at the preamplifier, let's assume that it has a peak output of 18.0 Volts. Since the line amplifier has 0 dB, the output will be the same as the input, as long as the input doesn't exceed the line amplifier's 12.0 Volt specification. So we immediately see that "secret hidden..." potentiometer R1 needs to be set so that a preamplifier peak output voltage of 18.0 is reduced to 12.0 Volts, for a loss of 6.0 Volts, which translates into 15.56 dB of attenuation for "secret hidden..." potentiometer R1.

With R1 and R2 respectively set for 15.56 dB and 20.62 dB of attenuation, each of the amplifiers in our simple system will clip at the same time, and we will have used the maximum dynamic range available from each.

In many systems that Answerman has seen, very few have "secret hidden..." potentiometer R2 installed, and fewer still have "secret hidden..." potentiometer R1 installed. As a result, Answerman has been the sad end user of noisy, limited dynamic range systems.

The question of how the noise increases in systems that are not level balanced will be dealt with in the future, but maybe not the near future.

—Neil A Shaw,
Menlo Scientific Acoustics ■

Circle 222 on Reader Response Card

WHEN IT CAME TO BEHRINGER WE LET THE EXPERTS MAKE THE NOISE.

Leading experts in recording, film post-production and live sound are discovering the many advantages of the Behringer 2-channel and 8-channel DeNoisers. They know Behringer takes the noise out of the dirtiest signal path without altering the audio quality. Their reactions show why Behringer is now the most talked about name in professional audio circles.

"Simply lovely. Smiles all around. Room agreement was unanimous: We want this thing on all our tracks." **Mike Joseph—Editor REP, March 1992**

"I have used similar 'single-ended' devices on the mixes of 'Ghost' and 'Godfather III' and found the Behringer Mark III to be superior in every category—from ease of operation to final result.

"Consequently, I am—without hesitation—recommending to LucasArts/Skywalker Sound that they buy at least four channels of Behringer Mark III DeNoising for each mixing console here and in Los Angeles; a total of twelve mixing rooms."

Walter Murch—Film Editor and Music Mixer, LucasArts/Skywalker Sound

"If the phrase *noise floor* is in your vocabulary and you would prefer that it was not, get a Behringer single ended noise reduction unit to the top of your *got to have one* list." **Robert Scovill—Sound Engineer/Mixer, Rush/Def Leppard**

The experts know why Behringer DeNoisers let them take the noise out and leave the audio quality in. Isn't it time you discovered all the good things Behringer can do for your audio?

THE PERFECT EAR.



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Circle 203 on Reader Response Card

GETTING THOSE REALLY BIG JOBS FOR THAT REALLY BIG MONEY

By Dr. Wilhelm Wokka III, Philadelphia Medical College of Musical Knowledge

Well, you have all been waiting for this one. And I have really gotten some serious money to (finally) do this article, so I shouldn't complain about divulging such devastating information.

You should consider yourself a genius for subscribing to Sound & Communications Magazine, because what I am about to divulge is worth the next hundred years' subscription, even at retail newsstand prices.

How many letters have I gotten that read like this: "Dear Dr. Wokka, I can't make any money at this rotten business of sound reinforcement and installations. I am getting nickel-and-dimed to death by Melody Music down the street at every turn. I'm stuck. I might as well go get a real job." I must get at least 15,000 letters like this a day, really. This is no exaggeration. Well the answer, my friends, is *think big!* I think this is one of P.T. Barnum's most famous sayings. Anyway, get out of that rinky-dink rut and go for the big-bucks arena jobs.

Not man enough, you think? Don't have the experience? Don't have the cash flow? Can't handle the pressure? Don't have the reputation? Don't know

where to start? Don't know what speakers to use? Well, probably everyone reading this is saying the same thing. And manufacturers and acoustical consultants will tell you to stay away from the "big glory jobs" because "they just don't happen that often." Let me tell you right here that these are all lies to keep all but a money-grubbing few out of a huge, highly profitable form of, essentially, legal theft. No wonder there is such a myth about big arena sound installations; the small group of people that have figured it out are merely protecting their hen that lays the golden egg. No wonder they don't want anybody to find

THERE IS NO INCENTIVE TO MAKE MONEY WITH ANY PUBLIC FACILITY.

about it. Well, fellow thieves, it's time the myth was shattered.

Here are some facts about large public arenas:

1. There are 19,522 major public arenas in America with an attendance of over 5,000. Of these, 18,451 are currently looking for a replacement for their existing outdated system which was installed in the early 1950s. There is a waiting list a mile long for companies to install new ones, merely because there are not enough sound contractors and system designers around who know about this bonanza. Think those in the know can name their own price? What would you do?

2. There are presently 9,545 new public arenas under construction in America, *right now*, with a seating capacity of over

5,000. They all need new sound systems to be designed and installed.

3. The budgets for new sound systems are typically twice what is needed, as is typical of government contracts.

4. Employees and managers of these large public facilities hold keeping their (cushy) jobs as their #1 priority. They will make decisions to do anything based on this. This usually means that they will do nothing that makes them stand out and be noticed, because this is threatening to the jobs of others, especially their superiors. Also, there is no incentive to make money with any public facility.

Compare this to the private arenas. The people running these ruthless affairs are actually cut in on profits and are downright capitalistic opportunists. For instance, manufacturers of sound equipment cannot display their logos on equipment in public arenas without paying a fee. They get charged! In a public arena, large logos can be displayed openly, to be seen on national television. No one complains because no one wants to stick their necks out. We will later see how this can work for the benefit of the sound contractor.

In conclusion, avoid private, profit-oriented arenas like the plague if you want to make any money at sound contracting. The public, government-run variety is where you will make the big bucks.

5. The sound system in a public arena is viewed as a "necessary evil" and is just one of those things no one questions. The budget for a new system usually arises because someone (a prominent businessman, an NFL player or someone else with a lot of money) buys a new stereo and notices that the arena system

Dr. Wilhelm Wokka III heads up the Philadelphia Medical College of Musical Knowledge, 106 Penn's Landing, Philadelphia, PA 19001. Dr. Wokka is a pseudonym.

doesn't even vaguely resemble the sound quality he has at home. So he complains to a congressman or state senator or something and eventually it gets back to the arena manager, who has to do something. So he appoints a committee, which

A BIG REPORT THAT NO ONE CAN UNDERSTAND OR EVEN CARES ABOUT IS DRAFTED.

finds an acoustical consultant to hire, and a big report that no one can understand or even cares about is drafted. The report normally contains a recommendation for "acoustical treatment" or "repositioning of the HVAC" and the design of a new sound system. Then the report is voted on and the original bud-

get doubles or triples in dollar amount, so that the committee, acting very knowledgeable, will not have to suffer the embarrassment and be singled out by an overbudget situation. Of course, this happens anyway, much to the advantage of the astute sound contractor.

6. No one will ever pass judgment on the sound quality of the new system. As long as it is installed and everything on the equipment list *appears* to be in the arena, the contractor will be paid promptly. Actually, no one cares how they sound, and for good reason. All these big arenas are hopeless "acoustical toilets" and no sound system in the world will improve on that. At the College here at Penn's Landing, we have already proven that every sound system with the same output capability, independent of the type of speaker, sounds the same in a big arena: absolutely hor-

rible. There are two exceptions to this. One is the megawatt wall-of-sound that these big loud guitar-jazz bands or whatever they are bring into arenas. They have enough output to overpower the

ALL THESE BIG ARENAS ARE HOPELESS "ACOUSTICAL TOILETS" AND NO SOUND SYSTEM IN THE WORLD WILL IMPROVE ON THAT.

reverberant field. (A brilliant, indisputable work has already been presented on this subject, by the author, in this journal.) The other exception is our very own "Sweet 1600," which a select few of

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us now have in our living rooms. I will also comment on the first of these in a major arena in this article. In conclusion, you have a lot of "artistic freedom" with the sound quality of a sound system put into a large public arena. In fact, as long as there is sound, that's all you need.

So, how can you get one of these big

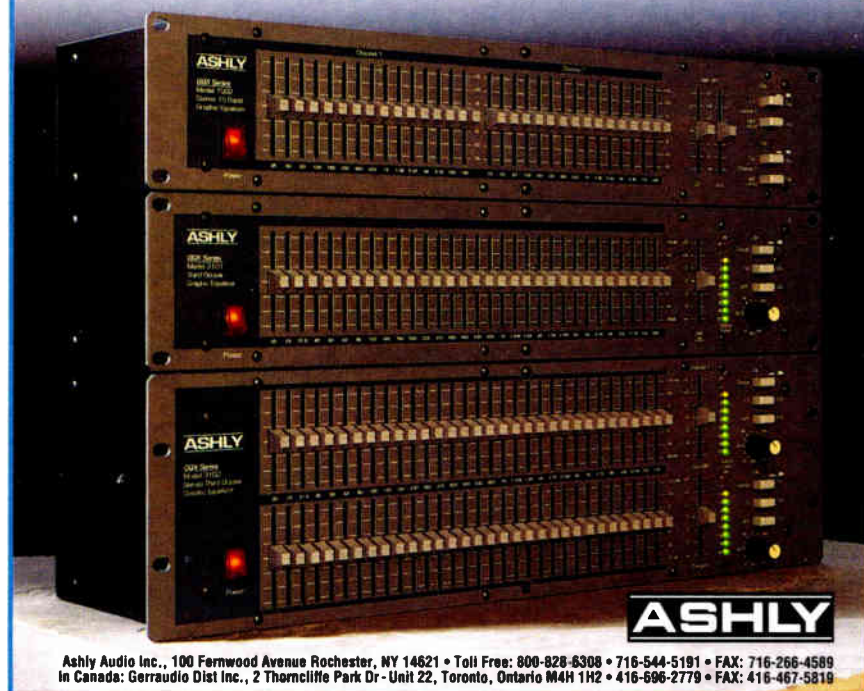
lucrative jobs? Easy.

1. Buy this book: "Unfilled Sound System Contracts for Large Public Arenas," available through the U.S. Post Office where you live. There is usually a bunch of them in a display on the bulletin board where the most-wanted criminals and such are on display. The book comes out every month, and it's huge. If it's not

there, they have one for you behind the counter. If they won't give you a copy, they are probably trying to protect the business of their relative or friend in the sound business locally. Call the police if this happens and you will get the copy right away. If this doesn't work, contact your congressman or senator. This always works.

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**IN FACT, AS LONG AS
THERE IS SOUND,
THAT'S ALL YOU
NEED.**

2. Go to the bottom of the list. These arenas don't stand a chance of getting a new system until the year 2000 at least. They will be overjoyed. Get the "bid specs" for a variety of these jobs and choose the ones that have the greatest number of "acceptable alternative" products and the greatest number of "or equivalent" phrases. The latter is a powerful tool for you as a businessman. Choose the best of these with the highest estimated price and send in an estimate of twice the total retail cost. The job

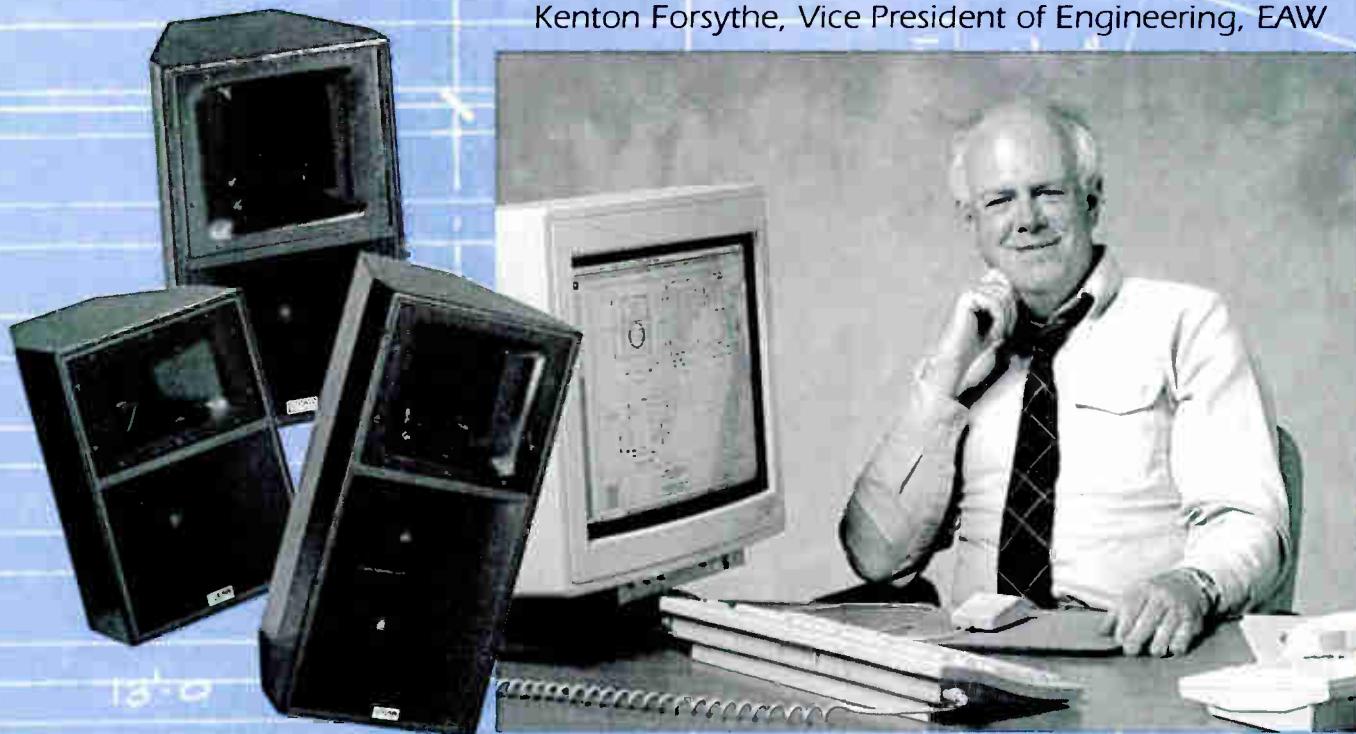
**CHOOSE THE ONES
THAT HAVE THE
GREATEST NUMBER
OF "ACCEPTABLE
ALTERNATIVE"
PRODUCTS AND THE
GREATEST NUMBER
OF "OR EQUIVALENT"
PHRASES.**

always goes to the highest bidder, so that an overbudget situation is avoided at the end of the job. This never happens, of course. The system always goes over budget, and we will see later how you can use this to your advantage.

3. When you get the job (you will, or you will get one of them, there are so many), contact *all* the manufacturers on the "acceptable alternative" list, and even

“It’s no longer necessary to sacrifice musical fidelity for vocal intelligibility.”

Kenton Forsythe, Vice President of Engineering, EAW



MH Series Engineered Sound Systems—part of a new series of tools for acoustical designers from the engineers of Eastern Acoustic Works.

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On world tours and in permanent installations, for chart-topping rock bands and renowned symphonies, Virtual Array™ Technology has set new standards of musical fidelity from New York to Tokyo. Now Kenton Forsythe has used VA™ design principles to develop a new set of high-performance tools for engineered sound systems. This new approach merges the predictability and intelligibility of constant directivity horns with the superior definition and output of VA™ touring systems. It’s a combination that has already turned several acoustical nightmares into dream projects.

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put, low distortion system that handles everything from lectures to a full spectrum of music.

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If you’re always looking for better ways to solve difficult sound engineering problems, we invite you to apply for membership in the EAW Acoustical Performance Partnership program. Or contact us for full information and specifications on the new MH Series. Either way, you sacrifice nothing—except, perhaps, a few preconceptions.

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those who aren't, and tell them all you in fact have the job. The promotional value of these big public arena installations is irrationally great to a manufacturer of professional sound equipment. It is so

TELL THEM ALL YOU IN FACT HAVE THE JOB.

great that you can play them against each other to get "obscene" deals on the "acceptable alternative" equipment. A large manufacturer will essentially do *anything* to get its equipment in a big public arena job. If you are not a dealer, the manufacturers will set you up as one, once they are sure you have the job. One arena job will set you ahead of most of their other dealers for the year anyway. The marketing and sales types in these companies will often persuade the direc-

tors of manufacturing to have product "fall off the truck" near the arena or the shop of the contractor. If you can get a bunch of manufacturers to do this, you can sometimes get a lot of "spare" equipment with the deal. If you design your system right, the arena will never need the spare equipment and you can use it for your next job. Get it? You see, the manufacturers use these arena installations in advertisements to attract the small contractors, and that's why you're getting killed by your local music store. The big money is in the big stuff.

4. Don't do any electrical work yourself. Hire an electrical contractor to do all this, the bigger the better. This way you will sleep better at night. Trust him. He will never fail you. Everything will be perfect.

5. Purchase any surplus wire for the speaker runs. My favorite is the old 167-

pair telephone cables, which you can get dirt cheap. Don't believe for a minute that the speaker wire will make a difference in an arena; it won't help and it won't hurt. If the wire gives a loss, just

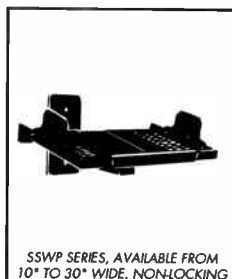
DON'T BELIEVE FOR A MINUTE THAT THE SPEAKER WIRE WILL MAKE A DIFFERENCE IN AN ARENA; IT WON'T HELP AND IT WON'T HURT.

turn up the amplifiers. You can get it loud enough, and everyone at a basketball game or the like will always want you to turn it down anyway. Use any wire and just turn up those amps. Solder special-looking ends on them so they

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look "technical" to the electrician and the arena managers. They wouldn't complain anyway, just as long as the job is done and there is sound in the room.

6. Rent an expensive sound level meter

RENT AN EXPENSIVE SOUND LEVEL METER TO "DOCUMENT" THE INSTALLATION. POINT THE SPEAKERS EVERYWHERE

to "document" the installation. Point the speakers everywhere, especially up at the ceiling and *not* at the seats. Then, measure the sound pressure level in an empty room. This will insure a well-established reverberant field every-

where and a constant spl everywhere. This will even make acoustical consultants happy. This will also insure a lot of "sound" in the room when announcements are made.

7. Let the manufacturers come out and photograph the job. These big manufacturing companies essentially run themselves, and most of the people there have nothing to do, especially the executives. They will send a crew with thousands of dollars worth of camera equipment out to shoot the photos, and the marketing/sales types will also come along to "supervise" so that everything will be "done right". They will shoot ten to twenty rolls of film, pay \$15 a roll to have it developed and give you ten proofs to choose from. It's a hassle, but this way you won't have to shoot it yourself, and you will ally yourself with them, if this is what you want. They will also take you

out for an expensive dinner also.

Stay clear of "technical papers" on the jobs. This is very risky.

So there you have it. Simple, isn't it? By doing this, I am actually doing the

STAY CLEAR OF "TECHNICAL PAPERS" ON THE JOBS. THIS IS VERY RISKY.

country a great service by improving the GNP and getting new sound systems into waiting arenas. It's a sick little game, in a way, but it's business. Roll with the punches. ■

EDITOR'S NOTE — As astute readers might suspect, Dr. Wokka's views are purely his own and in no way reflect the opinions of this magazine.

SOUNDSPHERE SPEAKERS KEEP NEWSDAY PRESSES ROLLING...

The Newsday corporate offices and printing plant are in a large building in Melville, N.Y. It contains the largest color offset operation in the country with ten printing presses. While they operate at the highest efficiency, the collation and inserting operations could not be stopped quickly when problems were encountered. The insert machines could not be turned off resulting in improperly collated newspapers.

After trying flashing lights, buzzers and various horn speakers, a Soundsphere #2212-1 model was tested and five more were installed in the extremely noisy inserting operations room.

Patrick O'Hanlon, Production Maintenance Electrical General Foreman at the site states, "The area in question is a high density noise area and communication is difficult. When Bernie Lory of Craftsman Sound talked about Soundsphere speakers in airport terminals, I knew it was the system for us. The even distribution allowed us to maintain a volume level that would not be overbearing, to permit quick quality control adjustments in the insert area and to still be heard in remote corners of the room."

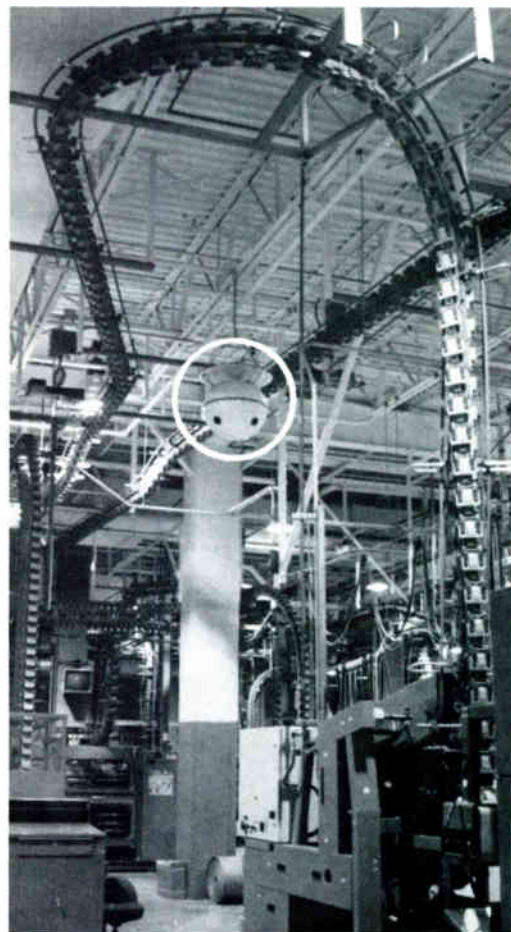
The installer, Bernie Lory has also put two Soundsphere #2212-2 speakers in the stacker area to improve the efficiency of that portion of the operation. He is planning to use more Soundsphere loudspeakers at this site to solve other operational problems.

Write or call direct for further information.

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A CLOSER LOOK

HUGHES SRS STEREO ENHANCER FOR COMMERCIAL SOUND

By Mike Klasco

In this periodic column, we will be taking a "closer look," focusing on communications technology. Home theater, media rooms, and commercial applications of this equipment are serious concerns for our readers.

While a sound contractor's comfort level may be high in judging the quality of a power amp or speaker, or using a multimeter or sound level meter, selecting or testing video components and systems may be a bit out of the bandwidth.

A Closer Look will be a series of hands-on evaluations of equipment such as video projectors, video- and soundfield processors, and field-use video test gear. The perspective will be on product selection decisions and concerns that are real and apparent to installers and their customers, rather than counting the angels that can dance on the head of a pin. Ease of installation, ease of adjustment, stability of adjustment (and reliability), as well as quality and performance will be examined. Trade-offs, benefits, and cost-effectiveness between line doublers, detail enhancers, aspect ratio controllers and other video processing, IDTV and data grade compared to lower resolution interface circuitry

Mike Klasco is the Technical Editor of Sound & Communications magazine.

will all be covered.

Still other issues that we will be taking a closer look at are rear screen versus front screen, flat versus curved screens, LCD versus tube projectors, and glass versus plastic projection lenses. This month Sound & Communications took a closer look at the Hughes SRS Stereo Enhancer.

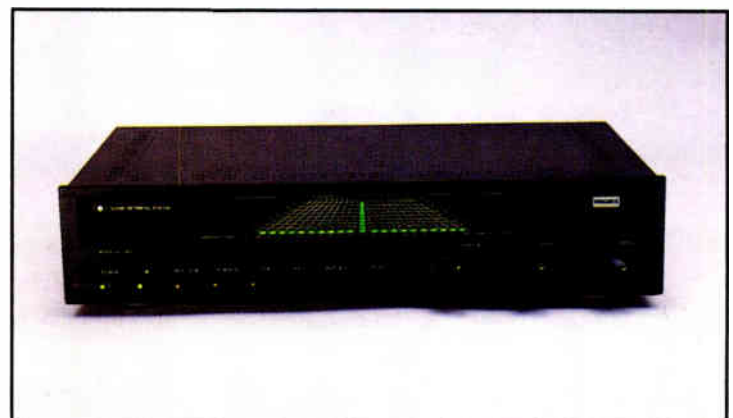
A few months ago a Hughes AK-100, the company's SRS stereo enhancement system, showed up at my door. About three years ago Hughes first introduced the SRS system, and Sony, RCA and a few others began to build it into stereo televisions. Soon after, a separate SRS audio component, the AK-100, was introduced with various buttons and dials and a fancy pseudo-3D display. The product has not exactly been going gangbusters in the consumer market. Apparently, most people who were going to spend money on surround sound wanted a genuine Dolby Pro-Logic decoder for home theater or one of Yamaha's or Lexicon's more sophisticated digital soundfield processors.

The Hughes gizmo is unique in that it

does not require additional amplifiers or additional speakers to create a more spacious sound. All you need is your stereo speakers. In a club, the existing sound system will do fine without adding additional channels. Roland, QSound, and others have also developed stereo enhancement systems, but these are more than 10 times the price of the SRS

THE STRENGTH OF THE SRS SYSTEM IS THAT IT CREATES A SPATIALLY OPEN SOUND WITHOUT LOCALIZATION OF THE SPEAKERS, AND LISTENER LOCATION IS NON-CRITICAL.

system (the Hughes AK-100 lists for \$299). While there may not be much hope for the SRS system going over big as an add-on component for home audio, it seems to work real well for clubs. A



The Hughes Sound Retrieval System, Model AK-100.

few other commercial applications are foreground music systems, movie theaters, roller rinks, business music systems and the like. The strength of the SRS system is that it creates a spatially

THERE ARE CONTROL POSITIONS THAT CONSISTENTLY SOUND GOOD.

open sound without localization of the speakers, and listener location is non-critical. These characteristics might enhance many commercial sound systems, especially considering that the AK-100 SRS device has a very effective mono to "3D" mode. The processing is sophisticated — center channel and voice range signals are kept intact so paging intelligibility will not be mucked

up. As an aside, another group at Hughes has come up with an intelligibility enhancement device which they call VIP for Voice Intelligibility Processor, and when these begin to ship late this fall we will take a closer look.

I brought the SRS device to Premier Sound & Light, a club installer in San Francisco. We listened to it and they installed the unit into a local club. The general reaction was positive and the operation of the "space" and "center" controls were considered effective in creating appealing effects.

There are control positions that consistently sound good and for the SRS would still be effective if it was preset and "locked-away." The SRS system not only works on the spatiality of the sound, but also expands the dynamics. The greater the difference (separation) information, the more the dynamics are

increased. If you are short on peak headroom, then you can back off on the Space control and this will keep the crest factor in check. An unusual 3D grid display on

I FOUND THAT THE TYPE OF SPEAKERS AND ACOUSTICS CONTRIBUTED TO THE RESULTS.

the face of the processor aids adjustment of spatial texture. The SRS process adds greater "space," and this quality is not lost when you move around the room.

I found that the type of speakers and acoustics contributed to the results. If the room was too reverberant or if the speakers were poorly designed then the effect was not as strong. Coaxial speakers, such as certain models from Tannoy, Yamaha, Radian, and others brought out the best in SRS. Other projects I am trying the SRS system in include an aerobics studio and a fitness center.

The AK-100 lists for \$299. It is not rack

HUGHES SRS AK-100 WILL NOT ADD NOISE OR DISTORTION TO THE SIGNAL PATH AND IS CLEAN AND QUIET AS A GOOD CD PLAYER.

mount, but neatly fits into a rack tray. Inputs and outputs are RCA jacks, and the processor will typically be inserted into the tape monitor or effects loop of a mixer or preamp, with the signal path for the equalizer after the SRS unit. Construction is very good, with excellent design, high quality components and superior audio specs. Hughes SRS AK-100 will not add noise or distortion to the signal path and is clean and quiet as a good CD player. Hughes Audio Products can be reached at 714-858-6154.

Even inexperienced personnel can operate complex systems when they're powered through a Furman Power Sequencer



Make sure the equipment you install is powered up (and down) in the right sequence by specifying an economical PS-8 Power Sequencer from Furman. Use it to avoid turn-on/off transients and excessive inrush currents by powering through its three delayed outlet groups. The PS-8 assures you of clean power via its triple-mode spike and surge suppression, multi-stage RFI filtering, and Mains

Wiring fault indicator. Options provide for either direct remote switching or remote switching by sensing AC power at a preamp's switched outlet (perfect for home theater applications).

For more information, please call or write:

FURMAN

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FACILITIES

With many more features than can be listed here, SR6000 offers a considerable step forward in SR console design concepts and defines a new horizon for the technology.

TOTAL CONTROL

SR6000's output system has been designed to allow maximum flexibility in configuration of output stages. Each input can separately address 8VCA/Mute groups and 8 audio subgroups, all of which are overlapping. The main stereo output and the 10 x 8 output matrix allow multiple speaker arrays to be controlled with ease, while the VCA Master gives overall control of all 10 main outputs.

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SR6000's revolutionary auxiliary system allows the 8 send buses to be split between left and right sides of the console, giving the engineer 16 auxiliary paths for large, effects-heavy mixes.

COMPACT SIZE

SR6000's compact design is only 1000mm wide for 40 inputs, 4 stereo effects returns and all output facilities. Robust steel construction equipped with side lift bars and concealed grip space under the console allow SR6000 to be manoeuvred and transported easily in the secure knowledge that all circuitry is fully protected from external impact.



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What Do They Think of Us?

We Ask the Design Community

BY KATHLEEN LANDER

There's a love-hate relationship going on — between residential electronic system installers and interior designers, both of whom often grudgingly have to interface with each other.

Reconciling the demands of audio and video performance with design requirements often leads to that love-hate relationship between the electronic installers and the architects and interior designers who request consultations. Called upon for technical knowledge and expertise in achieving the desired results, the installers also get cited for “unprofessional conduct,” pushing products they want to sell rather than what's ordered or is best for the job, and not putting primary importance on the client's needs and the design.

Both kudos and harsh criticism were evident in a Sound & Communications informal survey of architects and interior designers whose projects involve audio and video installations. There is one unexplained geographical difference — the farther from New York, the better the working relationships.

Those relationships can be improved, say the designers, by focusing on such changes as better explanations to cli-

ents or end users of how the systems work, delivery of exact specifications on equipment sizes before cabinets are designed, and industry standards for contractors.

Here are the comments from a varied group of professionals from across the country. Get ready for some harsh words.

A unique installation in which the entertainment center had to be designed around the elevator.

Designers agree that communication is a key in achieving a home entertainment system that satisfies the client.

(For the uninitiated: ASID stands for American Society of Interior Designers; AIA is the association of architects.)

Roger Gross, president of Ruben DeSaavedra, Ltd., New York: We've had nothing but problems with sound installers, who have shown complete inefficiency and lack of respect for the de-



signer. Different equipment may arrive after the cabinets have been done, and we have to cover up for their mistakes.

A change I would like to see is delivery of every piece of equipment to the cabinet maker before the work starts, because the exact physical measurements are needed. The equipment could be returned prior to installation. It's essential that the equipment delivered meet

Kathleen Lander is a freelance writer living in New York City.

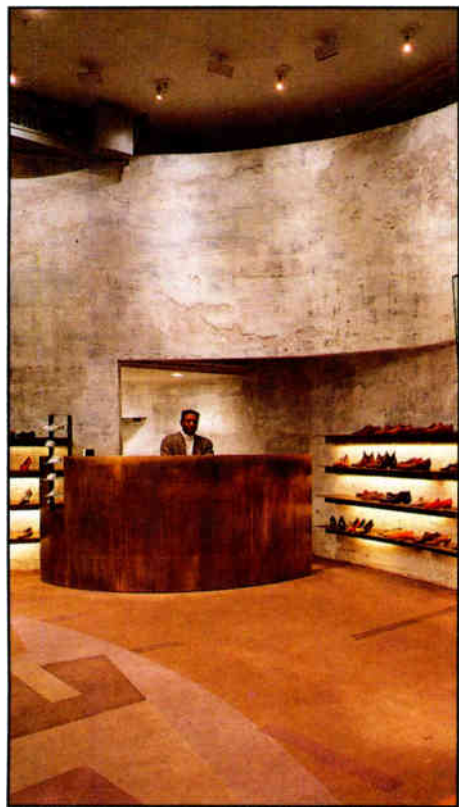
the original specifications.

We never have had problems with scheduling or wiring in working with installers on projects like a home disco in Westchester or a home theater with controls that brought equipment up from the floor.

B.J. Peterson, FASID and ASID president-elect, Los Angeles: The designer can't handle the technology alone but wants an expert to be sure all the speakers and cabinets, etc. are in the right places. The installers can encourage clients to include a-v systems, and the ones I've worked with are helpful in working out solutions that are good for both of us. I like to have the client and the installer work with me as a team to translate ideas into reality.

Sometimes the installer needs to fine tune and adjust a complicated system like a recent 8500-square-foot house with a media room, plus a-v in every room but the bathroom, which had audio only.

A 10,000-square-foot showroom for Kenneth Cole in New York, designed by architect Edward I. Mills.



A corporate headquarters boardroom installation in San Francisco designed by Raymond Kennedy.



The installers need to be sure the client understands a sophisticated system. The trend in the industry is for the professionals to work together.

The trend in the industry is for the professionals to work together.

Maggie Cohen, ASID, faculty member, New York School of Design: I value the installers' expertise and their advice on the correct positioning of components, shielding, venting, and logistical details. I often find them unreliable and unprofessional, not trained to deal with clients. I perceive a conflict of interest in that they push merchandise that's not necessarily the best for the client but what they can make the most money on.

There's such a great difference in qualifications that I think there's a need for industry standards and professional guidelines. In one case, the installer sold a client a \$10,000-\$20,000 audio system, attempted to deliver other merchandise five weeks late, and then added an installation charge that was not in the contract. The installer was competent in knowledge but unprofessional in behavior.

Raymond Kennedy, ASID immediate past president, San Francisco: I like the

knowledge of the installers, and I learn on every job. Electronics is so sophisticated today that we look more and more to the specialists for home entertainment centers, media rooms, board rooms and CEO offices. Smart houses and the telephone video dial also are opening tremendous new areas.

There must be a partnership between the designer and the installer. It's the designer's responsibility to be sure that specifications are complete before designing begins, and references of consultants must be checked. Plans must be flexible to allow for rapid changes in technology.

Areas where problems can occur are in scheduling, which affects all aspects of our work, and in lack of communication.

John Phifer Marrs, past ASID chapter president, Dallas: I turn to the audio-video installers as the experts in their area, just as I use the expertise of lighting or kitchen designers. They help to come up with the proper equipment for a surround sound system, wall TV, or other installation.

Sometimes the installers may not understand the overall design and get carried away to the point of overkill. I require that they give me a presentation of the project before the client presentation because the designer sees the whole



A master bath redo designed by John Phifer Marrs.

ally work with us and don't try to promote equipment over the concept. One outstanding example was in a historic renovation of a traditional house. The sound engineer worked for two months to find equipment that would fit into crown mouldings, air conditioning ducts, and walls to integrate the sound as a part of the background. He was working for a solution rather than selling equipment.

Even with good relationships, it's not always easy to get equipment on schedule. When there is a problem of some kind, we call in early, not at the last minute.

He was working for a solution rather than selling equipment.

project and knows the client's budget. The audio-video consultant needs to understand how the clients live and that it's not necessary to hide every TV.

More attention is needed in explaining to the client how the system works. It should be stated in layman's terms that clearly tell how to use everything.

The audio-video consultant needs to understand how the clients live.

Barbara Piazza, interior designer, Port Chester, New York: I depend on the installers to interact with the client and to pull together a sound system that will work with the client's lifestyle and home functions but still be aesthetically pleasing.

Communication is the biggest problem. There are different points of view in a triangular situation where the designer, client and system installer all must work together. I need to be informed on the sizes of equipment, proper placement of the TV, etc.

Total information is needed, and sometimes concessions must be made. The

designer must have exact specifications on the equipment required at early stages of the design process. I have had a few bad experiences with installers but mostly have worked with really good people.

Robert John Dean, ASID past president, Tampa, Fla.: The installers have the technical knowledge to get wonderful sound where it is wanted. They usu-

Edward I. Mills, pc, architect, New York: Audio-video consultants and installers are a new industry that's becoming more important. Software will be more and more of an added ingredient, particularly in commercial work, and is an ingredient most designers haven't dealt with before.

A recent 10,000-square-foot showroom for Kenneth Cole required four TV moni-



A custom built-in entertainment unit designed by Thomas Grabowski.

tors integrated with VCRs with two different tapes playing simultaneously and an a-v system throughout. We worked with a consultant on cabling, switching, heat load and other specifications.

We require that all equipment be sent

We go to the showroom to measure it, because the brochures are not accurate enough on details.

to the cabinet maker, or we go to the showroom to measure it, because the brochures are not accurate enough on details.

We've had no problems with installers except that we find they tend to be more technicians who want to go to an ex-

treme for perfect sound, saying "You have to do this; you can't do that." The specialist has to work with other aspects of the project.

The architect and the sound designer need to get together more at the beginning of projects to provide adequately for conduits, relays, and all mechanical requirements.

Thomas Grabowski, AIA, architect, Detroit, Mich. I advise clients to talk with the sound person themselves on residential projects. They decide on plan A, B or C. Clients have a better feel for what they want in a system and how much they want to spend. Problems come with a client who wants to work with existing equipment. TV and sound usually are installed in a concealed unit, and there is a growing market for entertainment units which will accommodate larger screens.

Summary: A long silence was the

nearly universal response to the survey question "What do you like most about audio-video installers?" Some responded first with a list of dislikes, although most acknowledged expertise and found some diplomatic words. A hopeful sign for

The specialist has to work with other aspects of the project.

happier working relationships between installers and designers/architects is the frequently voiced thought that the groups should work as a team. Several also noted that manufacturers are making the jobs easier with the introduction of smaller, less obtrusive equipment that is easier to install without compromises in design. ■

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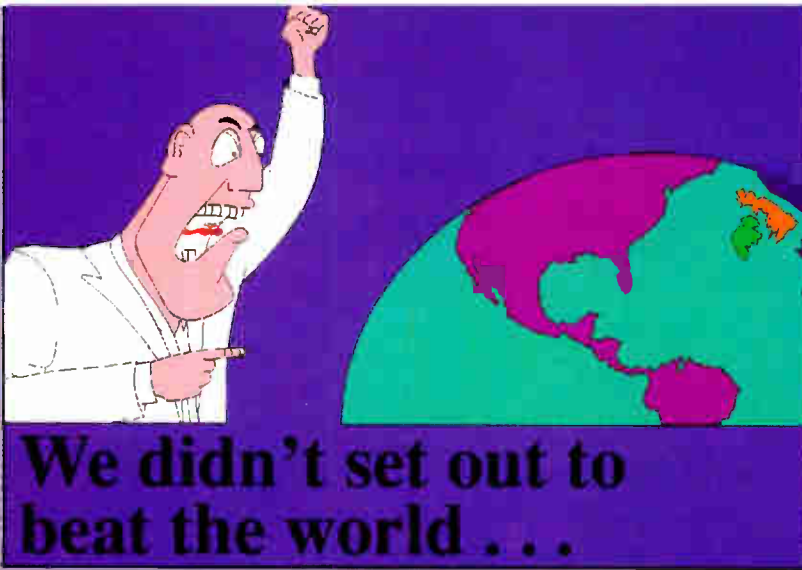
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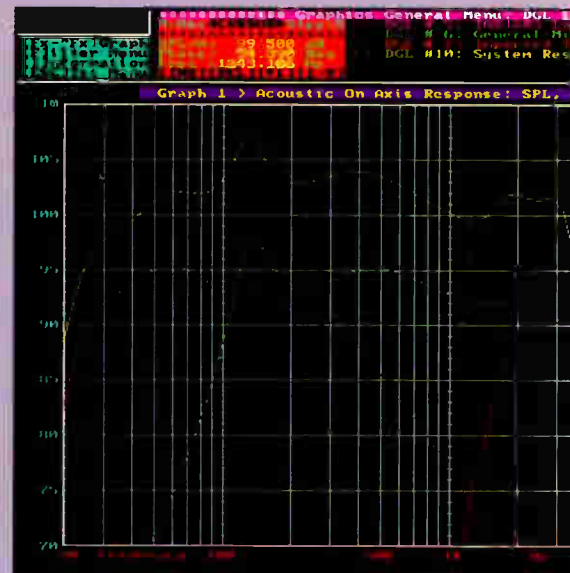
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LEAP



Roll Your Own Digital Sound

Do Home Electronics Face a Pro Future?

BY EDWARD J. FOSTER

New developments in consumer electronics promise to impact the commercial and pro fields. While DCC and MiniDisc products have not yet arrived on the market (but are promised for just after press time), their formats and technology may offer a peek at the future for sound and communications professionals.

This won't be the first time that consumer-audio hardware will have been pressed into professional service. Nor will it be the last. But it may be one of the neatest fits yet.

As a professional audio medium for special shows, museum exhibits, video shorts, etc., MiniDisc — Sony's erasable, recordable, affordable disc-based audio system — is likely to be a better choice than DCC (the Philips/Matsushita Digital Compact Cassette), the other new consumer digital-audio recording system. Why? Because MiniDisc is smaller, accesses programs more quickly, and gives you 74 minutes of uninterrupted audio. DCC offers a longer total recording time — 90 minutes to start, with the promise of 120 minutes to come — but, as with any bidirectional medium, there's a break at the end of each side as the deck reverses.

Edward J. Foster is the proprietor of Diversified Science Laboratories in West Redding, Connecticut.



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KH3 DCC deck.*

And, as is true of any linear streaming medium (as opposed to disc-based media), DCC takes longer to search for programs; it's designed to be faster than analog cassette, but it's no match for MiniDisc. This may or may not be important. If you've assembled custom software and the program organization is invariant, access time should not be important to you but, if the programming is variable, for example, if the track to be played depends upon user input to answer a question, or is otherwise determined by a decision tree, MiniDisc is the clear choice.

If you're developing a very long continuous program, or if your decision tree gets very complex and you need access to a large number of individual programs, discs have a key advantage over tape: it's easy to make a disc "jukebox," but quite

complex to make a cassette equivalent. In fact, on a recent trip to Sony headquarters in Tokyo, I saw a prototype of a MiniDisc changer — pretty stylish for the professional market, but good looks never killed an application.

There's bound to be a lot of bad-mouthing about the sound quality of MiniDisc and DCC because they don't use straight 16-bit linear-PCM encoding the way CD, DAT and professional digital gear does. I urge you to take the bad-mouthing with a grain of salt and listen for yourself. These systems sound pretty good right now and, unlike 16-bit linear-PCM encoders, the sound quality of these encoders can be improved in the future while maintaining compatibility with existing playback equipment. Keep that in mind!

Obviously, I'm bullish on the new en-

coding techniques, so I'd better explain how it's possible to have equal or better sound at a low bit rate (128 kbps/channel on MiniDisc, 192 kbps/channel for DCC) than at the high bit rate (705.6 kbps/channel) used on CD. Hey, there's nothing wrong with having lots of bits to work with; it's just that it's helpful to use some intelligence in deciding what to do with them. Here's what I mean.

When it comes to audio, 16-bit linear PCM is needlessly "dumb"—a straightforward, brute-force, engineering approach to preserving signal waveform. The idea behind linear PCM is to sample the wave at a high rate and convert the level of each sample into a digital word describing the amplitude. When the "words" are played back, samples are reconstructed to match holy writ and by "connecting the dots" with a filter, the original waveform is reproduced. That's



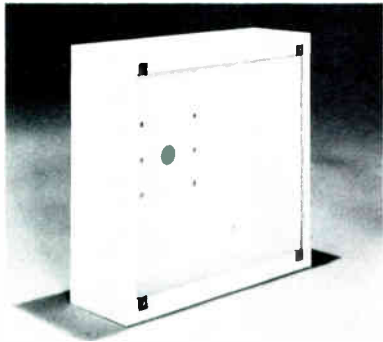
Sony MZ-1 MiniDisc player/recorder, prerecorded disc and recordable disc.

fine; but is it necessary?

When it comes to audio, there's a vast body of knowledge regarding what we can and can't hear and the circumstances under which we will or will not hear it. For example, psychoacousticians have derived a "threshold of hearing" function which establishes the minimum

sound pressure level (versus frequency) needed for the average human to "hear" a tone in an absolutely quiet background. As it turns out, our hearing is most acute in the region around 3.5 kHz and progressively less acute toward the frequency extremes. In fact, it requires almost 80 dB more sound pressure level

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at 20 Hz and 20 kHz to reach audibility than it does at 3.5 kHz. In digital parlance, that's about a 13-bit difference! There's no point "wasting bits" encoding "sounds" that are inaudible but that's exactly what linear PCM does, which is why I called it "dumb."

Next, there's the "masking effect." You have to speak up to be heard over the background noise of a New York subway but you can hear a whisper at home. It's obvious that loud sounds mask soft ones but how they do so is somewhat complex. The level difference needed for a loud sound to mask a soft one depends upon how close together they are in frequency and where in the spectrum they occur. To put a handle on this, psychoacousticians have established so-called "critical bands."

A critical band is the frequency range over which masking is effective. In the low bass region, the critical bandwidth is constant at 80 to 100 Hz. As the frequency increases, the critical band widens and ultimately becomes a constant percentage of frequency roughly equivalent to $\frac{1}{3}$ octave.

The encoders used for MiniDisc and DCC make use of these psychoacoustic phenomena to ignore signals that cannot be heard and to encode those that are perceptible only to the degree of accuracy needed to mask quantization noise. As a result, they can encode a music signal using a lower bit rate than linear PCM while still producing excellent sound. Although some commentators like to emphasize the lower data rate and refer to these encoders as "data-compression" systems, I prefer to think of them as "smart" perceptual encoders and avoid the negative connotation of "compression."

As our knowledge of psychoacoustics increases and more advanced perceptual algorithms are developed, it's possible that these systems will produce even better sound quality than that provided by linear PCM. I'm not saying that they do so at this point in their development, but the possibility is out there, if not at data rates of 128 kbps or 192 kbps,

perhaps at a somewhat greater rate. Certainly, using some "smarts" to allocate bits rather than slavishly trying to preserve a waveform is a step in the right direction. There's nothing magic about 16 bits; it's just what we've become accustomed to. In fact, Sony's "Super Bit Mapping" technique to improve the sound of conventional CDs applies psychoacoustic "smarts" to

16-bit encoding.

The first step in any perceptual encoding scheme is to frequency analyze the music to determine what components are present and what their levels are relative to each other and to the threshold of hearing. Then bits can be assigned to encode the audible components as perfectly as possible. Philips' PASC (Precision Adaptive Subband Cod-

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ing) and Sony's ATRAC (Adaptive Transform Acoustic Coding) systems perform the frequency analysis somewhat differently.

At high frequencies, the analysis is finer than it need be.

PASC uses a bank of digital filters to divide the audible spectrum into 32 equal bands each about 750 Hz wide. This means that, at low frequencies, the bands are wider than the critical bandwidth and, at high frequencies, the analysis is finer than it need be. Although PASC

number of samples in the block. The greater the number of samples, the narrower the analysis bandwidth. Another way of looking at it is to say that the analysis bandwidth is inversely proportional to the time duration of the block. Either way you look at it, you can have whatever analysis bandwidth you desire. But, there's a hitch.

Since analysis is performed piecemeal, an error occurs before and after each block. The audible result of this error is "pre-echo" and "post-echo." In relatively continuous music, the echoes are inaudible because they are masked by the ongoing sound. At the onset of a tran-



Sony MiniDisc units and media.

does not take full advantage of critical band theory, it's a relatively straightforward approach and can handle transients quite well.

ATRAC, which aims at an even lower data rate (128 kbps/channel compared with PASC's 192 kbps/channel), is more complex. With ATRAC, music data is mathematically converted from the time to domain to the frequency domain using a Modified Discrete Cosine Transformation (MDCT), similar to the more familiar Fast Fourier Transform (FFT) but more efficient than an FFT for this purpose.

Data samples are grouped into overlapping blocks and converted in turn by Digital Signal Processors (DSPs). The analysis bandwidth depends upon the

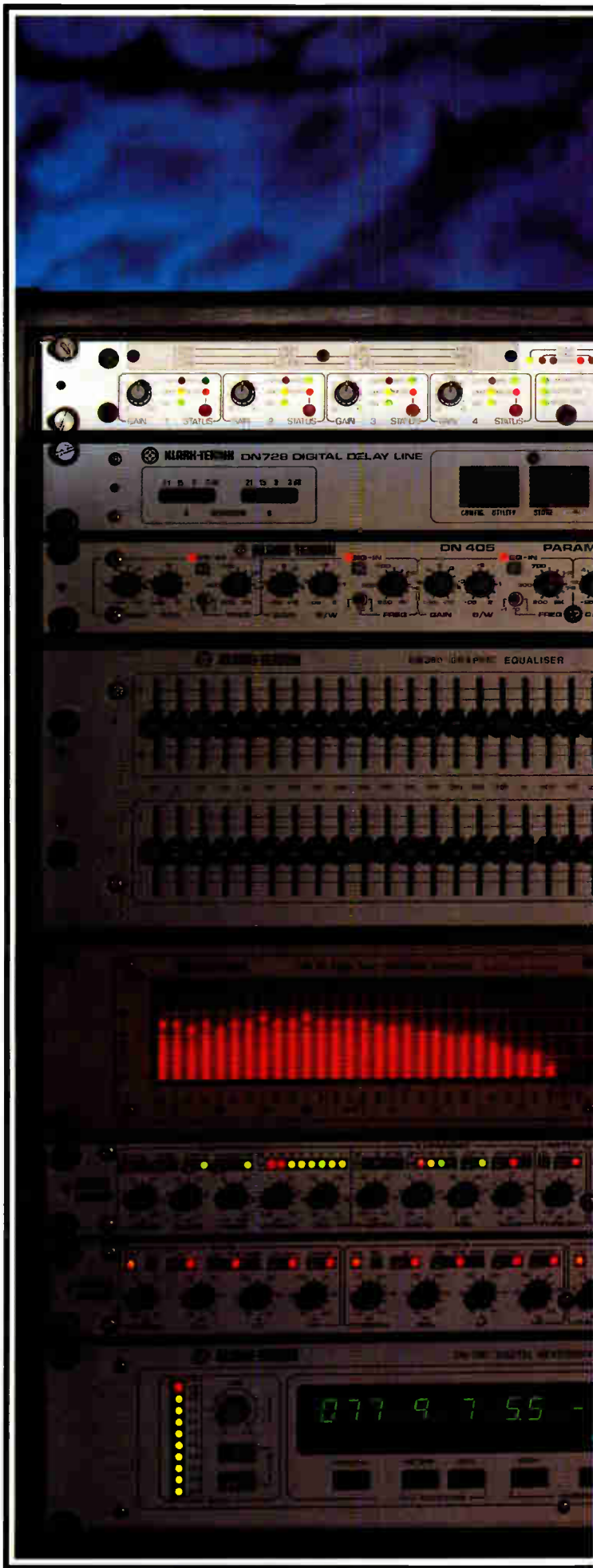
transient, however, the pre-echo can rear its ugly head. (Post-echo is seldom audible because it's masked by the natural decay of the sound.) The duration and audibility of the pre-echo depends upon the block length. Long block lengths (fine analysis bandwidth) produce a longer pre-echo on transients than short block lengths (wider analysis bandwidth).

ATRAC circumvents this problem by using different block lengths for different portions of the spectrum. First, the audible band is divided into three subbands, 0 to 5.5125 kHz, 5.5125 kHz to 11.025 kHz, and 11.025 kHz to 22.05 kHz. Each is handled by its own MDCT with block lengths changed dynamically depending upon the presence or absence of transients. At the onset of a transient,

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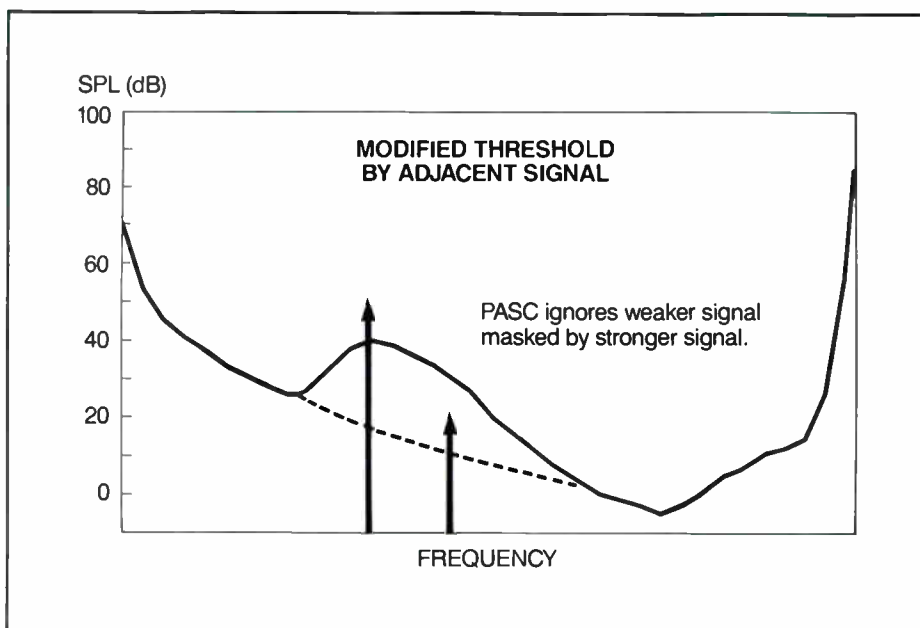
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the blocks are shortened to reduce pre-echo; with quasi-continuous sounds, the blocks are lengthened to reduce the analysis bandwidth and provide better frequency resolution. The result of this “non-uniform frequency and time splitting” is the synthesis of 52 analysis bands that correspond quite closely to the “critical bands” of human hearing.

Returning for a moment to “pre-echo,” I don’t want to leave the impression that pre-echo is necessarily audible. An offshoot of the masking effect is the so-called “pre masking effect.” Transients have a certain ability to mask sounds that occur just before the onset of the transient. The reason is thought to be the fact that loud sounds travel to the auditory portion of the brain faster than soft sounds and so the transient “overtakes” the pre-echo and masks it. The time period over which pre-masking is effective is short



Demonstration of PASC rejecting masked weak signals.

but the effect is real and, if the pre-echo is kept sufficiently brief (by limiting the block length), it can be masked by the sound that follows.

Obviously, one of the key elements in any perceptual encoder is the “bit-allocation algorithm,” *i.e.*, how the system actually decides how many bits to use to

encode the components that are present. At the time I’m writing this, details are sketchy and, in actuality, the allocation algorithm can be improved in the future and still be backward compatible with existing hardware because the recorded data actually “tells” the decoder how bits were allocated and what to do with them.

MIXa Amps. Pure QSC.



Thus, perceptual encoders aren't locked in to a rigid standard the way a linear PCM system was.

At least initially, ATRAC will probably use a combination of fixed bits and adaptive bits such that, for noise-like signals, most of the bits are allocated independent of spectrum but, for tonal signals, the allocation is based on the power spectrum of the signal. In any case, the idea is to assign enough bits to each band to ensure that the component masks the quantization noise produced by the limited number of bits.

As you probably know, when a signal is "quantized," *i.e.*, described by a digital word, quantization "noise" is generated. That noise is the error between the "true" value of the sample and the digital value that is used to represent it and is spread throughout the spectrum. The more bits there are available, the less the error

and the lower the noise. Now, as we've seen, the signal itself serves to mask quantization noise in the critical band surrounding it; components elsewhere in the audio band serve to mask noise in their respective regions. The idea is to allocate bits in an intelligent manner — as a function of what components are present — to ensure noise masking across the entire spectrum.

Sony's present algorithm allocates bits to each band using the power in that band without regard to the desired bit rate. Then, the bit assignment is reduced or increased more or less uniformly across all bands such that the required bit rate (128 kbps/channel) is achieved. Information regarding how the bits were assigned is imbedded as "side information" in the bit stream; this information "tells" the decoder how to act on the data.

For recording, MiniDisc uses a relatively new type of optical medium — called an "MO" (Magneto-Optical) disc — which heretofore has been used mainly in computer applications. Unlike "WORM" (Write-Once-Read-Many) discs, it's erasable and re-recordable, but also unlike WORM or pre-recorded compact discs, it does not rely upon physical deformation of the medium and differences in reflectivity to convey data and therefore must be read by a special "Kerr-Effect" pickup. Pre-recorded MiniDiscs will continue to use CD-like pressings and are not erasable. To accommodate both types of discs, Sony had to develop a new dual-purpose laser head. That, and the technology behind MO recording, is a subject by itself. If there's interest on the part of the readership, perhaps I can address that in a subsequent issue. ■

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Challenging the Great Outdoors

What to Expect in Residential Landscape Audio Installation

BY ALAN GABLE

When it comes to residential landscape audio installation, one fact reigns supreme: It's a jungle out there. No doubt, residential sound and communications contracting in general is rife with special challenges. Bringing audio to the great outdoors for a client's home, however, poses obstacles seldom encountered within four walls. A patio, veranda, swimming pool area or tennis court are, after all, a different bird altogether, requiring special preparation, yet should be considered just as important as the satellite rooms tied to the main system inside. "We do a lot of multi-room," says LA Sound's Nathan Oishi. "The outdoor areas really just become another room, often with its own zone."

Planning the "outdoor living room" system should be done much in the same way as the rest of the house. While planning an indoor wiring scheme from an architect's blueprints is commonplace, few installers have an adequate understanding of the blueprints and terminology used in landscape design. It is advised that the installer get a copy of the landscape plan as soon as that plan is

Alan Gable is a freelance writer and consultant in the residential installation field who lives in San Jose, California.

completed or, if possible, be in contact with the landscape designer from the start. A little study of landscape symbols and design goes a long way. The landscape designer or architect should be made aware that speakers will be a part of the finished landscape and that there will be wiring considerations that will need to be taken into account. By doing so, the appropriate sleeves for getting wiring around "hardscape" areas can be



arranged before any bricks are laid or concrete is poured. When laying down sleeves, it is recommended that you have more than what you actually need in place.

John Korothy has been in major residential landscape design for years. Along



An example of an installation designed by John Korothy. Early in construction sleeves and conduit are laid under proposed walks and patios.

According to Korothy, the finished product should be pleasing to the ear as well as the eye. "Natural" speakers are blended in with the landscape.

the way, he's worked with numerous installers in bringing "landscape audio" to clients' homes. "In any well-planned landscape," he remarks, "you have to run sleeves across the impasses." If you think a one-inch sleeve is going to be big enough... put down two one-inch

sleeves or one two-inch sleeve because landscape projects — particularly with regard to lighting and sound — tend to develop in ways you'd never expect no matter how hard you try. Always leave yourself room for expansion . . .”

Landscape projects tend to develop in ways you'd never expect no matter how hard you try.

Because the acoustics of an outdoor installation vary so greatly, expansion is key. That area you initially thought would be served adequately by a single pair of speakers may require more, depending upon a variety of factors. Proximity of neighboring residences, road noise and local sound ordinances will play an integral part in both choice and placement of speakers. Are you using box-type speakers suspended from above or omnidirectional in-ground units? Are you using one of the various rock speakers now on the market or are flush-mount drivers being mounted in an adjacent overhang or wall?

Wire paths and distances the signal must travel tend to be a lot less straightforward than their indoor counterparts.

Multiple pairs of speakers present another challenge to the residential installer. The maintenance of proper impedance levels so that source amplifiers are not damaged is crucial; because of the absence of walls or reflective surfaces, a greater amount of power is required. Not only are multiple pairs being driven, but wire paths and distances the signal must travel tend to be a lot less straightforward than their indoor

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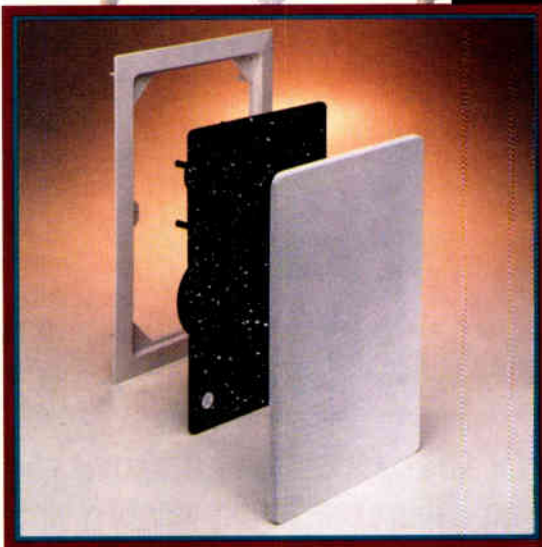


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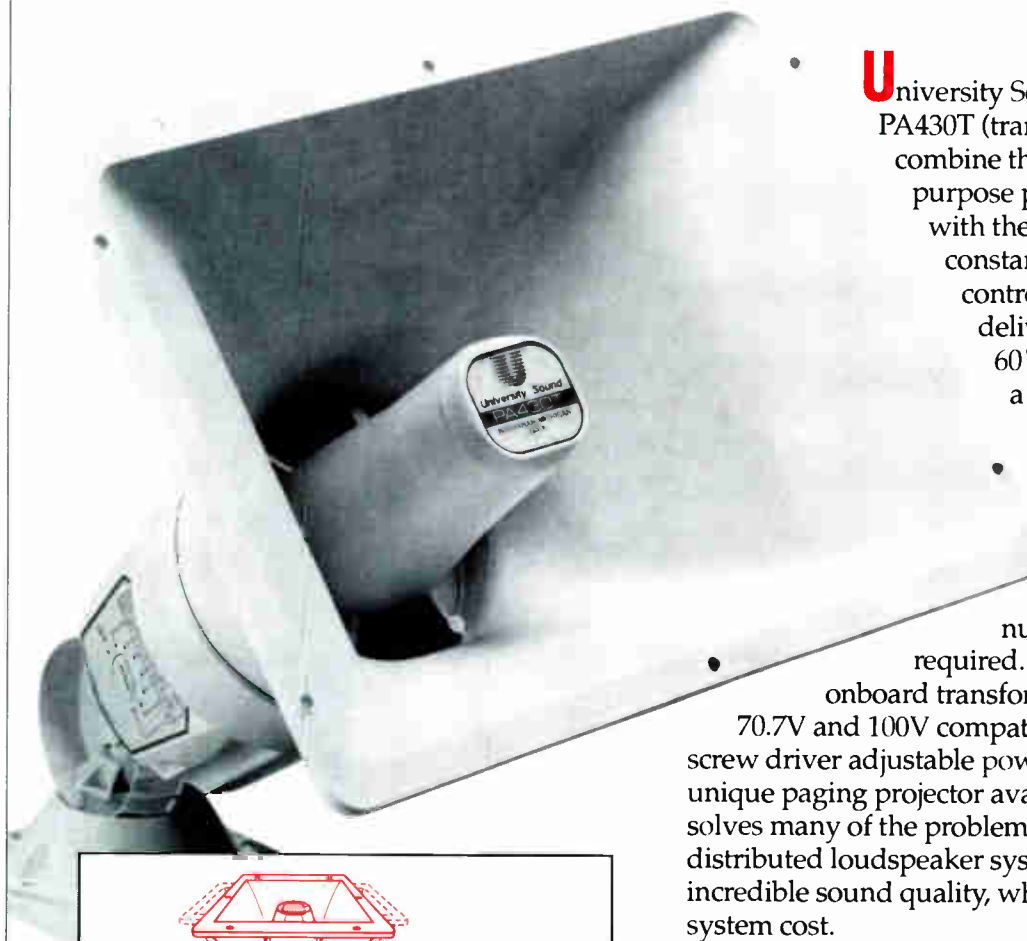


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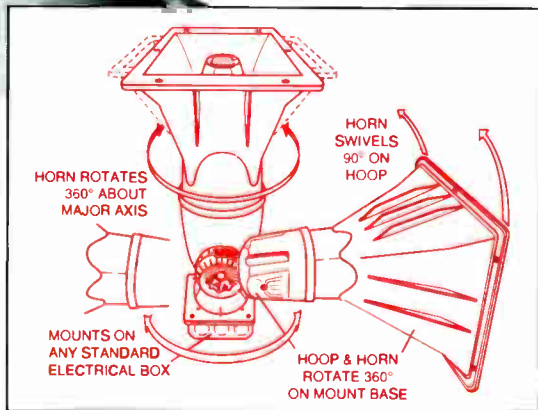
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This installation used Paramount omnidirectional in-ground speakers under the shrubs.



counterparts.

To that end, the impedance matching systems offered by companies such as Niles Audio, Sonance and Russound are convenient, particularly when the out-

Two chief approaches to wiring outdoor areas prevail. The most common involves use of "direct-burial" cable (though we have yet to turn up any of the "indirect-burial" variety). The direct-



Speaker distribution and impedance matching systems such as the Niles Audio SMS-10 are being offered, and are especially convenient when the outdoor area is an add-on.

door area is an add-on. Audio Design Associates began manufacturing the PF200 amplifier with outdoor installations in mind. The PF200 will handle a load down to one half ohm, allowing several pairs of speakers to be run off the single amplifier in parallel.

Another element of concern every installer surveyed agreed on was wire protection. The "outdoor room" is one place where hiding cable poses special problems. Wiring is now relegated to placement underground, and it's underground where insects, small animals and, less obviously, natural acids reside. If not sufficiently protected, even the installer's best laid plans can come undone.

burial approach is most common where retrofit work is being done and requires

Once you start putting in conduit — especially if it's rigid conduit — it always seems to be where the ball of a plant should have gone.

a lot less harm to existing landscape work and little or no excavation at all. The alternative to direct-burial cabling

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involves the sinking of conduit, whether rigid or flexible.

"Direct-burial cable is much easier to work with," says Korothy. Once you start putting in conduit — especially if it's rigid conduit — it always seems to be where the ball of a plant should have gone, so a plant is a little off-centered. Direct-burial is very flexible, very easily moved out of the way. The main thing is

to bury it deep enough so that your normal garden maintenance is not going to affect it."

How deep is that? According to the landscapers interviewed, a minimum of four inches below the sod line, where it is less like to be freezing and thawing or dug up when a lawn is being thatched or otherwise treated. Preferably, the cable should be double-jacketed, using an

outside sleeve over wrapped, multi-stranded conductors. When using conduit, flexible tubing is preferred, though greater protection is offered by using a rigid metal or PVC. If at all possible, try to secure a "floor plan" of any in-ground sprinkler systems and outdoor electrical system.

Try to secure a "floor plan" of any in-ground sprinkler systems.

Weatherproof. Weather Resistant. UV Protected. Sound Pollution Ordinances. "Hot Spots." These are just some of the terms the installer of outdoor audio needs be familiar with to successfully pull off a landscape audio system that will "weather any storm," so to speak.

Being aware of the difference between speakers and accessory housings that are *weatherproof* as opposed to *weather resistant* is essential. Weatherproof components are built to withstand the elements by themselves, regardless of sheltering conditions. Weather conditions vary from region to region, however, and components that may be considered weatherproof for an installation in the temperate climate of San Diego may not weather the beatings Mother Nature may inflict upon them during the long, cold winters of Minneapolis.

LA Sound's Oishi's comments echo the sentiments of most installers. "Long-range use is a concern of ours," he says. "Most products we use give us a durability of up to five years. After that, well . . ." After that, comes the opportunity for service. Because the industry of outdoor audio is one of the strongest growth areas of custom residential installation, system serviceability is important.

Weather-resistant products require placement under eaves, within shrubbery, in any area that affords some sort of protection from the sun, cold and rain. Usually, it is the in-wall speaker that is mounted house-side that is weather-resistant. What makes them resistant to

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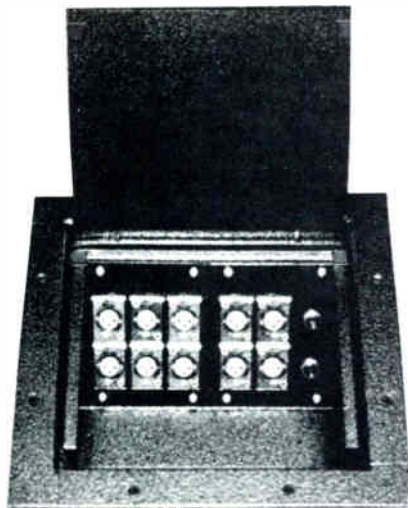
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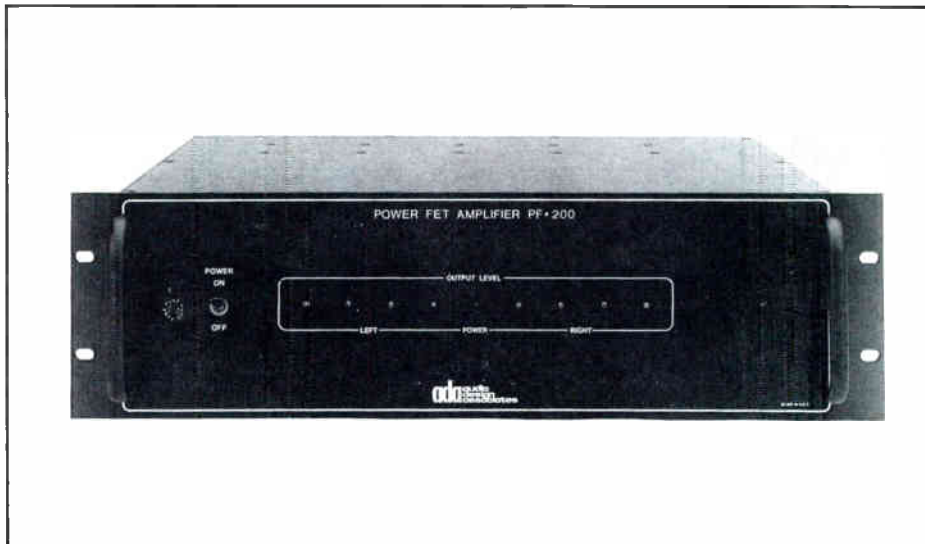
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Audio Design Associates began manufacturing the PF200 amplifier with outdoor installations in mind.

weather conditions is the use of polypropylene cones and rubber or foam surrounds that resist the moisture prevalent outdoors. It is the general absence

Restricting speakers to structure-mounting, however, is wise only when the area to be covered is small

of any type of weatherproofing agents to seal the faces of the drivers that prevents them from being considered weatherproof. Nevertheless, they are usually easier and less expensive to replace and a coating of weatherproof paint will help retard any rusting of the exterior mounting assembly. Restricting speakers to structure-mounting, however, is wise only when the area to be covered is small and immediately adjacent to where the speakers are being installed. Covering a large area with speakers placed on only one side of the area creates the "Hot Spot" or "Loud Zone." In a "Hot Spot" condition, sound coverage in an area is uneven; the person closest to the sound

source will be "blasted" by the sound, while those further away will be hearing a normal level.

"It's important to consider the filtration of speakers around the outdoor area," says Richard Stoerger of Audio Design Associates, "rather than a concentration of two speakers in one area designed to play loud. With outdoor audio, it's preferable to have, instead of high volume levels coming out of those two speakers, multiple pairs of speakers situated in and around the grounds such that the volume levels can be maintained evenly throughout the outdoor area."

Using speakers for intercom and paging purposes that have been designed primarily for music listening is nothing more than a short-sighted shortcut.

This is especially true if the speakers being used are also being used for paging. However, most installers agree that using speakers for intercom and paging purposes that have been designed pri-

marily for music listening is nothing more than a short-sighted shortcut. Oishi points out that, in residential applications, the paging system is usually tied in with the telecommunications system and that tying both into a sophisticated landscape audio system is more problematic than it's worth.

Stoerger agrees. "In my opinion, there are more critical questions regarding switching and overriding the system. Turning the system on if the area's off is one example. A separate paging system is definitely the better way to go." The traditional weatherproof horns that are normally associated with paging are best left to voice transmission; the wider frequency response but narrower range of systems designed primarily for music should be dedicated to the client's listening pleasures.

In the world of custom installation, a common philosophy says that "what the customer wants, the customer gets." Music on the tennis courts, in the garden, music by the pool, music in the pool. In the pool? As recently discussed in Sound & Communications, several manufacturers produce completely sealed transducers that fit into a "wet-niche" of the pool, housings used for the

Most pool builders and landscape construction firms let out an audible groan.

pool's lighting. Most contractors try dutifully to avoid taking on such installations. Bring up the subject of adding an in-pool speaker to the landscape audio equation, and most pool builders and landscape construction firms let out an audible groan. "Adding a wet niche that wasn't originally planned brings up a whole host of problems for the swimming pool contractor," says Korothy. "But if you are destined to add an underwater loudspeaker to the system, be very careful. Beyond a doubt, low volt-

age or not, I would have that done by a licensed electrician and I would be acutely aware of what local building codes and ordinances dictate."

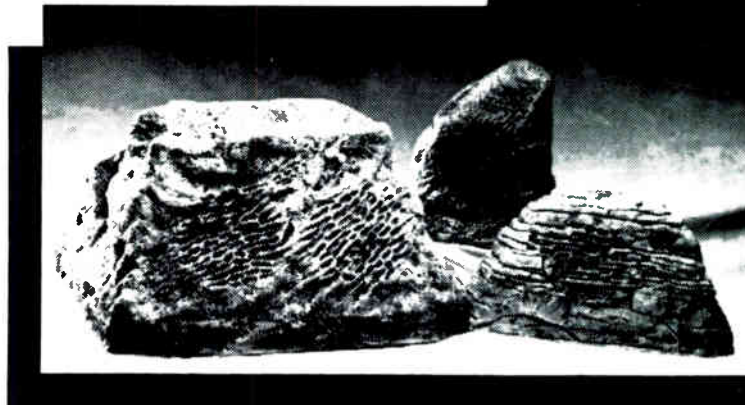
Local ordinances. Before venturing out into the wilds of an outdoor audio installation, check with the local government to see what restrictions exist regarding outside speakers. Some communities prohibit them altogether, though en-

forcement of such ordinances is rare. Usually, the liability for disturbances will fall on the home owner, and only upon formal complaint.

Apparently, the key to successful landscape audio design lies in preparation and expecting the unexpected. As one landscape architect so aptly put it: "Plan. And when you're done planning, plan some more." ■

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MAKING VIDEO AN EXPERIENCE FOR THE WHOLE HOUSE

By Rey Harju

A video distribution system can have a significant impact on a family's lifestyle. By distributing all the video signals to all the TVs simultaneously, any person can see anything on any TV, regardless of their location, or the location of the video source.

With the right equipment, that individual can control any video source from any room. This gives each member of the family more freedom to watch whatever he or she wants on any TV at any time. Still, the ability to provide this convenience hasn't always been easy, and even providing a partial ability of this idea has demanded a great deal from the contractor and installer.

The concept of extending all the benefits of the family room entertainment center can be most appealing. With the added features of such a "system," the installer can simplify the entire installation process, which means a significant uptick in profit potential. Just presenting the idea will attract the customers. You can show them how a rented videotape playing in the family room can be watched and controlled in the privacy

Rey Harju is marketing manager of Multiplex Technology, manufacturer of ChannelPlus Multiroom Video Systems and Components, located in Brea, California.

and comfort of the bedroom. Parents can watch their children's rooms from any TV in the house, as every TV can become a closed circuit monitor, displaying live transmissions from unobtrusive cameras at the front door or looking at the backyard or pool area.

Fundamentally, the basic building blocks to this new freedom are the modulator, amplifier, and the hardware.

The modulator serves as the heart of the system. Each modulator delivers a signal from a video source on an unused TV channel. Any TV can then select that channel and view that video source. Newer models offer home theater compatibility, stronger output, split-band output for both cable and off-air selection from the same modulator, and Smart House compatibility.

In the past, the installer needed to know about modulation, dBmV, bandwidths, splitters, etc. He had to calculate just about every step and joint in the line, and then there were the variances in the signal sources that could cause nightmares.

Today, most of the design work is completed by the suppliers of the equipment when they configure the product. All the installer needs to determine is what features and benefits the customer needs and is willing to pay for. Once this

IN THE PAST, THE INSTALLER NEEDED TO KNOW ABOUT MODULATION, DBMV, BANDWIDTHS, SPLITTERS, ETC.

is known, and if the concept of the multiroom lifestyle of video pleasure is sold, the selection of elements of the system is easy.

System suppliers such as Smart House, Square D, and ChannelPlus all supply video systems that require little in-depth knowledge of video signals on the part of the installer. The ChannelPlus system generates, distributes and remotely controls entertainment and camera video signals. The installed Square

A video distribution system can have a significant impact on a family's lifestyle.



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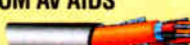






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A videotape playing in the family room can be controlled in the bedroom.

D system includes no entertainment video distribution but includes cameras, telephone, and audio distribution. The Smart House system provides the amplifiers and cabling to distribute video signals along with an electrical and electronic wiring infrastructure to support products yet to be developed.

What makes the system concept attractive right now is the cost. It is also easy to install and requires little or no adjustments. The ChannelPlus system for example, costs the installer less than \$2,000 for two cameras, and three channels of "in-house" generated entertainment video signals (from VCRs, satellite receiver, laser disc, etc.) distributed up to eight TVs. It includes all the cameras, modulators, amplifiers, connectors, and hardware, including wall plates. The Coaxial Cable Panel offers everything

on an easy-to-mount base, ready to "plug and play." The installer just adds coaxial cable and labor. The ChannelPlus system can be installed in both new houses and as a retrofit in existing homes (see Cable Panel based system in Figure 1.).

A Smart House wiring infrastructure costs about \$15,000 and can deliver both entertainment and camera signals to every TV. It must be designed into the house before it is built. Both Square D and Smart House use Channel Plus modulators to generate "in-house" channels.

All three systems offer the installer attractive product literature to help the installer sell the features and benefits of the systems to home owners.

For the contractor and installer, it's easier than ever before to add multiroom or whole house video to your offering. To the home owner it's easy to perceive

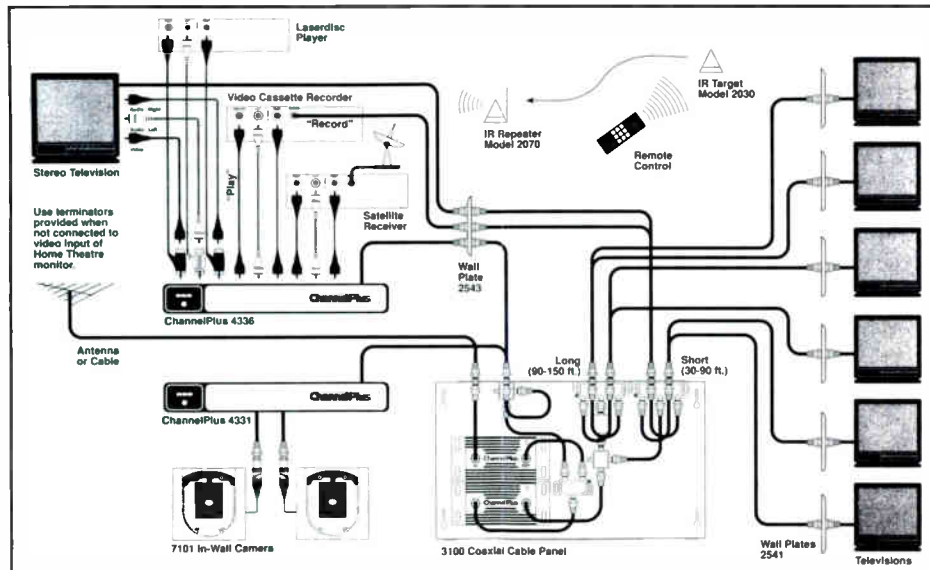


Figure 1. A cable panel-based system.

due to the simplicity of the idea, while not having to understand the technical side. And, the attractiveness of the idea

FOR THE CONTRACTOR AND INSTALLER, IT'S EASIER THAN EVER BEFORE TO ADD MULTIROOM OR WHOLE HOUSE VIDEO TO YOUR OFFERING.

as a whole is captivating. Compared to other investments, it offers very good value since more people are resorting to entertainment in the home. With these latest advances in system-based installations, it is easier, takes less time, and can yield additional income. ■

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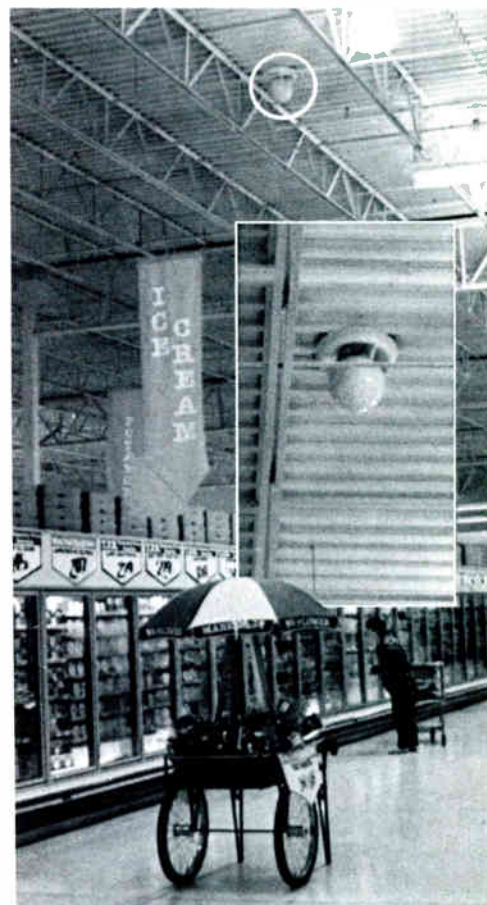
Scott Miller, Manager of Pro Sound at Muzak of Minneapolis, notes that the Cub Foods executives selected parchment-colored #110 Soundspheres to meld with the ceiling color and felt that the shape and color were highly compatible with the contemporary interior design esthetic.

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Virtually Noise-Free

Constructing a Residential Media Room

BY GEORGE SCHULSON

Ideally, a media room should be isolated and at the center of the house. But not everyone can do this or wants to go to the expense.

In building a noise-free media room, two areas are of major concern: the acoustical aspect and the much less thought of, but equally important, electrical aspect.

In the acoustical treatment area, we will be much less detailed since specialized articles should be sought out. We will go into some detail and touch on aspects which I feel have not been brought up in the past.

ACOUSTICAL TREATMENT

In the acoustical treatment area, we would like a media room to be in the realm of a mini-theater. We are striving to recreate what we would like to hear in a live performance. But since this is very difficult — and can be expensive — to achieve, and many things must be created electronically, we need to make compromises.

It is basic to avoid areas that we know will cause poor sound.

FLOORS

Floors should be covered with some sound-absorbing material like carpeting or a partial carpet to absorb the “hard room” sound. Not all of the floor need be covered. In fact, in some aspects, only part of the floor should be covered. Floors should also be well-reinforced to prevent creaks and vibrations.

George Schulson is Vice President, Design Engineering for Niles Audio Corporation in Miami, Florida.

WALLS

The same can be said about walls, although the carpet treatment may be extreme for some decors. Sound-absorbing material that looks good can be found. In most cases, you would want to avoid parallel walls, or break up the effect of parallel walls by using furniture or other items to prevent the formation of stand-

As for wall construction, the words are isolate, insulate.

ing waves. All rooms, whether they be rectangular or square, have a certain cubic volume which can set up unwanted resonances or “room modes.”

As for wall construction, the words are isolate, insulate and large wall masses. These three elements aid in the prevention of unnecessary vibration or rattles that can destroy the acoustic effect you are looking for.

CEILINGS

The ceiling and anything mounted to it needs to be reinforced to a very high degree since it is possible that a very large surface area may be suspended, possibly without interim supports.

Devices mounted to the ceiling such as HVAC air ducts, lamp fixtures, etc. need to be mounted tightly and well-isolated and insulated from possible vibration due to the speakers.

Especially important is any metal to

metal or wood to metal contact that could be cause for mechanical vibration, rattles, or buzzes.

Pieces of neoprene rubber or the like may have to be placed between these elements to avoid vibratory problems. This is especially true if some woofer systems are installed in the media room. This also holds true for walls, only more so.

VENTILATION

The area to be concerned with is the HVA air ducts. They should be well-supported, and should be fairly large — ten to 15 inches. The air flow must be adequate, but at a rather low velocity. Some HVAC units incorporate electronic air cleaners. Since these devices use high voltage to clean the air, they have the potential for not only electrical noise due to arcing, but also acoustical noise. These units must be maintained and kept clean to prevent this problem.

WINDOWS

If the media room has windows, you want to make sure they are isolated using weather stripping from the aluminum extrusions that hold them in place. Fortunately, this is not a problem since this is incorporated into most windows as a matter of course, for making them waterproof. If these windows can be opened and closed, you would want to make sure they can be tightly closed so acoustical vibration does not cause them to rattle or buzz.

Further weather-stripping may be required to cure these problems. But it is

best to avoid having a media room where there are windows present.

ELECTRICAL TREATMENT ELECTRICAL SYSTEM

Audio and video power feeds should be placed on their own separate circuit breaker. They should not share their electrical power feed with refrigerators, air conditioners or other generators of noise.

The electrical feeds should ideally have electrical noise filters connected to them, preferably at the circuit breaker panel. These filters can go a long way toward eliminating certain types of electrical noise which add coloration to the audio and can render the video picture unusable. A number of companies make these filters.

In some states, the consumer may do his own electrical work in his own

house. The problem comes when he sells the house. If the work done is determined to be faulty, and causes damage, he may be sued.

Ideally, all electrical feeds to the media room should be routed in conduit. This is a much less prevalent practice due to its increase in cost versus non-conduit electrical feeds. But it has great advantages: it shields the power feeds from other radiated noises, it is very advantageous for fire protection, and it tends to keep an electrically clean feed clean until it gets to the service outlet. Also, it is easy to add or delete wire as needed.

Any electrical feeds passing through a return air plenum must be in conduit.

Using isolated grounding AC outlets will go a long way to minimizing the next problem that has plagued home and professional audio equipment for a

long time: ground loops, the unacceptable hum or buzz that occurs when a group of pieces of equipment are interconnected, but grounded at more than one point.

There is always the potential for ground loops in an audio-video system. This is because consumer audio/video systems are unbalanced. Typically, signal goes out over a center wire and the return is the shield; invariably, ground loops occur. A particularly bad case of ground loops occur when the audio feed comes in contact with the cable video feed. NEC codes require cable companies to ground the shield of the feed. A potential ground loop exists when the cable shield becomes common with the audio shield. This usually occurs at the VCR because this is the most common place where the cable shield meets the shield of the audio cables, although it can occur in receivers which have the capability of routing cable/antenna signals. Two 75 ohm to 300 ohm matching transformers hooked back to back is an old trick.

LIGHTING

In the area of lighting, the rule is "incandescent lights." They generate no electrical noise by themselves.

Fluorescent lights of any kind have no place in a media room. They generate electrical "hash" by the very nature of their operation. Once this hash gets into the system, it can be very difficult to remove, and certainly degrades the audio and, possibly, the video.

Low voltage incandescent lights are becoming very popular because they are highly efficient with respect to their output of light, compared to normal 120V AC incandescent lights, although they do generate quite a lot of heat.

Neon lights also do not belong. They can interfere with the infrared remotes of some equipment.

DIMMERS

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point where people install them with no more thought than adding a light switch or in place of a light switch. They set the mood for the occasion, but they are some of the worst electrical noise generators you could ask for.

Sometimes the noise caused by these dimmers — whether in-wall or remotely-mounted — is so bad it can interfere with the correct operation of AV equipment or other remote-control devices.

NEC codes require dimmers and motor speed fan controllers (another source of horrible electrical noise) to be filtered. But not to anywhere near the degree required by today's high-quality A/V systems. Their filtering requirements barely allow them to be used in the presence of an AM radio, which, by the way, is an excellent device for detecting the presence of lamp dimmer noise. The radio emits a loud buzz

depending on the dimmer setting and proximity.

The in-wall dimmers that are most familiar just don't filter anywhere near what is required. Nor are they likely to. The more sophisticated types that mount

They are some of the worst electrical noise generators you could ask for.

back in the circuit breaker panel are somewhat better, possibly because they are far removed from the equipment, which they can contaminate. But even these devices, in my experience, are still woefully inadequate.

We must differentiate here between the noise caused by a lamp dimmer with respect to filament vibration, which is

different from the noise caused by the lamp dimmer as an RFI (radio frequency interference) source. The curing of lamp filament vibration is fairly easily accomplished. It does not involve the same type of filtering as is required to filter out the RFI caused by the nature of operation of the lamp dimmer. If the customer insists on lamp dimmers, and you want no noise, then you must use the variable transformer type dimmers. These are larger than the normal single and in-wall dimmers, but they generate no noise. By the way, this is what is used in almost every single recording studio in the world. They are operated manually but can be bought with motor drive units.

To put it simply, the inexpensive solid-state dimmers that people love do not — ever — belong in an A/V environment. ■

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DATA PROJECTION AND VISUAL INTELLIGIBILITY — PART TWO: INITIAL FINDINGS

By Steven J. Orfield

In Part One of this series, we discussed a recent study of the visibility of character-based video images on video data projectors. Recent video industry history bears out the fact that evaluation of the projected image is considered to be a subjective problem.

While there are clear connections drawn between qualities of the projection system, such as luminance and resolution, it has been generally assumed within the video community that placing two images adjacent to each other for comparison was one valid method of considering overall image quality.

While it would be counterproductive to argue against subjective evaluation of video images, there have been many higher level perceptual tests developed which define and focus perceptual evaluations in order to make them more meaningful. One useful analogy within the audio field is that of subjective intelligibility testing, using scalings such as the PB Word Score and the Modified Rhyme Test.

The intent of this study was to intro-

duce this same issue of information transfer to the video field as a basis for evaluation of video product performance, and the metric "Visual Intelligibility" was offered as a new means of evaluation.

Using three projectors and a variety of rear screens of two different sizes and viewing areas, photometric measurements were taken at various distances

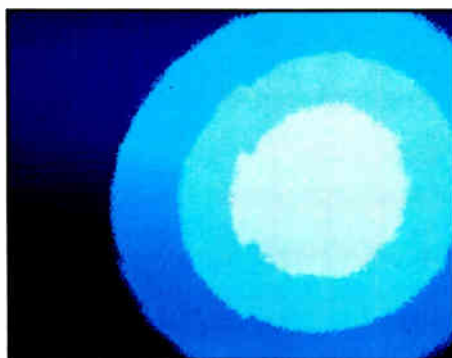


Figure 1: Luminance Contour.

and angles of view with regard to each video image. Data collected included luminance, contrast, color shift and veiling reflections. In addition to evaluating the luminance and contrast of the video image, a viewing jury was assembled in order to view specific alphanumeric displays. These viewing tests were subject to a limited time of exposure and an "open" choice of filling in the character seen.

Thus, two parallel experiments were undertaken with the same images, one objective and one subjective. The intent was to begin to evaluate actual viewer performance and to compare this data with photometric performance of the

projectors and screens.

Common wisdom within the field suggested that there should be little significant difference between similar projectors and between "high quality" screens. (In order to avoid "appropriate use" confusion, all manufacturers were given test lab and screen dimensions along with viewing angles and were asked to provide their "most suitable" screen or screens.)

COMMON WISDOM WITHIN THE FIELD SUGGESTED THAT THERE SHOULD BE LITTLE SIGNIFICANT DIFFERENCE BETWEEN SIMILAR PROJECTORS AND BETWEEN "HIGH QUALITY" SCREENS.

ISSUES

This experimental design and process dealt on one hand with technical variables known to the video field. At the same time, there has been no established linearity between those variables and visibility results. On the other hand, this research took into account directly the ability of a typical viewing audience to read information from the screen in a given time period; that is, it evaluated visual performance.

At this first stage in visibility analysis,

Steven J. Orfield is the President of Orfield Associates Inc. in Minneapolis, Minnesota.

there are a number of experimental and preliminary findings which the video community should find of interest, and these center around three variables, their research values, and the relationship of some of these variables to subjective Visual Intelligibility tests:

- Luminance and Viewing Angle
- Contrast
- Veiling Reflections

Each of these variables will be discussed, and some of the results of this research project will be detailed; additional suggestions for further work will be suggested.

A MEASURE OF LUMINANCE MAY BE A MEASURE OF BOTH THE OUTPUT OF A PROJECTOR AND OTHER ROOM SOURCES, SUCH AS DAYLIGHTING.

LUMINANCE

Luminance (or photometric brightness) is a measure of the amount of surface luminance at a given point on a rear projection screen as a result of all sources of light affecting the screen. Thus, a measure of luminance may be a measure of both the output of a projector and other room sources, such as daylighting, ambient room illumination, etc. Projectors are rated for their "lumen output," and screens are rated for their "gain" at a given angle, but there is generally no rating of luminance versus angle for any projector-screen (and mirror) combination.

Video luminance has generally been used to describe a video image at a given viewer position, but much as in the case of audio intelligibility, it is the "worst case" which defines the performance limits of the system. If a video system is to be installed in a 1,500 square foot room with viewing angles from 0 to 45

degrees off-axis, it is therefore the most common viewing position (0 degrees) of an evaluator (purchaser/specifier) which is the least important in defining system performance. Secondly, it is

AS THE VIEWER MOVES OFF-AXIS, THE VISUAL DISPLAY LUMINANCE PATTERN GENERALLY SHIFTS TOWARD THE VIEWER, AND THIS IS ONE OF THE FUNCTIONS OF BOTH PROJECTOR AND SCREEN DESIGN.

the least common distance (back of the room) which defines the actual minimum display size and maximum difficulty in the inhabited room. It is interesting to note that even when the rear off-angle position is used in experimentation, there is some level of forgiveness left in the experiment. This is due to the fact that distant viewers are often partially blocked by other viewers, and screen reflection due to ambient lighting is generally more problematic under off-axis viewing conditions.

In order to control for system performance, all testing was completed with no ambient lighting or daylighting in the testing labs (the spaces were dark). With regard to luminance results, it is first important to understand the typical on and off-axis luminance patterns for projectors and screens. As the viewer moves off-axis, the visual display luminance pattern generally shifts toward the viewer, and this is one of the functions of both projector and screen design. Figure 1 provides a look at a typical luminance distribution, represented as a luminance contour map.

In terms of differences, it is important to note that both angle and distance can cause reductions in luminance. With a

typical projector, luminance can easily vary by 50 percent between on-axis and 30-degree off-axis viewing. By considering the variation in screen types, the range of luminance shift on one type may be only 15 percent while another may be 50 percent. It is generally true that screens which have more even luminance provide a lower maximum on-axis luminance, as the projector image is being distributed more evenly. (Keep in mind that these ranges are for manufacturer selected applications of their products.) Given two different projectors and the same rear screens, the statistics can look like this:

Image Luminance at 12 Feet				
(Degrees)	0	10	20	30
Projector 1 / Screen 1	26	24	21	16
Projector 2 / Screen 1	45	43	36	27

Image Luminance at 12 Feet				
(Degrees)	0	10	20	30
Projector 1 / Screen 3	23	22	20	15
Projector 2 / Screen 3	40	39	45	25

With a view toward a larger set of data, the distinctions become even more obvious. Thus it can be clearly seen that when comparing two projectors, both

WHEN COMPARING TWO PROJECTORS BOTH BEING HIGH IN QUALITY AND INTENDED FOR DATA USE, THERE ARE BOTH CLEAR AND UNPREDICTABLE DIFFERENCES BETWEEN THEM IN OVERALL PERFORMANCE.

being high in quality and intended for data use, there are both clear and unpredictable differences between them in overall performance. Often, this difference is impossible for the user

or the specifier to characterize via any tools which they have available. Even a side-by-side inspection of the products would do little to establish this information. Many in the video community would argue that differences which are not noticeable to the viewer upon side-to-side comparison are not significant.

While this is often true, the actual case is far more complex. Two products may be similar under many circumstances but very different under other, non-viewed conditions. Secondly, the screens which are viewed may bias the quality of the projector at a given viewing position by either degrading or enhancing it.

Thus, luminance-based data begins to argue strongly against any simple luminance assumptions being used in specifying projectors or screens.

CONTRAST

While luminance is the level of light emitted by a surface by transmission (rear screen) or reflection (forward screen), there is another very important variable in the analysis of visibility, and this is contrast. This variable becomes more difficult due to the fact that contrast is a function of the projector, the rear screen and of the image itself. The image projected provides the benchmark for maximum contrast in most cases. The video projection system and rear screen system tend to degrade that contrast based on imperfect replication of the image. While luminance is very important to visibility, it is quite possible to provide an extremely high luminance image with insufficient contrast to identify portions of the image.

Most work in the study of contrast has employed viewer-based alphanumeric

or symbol testing, as does much of the current vision testing in the contrast sensitivity field. The testing performed in this study included both viewer-based testing as above and photometric testing of the contrast of images.

Generally, it is important to realize that contrast reduction may or may not reduce visibility. If the visual image is already difficult to see, reducing its contrast may move it below the threshold of fast viewing detection. If the image is easily seen, a substantial reduction in contrast is required in order to reduce detection of the image. It is also important to keep in mind that our research employed a "direct focused" test method in which the viewer both knew the intent of the recognition task and was motivated to detect the image; in real life presentations, this attentiveness is often not the case.

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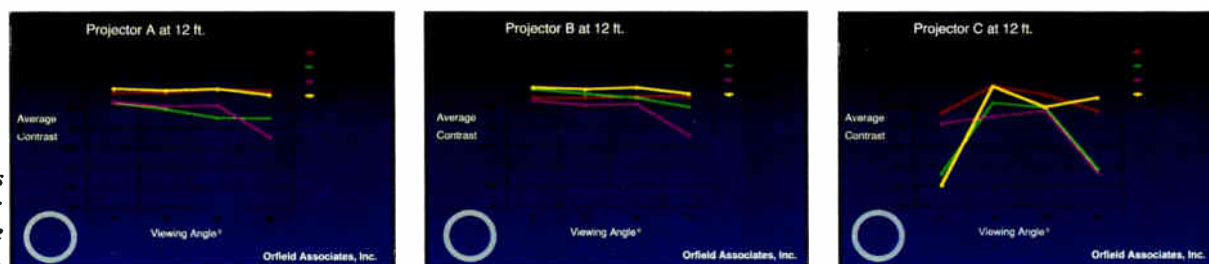
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Figures 2, 3 and 4: Average Contrast.



Additionally, real presentations are often visually far more complex than our research design, and thus this data is only a relative indicator of shifts in performance.

In order to look at the contrast data, we will select the same two projectors used in the luminance examples above for our contrast examples.

Image Contrast at 12 Feet				
(Degrees)	0	10	20	30
Projector 1 / Screen 1	.86	.85	.82	.82
Projector 2 / Screen 1	.89	.88	.87	.85
Image Contrast at 12 Feet				
(Degrees)	0	10	20	30
Projector 1 / Screen 3	.86	.85	.86	.76
Projector 2 / Screen 3	.88	.88	.86	.84

This suggests that in the case of these two projectors, the contrast and contrast shifts are far more constant than are the luminance values and shifts. A look at the graphs of contrast performance in figures 2, 3 and 4 suggests similar information, although adding data from a third projector begins to suggest the range of potential performance possible.

With difficult images, any of these projectors and screens could degrade contrast sufficiently to cause problems; in each case, the selection of the appropriate screen will enhance the image results from a modest to a significant degree.

VEILING REFLECTIONS

Among those who design video projection systems, few have not had complaints due to the interference of ambient lighting or daylighting with their presentation system. Both types of illuminance cause three problems. On one hand, they cause the eye to select a transient adaptation

level above that of the screen so that the aperture of the eye is too small for most efficient viewing. Secondly, they may cause direct glare due to the extreme source brightness as compared with the image. The final and most common problem is indirect glare of the lighting on the screen, which is known as veiling reflections. Depending on the BDRF (bidirectional reflection function) of the front surface of the screen, the screen may be easily affected by veiling reflections, and all screens exhibit some reflection problems.

The veiling reflection evaluation in our report was based on projecting a lighting source at the screen and determining the percentage of reflection at various viewing angles. Below is individual and summary data based on the projectors, screens and viewing distances noted above.

Veiling Reflections in Percent (all < 1%)				
(Degrees)	0	10	20	30
Screen 1	.16	.15	.14	.12
Screen 2	.04	.04	.04	.07
Screen 3	.04	.05	.04	.05
Screen 6	.72	.59	.65	.82

(Figures for the back side of rear screens often are in the range of 5 percent, suggesting disaster if a screen is reversed or if reflections are generated in the rear screen room.)

While these figures look relatively low, the computer industry has been facing the same veiling reflection problem with monitors for some time, and anti-reflection coatings of .25 percent are now considered insufficient for many installations; target values are moving toward .1 percent. Our own work with outdoor video displays confirms this view.

VISUAL INTELLIGIBILITY (VI)

This research project began as an effort to consider the issues of video visibility; it has concluded with a preliminary definition of visual intelligibility, based on alphanumeric recognition rates. Comparing the same systems noted above, the VI values are noted below.

Visual Intelligibility at 12 feet (%)				
(Degrees)	0	15	30	40
Projector 1 / Screen 1	82	84	80	77
Projector 2 / Screen 1	90	89	83	79
Visual Intelligibility at 12 feet (%)				
(Degrees)	0	10	20	30
Projector 1 / Screen 3	88	84	80	74
Projector 2 / Screen 3	88	86	82	79

Similarly, graphs of Visual Intelligibility look like those shown in Figures 5 and 6.

Thus, initial test results show that luminance and contrast have far more variation than visibility with this set of data.

RECENT RESEARCH IN "SURPRATHRESHOLD" VISIBILITY SUGGESTS THAT THE EYE IS FAR LESS SENSITIVE TO LUMINANCE AND CONTRAST VARIATIONS AS THE BASIC TASK BECOMES LESS DIFFICULT.

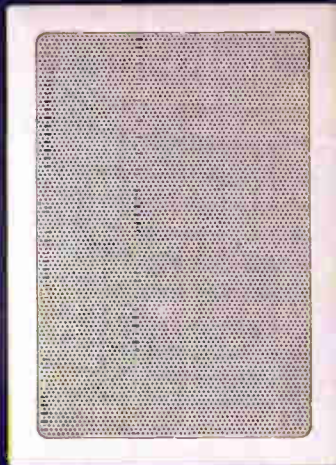
Most research in visibility has been performed at "threshold levels," meaning at the point where visibility becomes problematic due to its reaching the lim-

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its of visual performance.

Recent research in "surprathreshold" visibility suggests that the eye is far less sensitive to luminance and contrast variations as the basic task becomes less difficult. This suggests, for example, that selecting the correct size type, viewing position and task contrast may be a far more economical and more successful solution than selecting the best projection system without controlling the viewing task.

SUMMARY

In Part Two of this series, it has been our intent to clarify the experimental

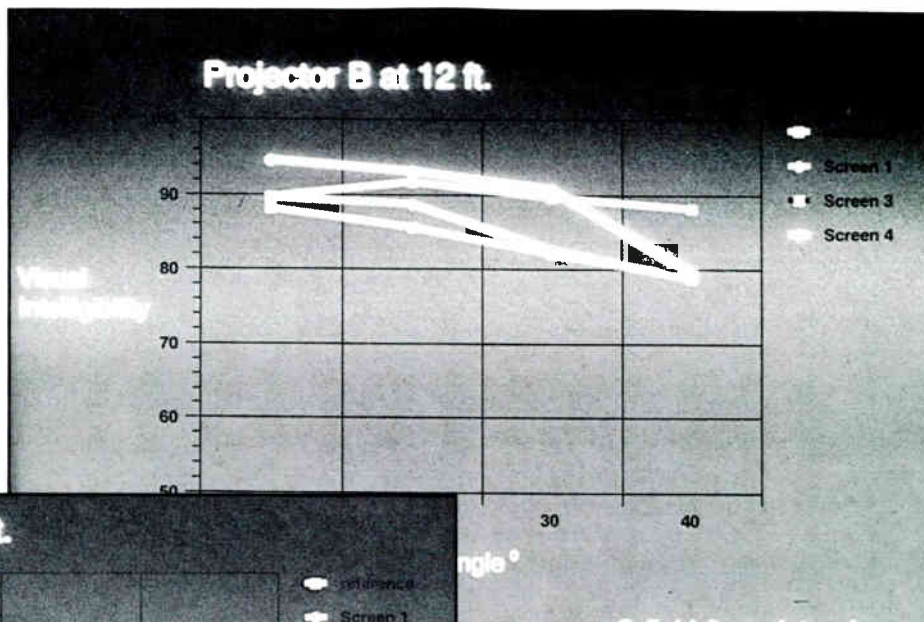


Figure 5: Visual Intelligibility.

I would like to thank Sony, Barco, Sharp, Da-Lite, Draper and Optix for their sponsorship of this research; they have expressed an open interest in a more advanced view of this problem in

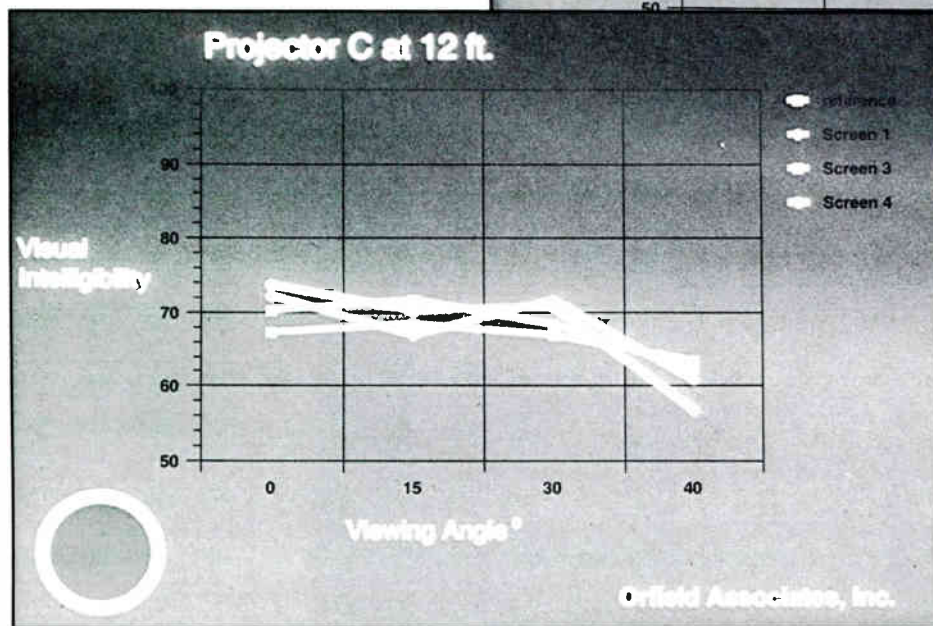


Figure 6: Visual Intelligibility.

basis underlying this research and to thus support the need for consideration of a new standard for subjective video task performance (data) quality, "Visual Intelligibility." This two part series has been very limited in its scope, compared to the research project. This is partially due to space allowed and partially due to the confidential nature of individual product results.

It is our belief that this information supports the development and standardization of a metric to deal with the viewer-based quality of video data images, standards for size and contrast of media used in this format. There are many

individual complexities not dealt with in this research, such as image complexity, color effects on image visibility, the relationship between resolution, screens and visibility, font legibility, etc.

It is our hope that the video field supports a move toward a new standard and toward a definition of many of the secondary issues.

It is also important to point out that this research is highly applicable to any visual display system; this is one of its strongest benefits. Secondly and most important, it is the only evaluation system which proposes to justify itself via its correlation to viewer responses.

IT HAS BEEN OUR INTENT TO CLARIFY THE EXPERIMENTAL BASIS UNDERLYING THIS RESEARCH AND TO THUS SUPPORT THE NEED FOR CONSIDERATION OF A NEW STANDARD

hopes that it will assist the specifier and the user in providing better design and use of video projection systems.

They are all well too aware of the fact that purchasing high quality products often will not insure adequate performance. Having been leaders in their fields, they are profoundly concerned with the need for specifier and user education, and the development of a metric and calculational tools will clearly reduce the problems of poor projects. ■

LETTERS

(continued from page 5)

11. Ear Plugs

Cabot Safety Corporation
5457 West 79th St.
Indianapolis, IN 46268
317-872-6666

Musician's Earplugs

Etymotic Research
61 Martin Lane
Elk Grove Village, IL 60007
708-228-0006

12. Hoists, Lifts or Scaffolds

Genie Industries
18340 N.E. 76th St.
P.O. Box 69
Redmond, WA 98073-0069
800-426-8089
604-984-4242 (Canada)

13. Impedance Meter

Gold Line
P.O. Box 500
West Redding, CT 06896
203-938-2588

Electro Dynamics Development
475 Mt. Hood Dr. S.W.
Issaquah, WA 98027
206-392-2493

14. Input/Output Balancing Amplifiers

Headphone Amplifier
Summing Amplifier
Audio Monitoring
Panel/VU & PPM
Benchmark Media Systems, Inc.
5925 Court Street Rd.
Syracuse, NY 13206
315-437-6300

15. ITE Microphones

(See Musician's Earplugs)

16. K-Pads

Kentrox Industries
(Plantronics)
P.O. Box 10704
Portland, OR 97210-0704
503-643-1681
800-733-5511

17. Mounting Hardware

Omnimount Systems
10850 Van Owen St.
North Hollywood, CA 91605
818-766-9000

18. Oscillator & Meters

Gold Line
P.O. Box 500
West Redding, CT 06896
203-938-2588

19. Polarity Checker & Cable Tester

AB International Electronics, Inc.
1830-6 Vernon St.
P.O. Box 1105
Roseville, CA 95678
916-783-7800
Fax: 714-586-8229

Galaxy Audio

625 East Pawnee
Wichita, KS 67211
1-800-369-7768

20. Precision Equalization

Altec Lansing
P.O. Box 26105
Oklahoma City, OK 73126
408-324-5311

21. PZM Prototypes

Ken Wahrenbrock
Wahrenbrock Sound Assoc.
9609 Cheddar St.
Downey, CA 90242
213-803-6045

22. Remote Volume Control

Sonics Assoc. Inc.
327 Oxmoor Circle
Birmingham, AL 35209
205-942-9631

23. Servo-Operated Subwoofers

Intersonics, Inc.
3453 Commercial Ave.
Northbrook, IL 60062

24. Shock & Vibration Control — Acoustical Floor Systems

Mason Industries Inc.
350 Rabro Dr.
Hauppauge, NY 11788
516-348-0282

25. Sonex

Illbruck
3800 Washington Ave. N.
Minneapolis, MN 55412
612-521-3555
Fax: 612-521-1010

26. Sound Level Meter

\$29.95 at your local
Radio Shack.

27. Speech Processor and RT Meter

Communications Co.
4390 Noell St.
San Diego, CA 92110
619-297-3261

28. Sweep Generator

Production Devices
356 N. Marshall Ave.
El Cajon, CA 92020
619-278-1141

29. Theater Audio Control System

(See category 22)

30. Transformers (Audio)

Jensen Transformers, Inc.
10735 Burbank Blvd.
N. Hollywood, CA 91601
213-876-0059

31. Underwater Sound

Lubell Laboratories
21 N. Stanwood Rd.
Columbus, OH 43209
614-235-6740

32. Wall Plug Tester

Daniel Woodhead Co.
3411 Woodhead Dr.
Northbrook, IL 60062
708-272-7990

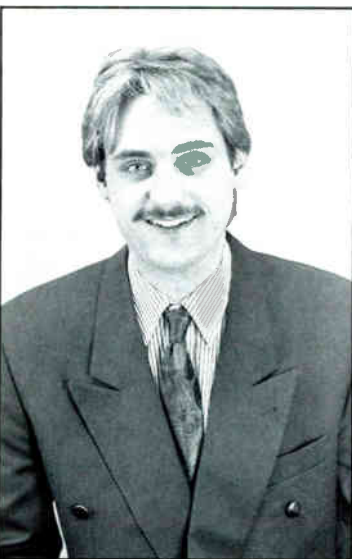
33. Wired & Wireless Communications

HM Electronics
6675 Mesa Ridge Rd.
San Diego, CA 92121
619-535-6030

Muzak in Taco Bell; Samson Posts Best Year

National Chains Using Muzak

Muzak has announced that several national chains such as Taco Bell and Associated Wholesale Grocers are providing instantaneous, simultaneous delivery of computer data along with in-store music to remote locations nationwide via Direct Broadcast Satellite. Nearly 1,800 satellite dishes have been installed on company-owned Taco Bell rooftops, bringing the chain fully on-line with Muzak's "one-stop shopping" broadcast service, the integrated product package offering in-store music, video, data, advertising, and equipment installation. Muzak president John R. Jester said, "Most large chains needing to download data such as pricing information and marketing updates can broadcast the data along with Muzak's 24-hour music service simultaneously to all locations." Muzak's DBS service went on the air in 1989. Last year, it signed a deal with Microspace, a division of Capital Broadcasting, to lease transponder space on the Hughes SBS-6 Ku-band satellite. Muzak now broadcasts 11 channels of music via DBS. Its current subscriber list numbers over 200,000 businesses, with over 35,000 of those locations on the DBS system.



Ulrich Behringer

Vega Quiet Room

Vega has completed a new quiet room at its El Monte facility for testing of wireless microphone systems. The room was created in order to "test audio performance in an environment closer to that found in typical professional applications." Because the ambient noise level of the factory was too high to permit easy detection of very low level noise and subtle nuances in audio quality, Vega constructed a sound-proofed room for testing, using alternate layers of acoustic absorber and gypsum board, with a final layer of acoustic foam. In total, the room provides approximately 30 dB of rejection of external noise. At the same time, the listening room equipment was upgraded, using a new DDA Interface console, two Electro-Voice Sentry 500 monitors and a stereo power amplifier.

Samson Has Best Year

Samson Technologies has announced revenue of \$24 million for the fiscal year ending August 1992, thereby posting the best year in the history of the company, which was formed in 1980. Scott Goodman, vice president of sales and marketing, said, "We are obviously pleased with our continued success. Our wireless systems sales reflect a growing recognition of the quality and level of technology we can provide anywhere in the world. Further, the sales of our other products have increased to the point where we were forced into a much larger facility." Samson also distributes Hartke Systems musical instrument speakers and enclosures, Soundtracs consoles, and Behringer signal processing equipment.

Ulrich Behringer, the 31 year old head of Behringer, has said, "Our association with Samson represents a very important step in our company's history. Besides the friendly personal relationship we share, we feel Samson is a very competent, inspirational and powerful partner."

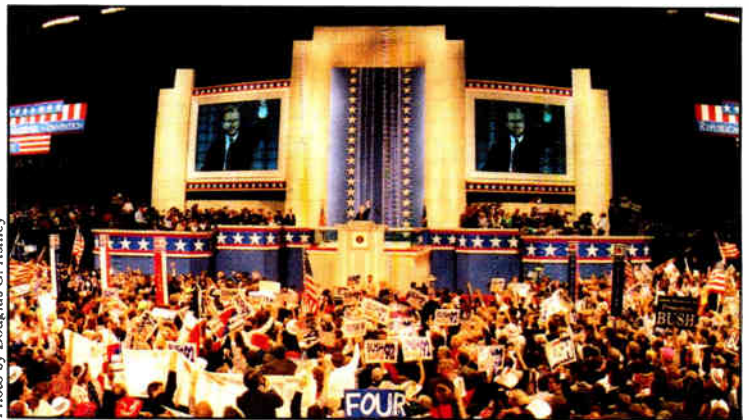


Photo by Douglas C. Ashley

Convention Communication

Electrosonic Systems provided extensive video display equipment for the GOP Convention in Houston. Two videowalls, each measuring 20 feet wide by 15 feet high, were placed at stage right and stage left, to the sides of the podium. Each videowall was a seven unit high by seven unit wide assembly of Electrosonic ProCube II video projectors. According to Electrosonic, the 98 projector display was the largest single event display ever constructed in the U.S. with this technology. Staging was managed by AVTS of San Francisco and Rent'Com of Chicago. Nearly four miles of cable were used to link the videowall systems, reach camera platforms, and connect to broadcast control. Chain hoists, operated by local union workers, lifted the ten tons of equipment into position on the I-beam supported stage. The Electrosonic designed and manufactured ProCube uses a specially built Zenith electronics module.

Maryland Sound Provides Smithsonian

Symetrix has announced that Maryland Sound has provided six Symetrix 571 SPL computers with slave units to the Smithsonian Institute. The units are used to control audio volume levels while presenting the exhibit "American Encounters." The exhibit reportedly requires audio levels to track and follow ambient noise levels which vary

considerably according to attendance numbers.

Touchscreen Device for PCs

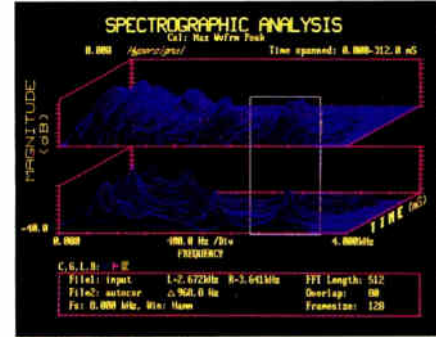
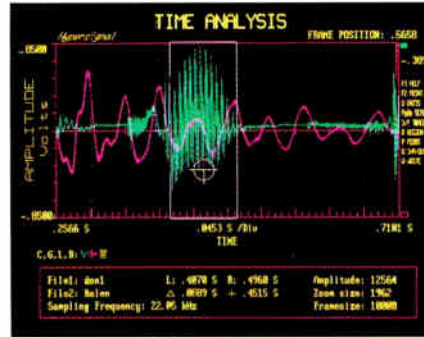
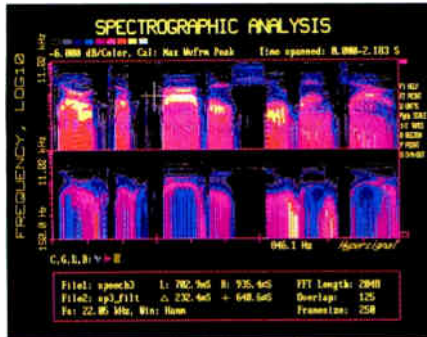
Digital Equipment Corporation has introduced DECTouch hardware which quickly converts MS-DOS-based PC monitors into touchscreen input devices. No special application software is required, nor are any monitor modifications. Sitting beneath the monitor, DECTouch hardware plugs into a PC serial port and calibrates itself to the size and weight of the monitor. It operates as a standard pointing device under the MS-Windows user interface, and can either coexist or replace a mouse. Monitors measuring 12 to 19 inches and weighing up to 90 pounds can be accommodated. The DECTouch is rated at 40 touch points per inch with pressure sensitivity user selectable up to 256 levels. It comes with C-callable libraries and touch device emulation for application developers running MS-DOS V3.3 operating system or later.



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Hypersignal-Acoustic has always been known as DSP-oriented software, which implies flexibility, power, and accurate results, but also implies a nerd-friendly interface. However, we *are* listening, as our many new customers can attest. We have continued to install new acoustic/audio functionality and improve the user-interface with ideas like single-step macros, new flexibility in the Spectrum Analyzer, and practical Tutorial examples. Hypersignal-Acoustic contains a full range of *integrated* measurement, simulation and real-time tools, and has built-in device drivers for premier acoustic and audio hardware such as the Techron TEF20HI system and several plug-in DSP boards from Ariel.



DESIGN and SIMULATION

- "Room Auralization" using non-real-time mono or stereo convolution; real-time operation with limited impulse length
- Difference Equations: signal arithmetic/trig/calculus, feedback, function and noise generation
- IIR and FIR classical and arbitrary filter design, file-based and "snap-in" real-time usage, graphical editor, code generation
- DSP Functions: FFT, convolution, correlation, linear predictive coding, power spectra, transfer function, etc.
- The DSP chip in the TEF20HI or on the Ariel boards can be used as an "Accelerator"

INTERACTIVE WAVEFORM DISPLAY and EDITING

- Time domain, frequency domain contour, waterfall, unwrapped phase, group-delay, and pole zero
- D/A output from target waveform sections in time domain and contour frequency domain displays
- Time domain editing includes both cut-and-paste and free-form "point" modes, and can be performed in linear or log display modes on mono or stereo waveforms
- Publication-quality hardcopy to nearly 200 printers

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- Spectrum Analyzer with dual- or overlaid-trace linear/log magnitude, transfer function, impulse response, time, and phase display; averaging; mixed file and analog input; log frequency axis and 1/N octave band display; triggering; file storage; print; cursor readout and calibration
- Continuous signal acquisition/generation to/from disk
- Stimulus & Response measurement, including a single-step macro that creates a stimulus waveform, and calculates impulse and frequency responses
- Equalization using real-time filters derived from matching of FIR filters to inverted Spectrum Analyzer trace storage
- "Snap-in" real-time filters can be enabled to achieve selective frequency band analysis and delays

REAL-TIME IMPLEMENTATION

- TEF20HI and several Ariel boards supported, including the DSP-16, DSP-32C, DSP-96, and interfaces to DATPort
- DSP Source Code Interfaces for: Analog Devices ADSP-210x, AT&T DSP32C, DSP3210, Motorola DSP56001 and DSP96002, NEC 77220, Texas Instruments TMS320C25, TMS320C30

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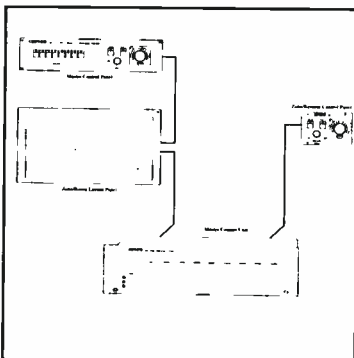
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Circle 211 on Reader Response Card

World Radio History

All Pro Installs Combining System

All Pro Sound in Pensacola, Florida has completed one of the first installations using the MCS Room combining System from Oxmoor Corporation. Chuck Walthall, All Pro Sound's Senior Design Engineer, said, "You don't normally expect an Elks Lodge job to have features that push the limits of what commercial equipment is available. But the Elks Lodge wanted an affordable system that would combine eight rooms, have selectable zone paging override and emergency all call override. In addition, they wanted multiple background music sources and a different number of mic inputs in each zone. The system needed to be very simple to operate with the ability to lock out certain controls from unauthorized persons." Walthall expressed pleasure in the field programmability of the MCS System. "It allows us to keep our options open." The microprocessor based system satisfied the customer. Bud Arkin of the Elks Lodge said, "The system fulfills every need we have." The paging panels for the system were custom designed by All Pro Sound and manufactured by Whirlwind Music Corporation. The panels address the Oxmoor RMX-44 matrix mixer which in turn routes the signal to the designated Crown PIP-RPA module. Crown CT-200 power amplifiers were used in conjunction with the PIP modules to provide the necessary number of source inputs in each zone.



CES Space Requests Up

The 1993 International Winter Consumer Electronic Show has reported a 19 percent increase in space requests over last year. The Winter CES takes place in Las Vegas January 7 through 10, and has expanded the number of on-site product categories. The keynote address will be delivered by Jack D. Kuehler, president of IBM. Apple Computers will be in the Winter Show for the first time. And several manufacturers including Sony, Motorola, Yamaha, RCA and Mitsubishi are returning to the show floor after an absence. The Mobile Electronics product area, as well as all of the main floor exhibit space and the Mirage and Hilton Hotel exhibit areas were sold out by the application deadline and are now holding waiting lists. Multimedia and Mobile Office are new product areas which are debuting at the Winter CES.

Wireless Provided by Systems Wireless

Systems Wireless of Herndon, Virginia provided wireless systems for both the Democratic and Republican conventions this summer. Wireless microphones, IFBs, and wireless intercoms were supplied to CNN, AP Radio, C-Span, CBS, ABC, VOA, and affiliate stations. A custom-made Systems Wireless IFB system supplied to the Voice of America was highlighted during a C-Span broadcasted tour of VOA equipment. The challenges of coordinating frequencies to guarantee interference free operation was met with a mixture of VHF and UHF systems. More than 700 different frequencies were estimated to be in use at each convention. Equipment provided by Systems Wireless included the Series 800 UHF wireless intercom, Vega UHF and VHF wireless microphones and intercoms, Lectrosionics wireless microphones, and Comtek and SWL wireless IFB systems.

DirecTv Chooses Customer Service

DirecTv, Inc., the subsidiary of Hughes Communications, has executed an agreement with Matrixx Marketing to provide the national telephone marketing and customer service center for its 150-channel DirecTv direct-to-home satellite television service. Matrixx Marketing is a subsidiary of Cincinnati Bell. DirecTv, expected to begin in early 1994, will be delivered to households equipped with a low cost satellite receiving system. The home receiving system, distributed under the RCA brand name at an initial retail cost of \$700, will consist of an 18-inch satellite dish, decoder box and remote control unit.

Test Results Available on Digital TV

The Advanced Television Test Center in Alexandria, Virginia has announced the availability of the "Record of Test Results for DigiCipher HDTV, the first digital Advanced Television System tested at the ATTC under the auspices of the FCC Advisory Committee on Advanced Television Service. The report represents the second in a series of five reports to be used by the FCC ACATS for comparing the performance of the systems seeking to become the HDTV broadcast transmission standard for North America. DigiCipher HDTV was developed by General Instrument Corporation on behalf of the American TeleVision Alliance. The cost of the volume is \$400.

Sam Ash Adds Department

Sam Ash Professional, the studio sales division of the Sam Ash Music Stores chain, has added a parts department occupying the ninth floor of its building. The division services the audio/video community with cable, patch bays, connectors, tools, tape, discs and racks from such manufacturers as ADC, Ampex, Amphenol, Canare, 3M, Middle Atlantic Products, Gepco,

Neutrik, Panduit and Switchcraft. Myron Dubb and Jim Gillespie manage the department. Gillespie was previously with Martin Audio/Video and Harvey Professional. Myron Dubb was previously with Martin Audio.

Bag End Supplies Conference

Bag End Loudspeaker Systems is supplying the main loudspeaker systems for the International Computer Music Conference in October at San Jose State University. The electro-acoustic music department at San Jose has used Bag End systems for the last ten years. Bag End is supplying two separate sound systems for the conference. For the main system, four Time-Aligned TA15 loudspeaker systems are being used, in addition to an ELF-1 integrator subwoofer system, and four double 18-inch D18E-R loudspeakers. Larry Wendt, technical director of the conference, said, "This particular arrangement of sound systems will allow us the flexibility to present concert material in either the more familiar quad and stereo speaker arrangements used in the United States, or the multiple speaker diffusion formats popular in Europe."

Hyatt Regency Ballroom

Audio Logic has announced that nine Audio Logic SC-31 graphic equalizers and six Audio Logic SC-610 mixers have been installed in the Grand Ballroom of the Crown Center Hyatt Regency hotel in downtown Kansas City. The installation was performed by Visual Aids Electronics of Cincinnati. VAE installed the equipment as part of an upgraded 70-volt voice reinforcement and background music system for the 17,500 square foot ballroom that can be split into eight different rooms. One SC-31 is being used as an equalizer for the whole room, while the other eight handle a combination of equalization scenarios that are controlled via a patch panel.

Renkus-Heinz in Studio and Church

Todd Cashman of Bandwest Productions in Anaheim has purchased a Renkus-Heinz C-3 sound reinforcement system for Bandwest's new 35 foot by 50 foot rehearsal studio. Bandwest is one of the largest rehearsal studios in southern California, and is the first to install a Renkus-Heinz TSC loudspeaker system. Also included in the facility are four R-H W-1A stage monitors. Micworks, Inc. of Huntington Beach handled the sale and installation of the entire system. Disneyland was one of the first to book the new room for a stage show rehearsal.

AAA Services, the contracting/service division of Orth Audio of Garden Grove, California has installed Renkus-Heinz FRS series loudspeakers in St. Stephens Lutheran Church in Fullerton. Two custom Renkus-Heinz LFS 121 loudspeakers along with a Pro-Guard controller. AAA Services has also installed Renkus-Heinz speakers in The First Christian Church of Downey in Downey, California, and in The Second Baptist Church of Santa Ana, Santa Ana, California. The Second Baptist Church needed a system that "could handle the 'rock and roll' sound of their multiple choirs" and provide clear speech reinforcement within a small budget. AAA selected and installed two Renkus-Heinz FRS-121 speakers for the main reinforcement system and used two CM-81 cluster modules as stage monitors.

Sharp TV with Satellite

Sharp Corporation has introduced for the Japanese market a 28-inch Wide-Vision color TV with a built-in broadcast satellite tuner. The Model 28C-WD2 is compatible with multi-format video software, and "brings the power and presence of a 16:9 wide screen into the home," according to the company. The new television, in addition to the built-in tuner, features three dimensional Y/C Separation Logic, a Super-Flat 4 Pri-



mary Color Wide-Vision Picture Tube," and 3D Active Servo Technology for the bass sound. The unit is selling in Japan at a suggested retail price of 255,000 yen.

EDS Plans

The Electronic Industry Show Corporation has announced the election of Bernard T. Marren as president for the 1993 Electronic Distribution and Conference Show, to be held April 14 through 16 at the Orange County Convention/Civic Center in Orlando. Marren is vice chairman and founder of Western Microtechnology and is leading the planning of a new one-level trade



Bernard T. Marren

show format for the EDS. Marren succeeds Blair K. Haas, president of Bud Industries. In addition to his activities with EDS, Marren is current president of the National Electronic Distributor Association, and was the founder and first president of the Semiconductor Industry Association. Other officers elected to the EISC board are Steven T. Ross of Ross Marketing Associates and Arnold Rosenblum of Cole-Flex. EDS operates as a not-for-profit corporation under the sponsorship of the EIA, NEDA, and the ERA.



(L-R): Hartley Peavey, Melia Peavey, Mousie Richards.

Data Broadcasting Discussed

Forty-seven television group executives have signed up to explore the business opportunities of data broadcasting at the National Association of Broadcasters' annual Television Group Executive Forum. "The move to digital means broadcasters will have the ability to participate directly in the much larger, digital data communications business," said Chuck Sherman, senior vice president, NAB television. The Forum was scheduled for an October meeting.

Peaveys Honored for Charity Work

Hartley and Melia Peavey have been presented with the Meridien, Mississippi Knights of Columbus Monsignor J. Burns Award for their work with the newly opened Shelter for Abused and Neglected Children. The Peaveys were presented with a plaque and a \$1,000 check which they donated to the children's shelter. Hartley and Melia Peavey have spearheaded the effort to open and raise money for the Lauderdale County Emergency Shelter for Abused and Neglected Children. Among their efforts has been the organizing and sponsoring of the annual Shelter Fest fundraiser which features an all-star concert by top Peavey endorsees.



ETA Power Distribution

ETA Lighting Systems has introduced the PD9 power distribution/conditioning unit to accommodate up to eight 120 V line voltage converters. The PD9 is a single rack space unit featuring eight U-ground Edison AC outlets on the rear panel and an additional outlet on the front panel. The product is one of six rackmounted models designed for audio and electronic processing equipment. Other features include total capacity 1,800 watts, 15 amps, unit reset breaker on the front panel, and master power on/off switch.

Modular Lighting Control

Lutron Electronics has introduced pre-packaged lighting control systems that enable movie theater projectionists to quickly adjust light levels via a button or via projection equipment. The Lighting Control Packages for movie theaters allow the user to select the light levels that they present for audience entry or exit and viewing. By pressing one of the wallstation buttons, the lights adjust to the desired level. By interfacing an LCP directly with projection equipment, theater lights are synchronized to adjust at the start or conclusion of a show. The packages feature specification grade wallstations and modular dimmers designed to be mounted in an electrical equipment closet or behind ceiling panels. LCPs for movie theaters are available in two or four channel configurations, with an electrical load capacity of 2,000 watts per channel. Controls or power capacity can be added.

Multiplexer Planned for 1993

Dedicated Micros plans to introduce a new 16-channel, duplex multiplexer, the Duet, to the U.S. market in early 1993. It will have all the features of the company's current Uniplex Sprite, plus duplex capability and multi-screen playback options. The Sprite is designed as an eight camera system. Playback is in two quad pictures with single camera full frame also available. According to the company, there is increasing worldwide demand for multiplexer products as the "central brain" of closed circuit television systems for the security industry. The company's leading sales model is the Uniplex Series 2, which records video images from up to 16 cameras simultaneously onto one-half-inch videotape. The Uniplex Series 2 records full frame camera images.

Kuwait Interpretation

Brahler ICS Germany, in association with Informationsteknik of Denmark, has supplied a microphone discussion system, electronic vote counting and wired simultaneous interpretation system to the new Parliament building in Kuwait. The 160 delegates' units all feature Arabic inscriptions and a removable chip card programmed to register the delegates' names, voting status and other data. Special software was developed to print Arabic characters to a laser printer and to display the results via a G.E. Talaria.

Hughes Names Sales Network

Hughes Aircraft Company's Audio Intelligibility Systems has appointed a nationwide network of 16 manufacturers' representatives for its line of Voice Intelligibility processors. The sales reps will handle the full product line, including the new Model VIP 110, throughout North America. The Hughes systems, introduced earlier this year, improve the intelligibility of audio signals in environments where there is high ambient noise. The new rep firms are: Audio Marketing Associates, Avwest, Inc., Bencsik Electronic Systems, Cartwright & Bear, Gravley & Associates, J.Y. Schoonmaker Co., Kodo Associates, MJA Marketing, Pearson & Pearson, Peter Schmitt Co., Repworks, Roger Ponto Associates, Shalco, Sound Sales, Warren Associates, and Ziskind Associates.

REP NEWS

Sigmat 2 Named Rep of Year

Sigmat 2 has been named the Crown Rep Firm of the Year, based upon the firm's "sales performance as well as its overall excellence." Sigmet 2, based in Valley Forge, Pennsylvania, serves a territory that includes Delaware, Maryland, Virginia, southern New Jersey, eastern Pennsylvania, and the District of Columbia. Sigmet 2 handles Crown's full line of amplifier, microphone and computer control products. The rep firm has represented Crown for more than 25 years and is currently staffed by Sam Helms, Greg McMahon, Ed Portko, Bob Finlan and John Kirkland.

Crestron Announces Rep

Crestron Electronics, Inc. has announced the appointment of Dimension/Point IX Marketing Corporation to represent Crestron in Texas, Oklahoma, Arkansas and Louisiana. Dimension/Point IX, whose president is Terry Green and vice president Phil Canavespe, was formed in 1984 to market professional, commercial and consumer electronic products.

Cambridge, MJA Named

Whitenton Industries, Inc., parent company of the Juice Goose, OnePower, and Passac product lines, has appointed Cambridge Pro Sales as its Northern Central Representative. Cambridge is headquartered in Columbus, Ohio, and represents the product lines in Ohio, West Virginia, and western Pennsylvania. MJA Marketing, headquartered in Kansas City, Missouri, has been named to represent the product lines in Missouri, Kansas, Nebraska, and Iowa.

ERA Conference Planned

The biennial national conference of the Electronics Representatives Association will take place March 17 through 21, 1993 at the Sheraton Grande Torrey Pines Hotel in La Jolla, California. New programs include a "Socratic Dialog" of industry members, and an address and workshop by Stephen R. Covey, author of "Seven Habits of Highly Effective People" and "Principle-Centered Leadership."



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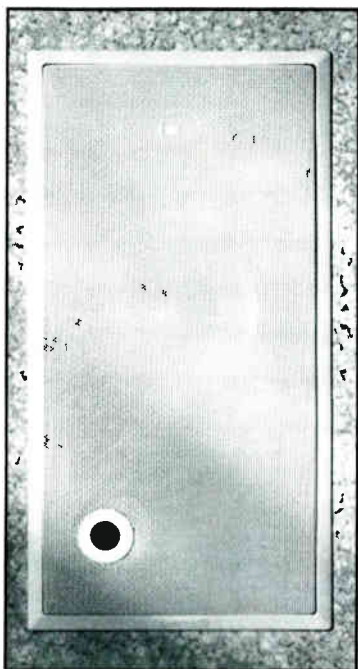
INFOCOMMTM INTERNATIONAL

Exposition Dates: January 14-16, 1993
Seminars & Conferences: January 11-17
New Orleans Convention Center
New Orleans, LA

PRODUCTS

Pioneer's In-Walls; Observing Philips

By Steve Jacobs



other, or up to 1800 feet with a Philips line amplifier. The system offers preference of programmable camera sequencing with time intervals between four and 60 seconds. It also provides alarm and intercom system capabilities.

CIRCLE 2 ON READER RESPONSE CARD

Driving Design

Celestion's BX Series includes 12- and 15-inch cone drivers rated to handle up to 600 watts (average continuous pink noise). Priced from \$175 to \$268, the drivers have three leg cast aluminum frames, fiber composite cones for rigidity and reduced mass, and two 1/2-, three- and four-inch edgewound reinforced Kapton voice coils. More magnetic force has been put into the voice coil through Celestion's Finite Element Computer Analysis.

CIRCLE 3 ON READER RESPONSE CARD



Two Ways In Wall

Pioneer Electronics (USA) Inc. has introduced its in-wall speaker package. The S-F100 two-way, full-range loudspeaker system is designed for custom installation in walls or ceilings.

The system can be used for main, surround and center channel applications, and includes a mounting facility for the optional inclusion of a Pioneer MR-100 remote sensor or MR-101 remote emitter.

CIRCLE 1 ON READER RESPONSE CARD

Six-Camera Observation

Philips Commercial Sales has announced an observation system that accommodates six cameras on a single 110-volt line. Philips enhanced observation system, the VS32405R, is designed for observation, security and surveillance applications including large convenience stores, service stations, hotels, hospitals, warehouses, parking garages and small manufacturing facilities.

The camera and monitor can be located up to 600 feet from each

a 1/3-inch CCD image sensor with 520 x 492 pixels and a horizontal resolution of 330 lines. It has a sensitivity rating of 2 Lux and S/N of 47 dB.

CIRCLE 4 ON READER RESPONSE CARD

Vandal-Proofing

Atlas/Soundolier VP Series Vandal-Proof Baffle/Enclosures are designed to protect four- and eight-inch loudspeakers from tampering and abuse in public access areas. Suggested uses are in schools, community centers, hotel facilities, sports/recreational complexes, bus/rail terminals and subway stations. They are also recommended for use in detention and correction facilities.

CIRCLE 5 ON READER RESPONSE CARD



400 Line Res

Gyyr, a division of Odetics, has introduced a 24 hour timelapse video recorder with 400 line resolution that the company claims is the industry's first. The TLC1824 is based upon a commercial chassis for withstanding the constant use



of security applications. The unit also has two video input sequential switching.

CIRCLE 6 ON READER RESPONSE CARD

Evacuation Speakers

Gentex Corporation has announced a line of evacuation speakers that meet the requirements of the Americans with Disabilities Act (ADA). The SPK Series meets building codes, emits voice commands up to 96 dB and offers optional 100-candela strobe warning lights.

The speakers can be flush mounted into a wall or ceiling with four-inch electrical boxes and topped with eight-inch round or four-inch square face plates.

CIRCLE 7 ON READER RESPONSE CARD



Seamless Screens

Vutec Corporation has announced its Vu-Flex Pro line of projection screens. Screens up to 25 feet diagonal are available with no seams. Tension tabs and guide wires are not needed to the "lay flat" screen.

The Vu-Flex Pro line is available in motorized models. Heavy duty fabric is available in matte white.

CIRCLE 8 ON READER RESPONSE CARD

Multi-Purpose Surveillance

JVC Professional Products Company has introduced two multi-purpose surveillance cameras. The TK-1280U offers a 1/2-inch CCD with 768 x 494 pixels and a horizontal resolution of 470 lines. The camera's sensitivity is 1.5 Lux and its signal-to-noise ratio is nearly 50 dB.

The TK-1180U is equipped with



Hot Country

3M Direct Broadcast Satellite Network has introduced its "Hot Country" channel. Also known as Starchannel V the offering features well-known country artists and hits

from the '80s and '90s.

It is available for businesses 24 hours a day. In-store advertising including customized ads can be inserted at intervals into a store's music program.

CIRCLE 9 ON READER RESPONSE CARD



rf Amp

Amplifier Research has introduced a solid-state benchtop rf amplifier that delivers a minimum output power of 50 watts cw linear across a frequency range of 10 kHz to 220 MHz.

The Model 50A220 is part of a line that is designed to lower

the "cost-per-watt" of rf power. Features include: full bandwidth without tuning or band switching; and swept frequency applications such as rf susceptibility (EMC) testing, power-meter calibration, antenna testing, and plasma studies.

CIRCLE 10 ON READER RESPONSE CARD

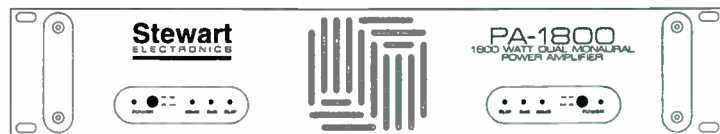


AGC Limiter

Symetrix Inc. has announced the 421 AGC-Limiter. The unit has applications for controlling levels from microphones or audio chains, and also can sense the difference between noise and signal.

The Target volume control and parallel input/output meter allows the user to see what the input level is and adjust it to the desired output target level. Noise is controlled with a downward expander.

CIRCLE 11 ON READER RESPONSE CARD



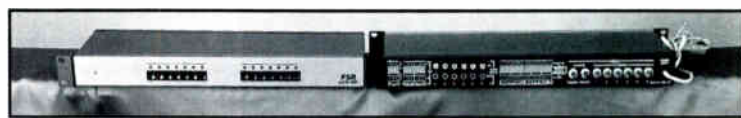
Dual-Monaural Amp

Stewart Electronics has introduced the PA-1800 to its line of professional power amplifiers. The amp occupies two rack spaces, weighs 17 pounds and is 15 inches deep. It delivers in excess of 400

watts per channel at 8 ohms.

The unit features Stewart's High Frequency Switch Mode Power Supply that is designed to maximize the amplifier's power factor. Four PA-1800s can be run on a single 20-amp circuit.

CIRCLE 12 ON READER RESPONSE CARD



A/V Switchers

FSR, Inc. has expanded its line of audio and video switchers. The AVS-8M and AVS-8S are 8 x 1 audio/video switchers available in mono or stereo versions. The AVS-6P is a 6 x 2 audio/video switcher

with main and preview operation.

Both switchers are single rack units featuring silent audio switching, video switching during vertical intervals and remote control of all switches.

CIRCLE 13 ON READER RESPONSE CARD

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Circle 281 on Reader Response Card

October 1992 73

LITERATURE

Consultants and Baffles

NCAC Directory

The National Council of Acoustical Consultants has made available its 1992 directory of members. This directory of the approximately 120 member firms includes a description of the association's purposes, a "matrix" of specialties and outlines the selection of an acoustical consultant.

Circle 20 on Reader Response Card

Master Tools

A 284-page Master Catalog from Jensen Tools introduces OSHA-required insulated tool sets (VDE certified), magnetic screwdrivers and other tools for electrical and electronic installation and repair. Also included are wiring accessories, handheld multimeters and other bench and field instruments, tool belts, kits and cases.

Circle 21 on Reader Response Card



Baffle/Enclosure Guide

Atlas/Soundolier is offering a Baffle/Enclosure Mounting Guide to assist contractors and architects in specifying baffles, backboxes, mounting rings and tile bridge combinations. The guide can be used to verify product selections and to identify product substitutions.

Circle 22 on Reader Response Card

Product Line

Galaxy Audio has announced literature featuring the Galaxy product line. The individual sales sheets features product descriptions and

specifications. The products covered include: a vocal monitor, a permanent installation loudspeaker, a portable sound system, a polarity tester, a full range coaxial loudspeaker, two-way constant directivity system and accessories.

Circle 23 on Reader Response Card

Structure Guides

Tech Writers has released Structure Guides for Technical Documents, a 142-page book priced at \$45.50. These structure guides show writers how to accommodate readers who expect technical documents to contain certain information in familiar places and sequences.

Checklist charts show the standard "document plan" headings for each kind of document. Example pages show a graphic representation of the structure information.

Guides are provided for instruction manuals, software user guides, data bulletins, seminar papers, proposals, magazine articles, etc.

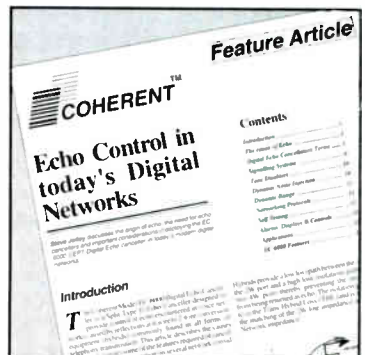
Circle 24 on Reader Response Card

Echo Control

The report "Echo Control in Today's Digital Networks" is available at no cost to any interested person or organization.

The bulletin, compiled by Coherent Communications Systems Corporation, illustrates the origin of echo, the need for echo cancellers and considerations in using echo cancellers in digital networks.

Circle 25 on Reader Response Card



60 Meg Scope

Leader Instruments Corporation has made available a three-channel, 60 MHz dual time base oscilloscope, capable of six trace operation.

The Model 8060's sensitivity ranges from 1 mV/div to 5 V/div in 12 steps with band limiting to 20 MHz at the 1 and 2 mV/div settings.

Circle 14 on Reader Response Card

Wireless Relay

ChannelPlus has introduced the Infrared Wireless Remote Control Relay System 2000 to enable the home owner to control a VCR, laser disc player, or other video source located in another room.

The system consists of an infrared target, infrared repeater and infrared LED emitter extension. The system will work with any IR remote supplied with video source equipment.

Circle 15 on Reader Response Card

Intelligibility Processor

Hughes Aircraft Company has introduced an upgraded version of the company's Voice Intelligibility Processor. The VIP 110 allows audio signals to become understandable in high-noise environments.

The upgraded unit includes bypass circuitry that allows the input audio signal to be connected directly to the output in the event of a power loss, and provides a "conve-

nient" setup mode. Other features include switch-selectable input levels for hi-fi or pro sound equipment and software enhancements.

Circle 16 on Reader Response Card

Windows ENM

Scantek, Inc. has introduced ENM (Environmental Noise Model) for Windows. The program allows the inputting of sound power level data, 3D source and receiver coordinates, and directivity for several source types. Data can be read from a spectrum analyzer and graphed or manipulated in a spreadsheet format.

Circle 17 on Reader Response Card

Portable and Professional

Rauland-Borg has introduced the TravelPro, a portable sound system. It comes with microphones, loudspeakers, powered mixer, stands and cables. Incorporated in the TravelPro are high-efficiency loudspeakers for musical performances. Directional high-frequency horns and microphones along with a built-in equalizer are included to reduce feedback problems.

Circle 18 on Reader Response Card

Wire Reel Holders

Music Supply Co., Inc. has introduced the Easy-Kary Wire Reel Holders, EK-13/24A. The holders are designed to keep cable and wire reeling off spools without kinks and tangles.

Circle 19 on Reader Response Card

PEOPLE

Samson and TOA Appointments

Samson Appoints Caputo

Samson Technologies Corp. has appointed Bob Caputo as Product Manager of its Soundtracs/Behringer division. Caputo comes to Samson with a background in pro audio and retail sales. After a number of years as Atlantic Recording Studios' Chief Technical Engineer, Caputo worked for a pro audio dealer in the northeast.



Caputo

TOA Adds

TOA Electronics' Communication Systems Division (TOA-CSD) has hired Bill Ghan to oversee activities within the division's newly-created Northwest sales region. Ghan has in excess of 14 years of correctional, school and hospital communications contracting experience with Northwest Electronics and Unitech Systems. He has also assumed national sales and marketing responsibilities for contractors and consultants involved with large installation in correctional institutions.



Ghan

TOA-CSD has also appointed Mike Corcoran to another regional manager position. Corcoran is managing sales and marketing in his territory in the midwest. Corcoran has



Corcoran

experience with low-voltage electronics, surround sound systems, intercom systems and in the computer-interfaced security market.

Martin is Manager

Lynn Martin has been named U.S. sales and product manager for Allen & Heath. In his position, Martin is responsible for marketing, sales and product distribution of Allen & Heath products in the U.S. He is also continuing as eastern sales manager for DOD Electronics products.



Martin

Martin has experience as a manufacturer's sales representative, pro audio store manager, recording school manager and professional musician.

Lancken and Bell at Fairlight

Fairlight has made two recent sales and marketing appointments. John Lancken has taken the position of International Sales Manager. Lancken was previously with Australian pro audio sales organization, Amber Technology. Lancken's background is in sales of digital audio workstations, consoles, recorders and outboard processors.



Bell

The appointment of Andrew Bell as Marketing Manager follows three years as Audio Product Manager for Fairlight. During this time Bell was a member of the team that developed Fairlight's MFX2 Digital Audio Workstation.

CALENDAR

Upcoming Events

NOVEMBER

International DJ Expo: Chicago, Illinois. Contact: (516) 767-2500. November 9-12.

SMPTE: Toronto, Ontario, Canada. Contact: (914) 761-1100. November 10-14.

COMDEX/Fall: Las Vegas, Nevada. Contact: (617) 449-6600. November 16-20.

Design Engineering Show: Anaheim, California. Contact: (203) 352-8372. November 19-21.

Networking '92: Kortrijk, Belgium. Contact: (617) 235-8095. November 24-26.

JANUARY 1993

Consumer Electronics Show: Las Vegas, Nevada. Contact: (202) 457-4919. January 7-10.

National Association of Music Merchants (NAMM): Anaheim, California. Contact: (619) 438-8001. January 15-18.

Infocomm: New Orleans, Louisiana. Contact: (703) 273-7200. January 11-17.

Imaging Conference and Exposition (IMEX): Miami, Florida. Contact: (617) 487-7934. January 21-23.

FEBRUARY

Image World: San Jose, California. Contact: (800) 800-5474. February 1-5.

ISC West: Anaheim, California. Contact: (708) 390-2462. February 16-18.

MARCH

InterMedia: San Jose, California. Contact: (203) 352-8297. March 30-April 1.

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- Our Year End Suppliers Survey and Economic Report 1992
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Advertising Closes: **November 19**
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Audio Tape Players	TECHNICS	TEAC	YAMAHA
CD Players	TECHNICS	SONY/YAMAHA*	NAKAMICHI
Microphones	SHURE	AUDIO-TECHNICA	ELECTRO-VOICE
Portable Consoles	RAMSA	TOA	BIAMP
• Racks	• ATLAS/SOUNDOLIER •	MIDDLE ATLANTIC •	ELKAY
VCRs	PANASONIC	JVC	SONY
Video Monitors	PANASONIC	JVC	MITSUBISHI
Signal Processors	RANE	FURMAN	YAMAHA
Mixers	RANE	TOA	STUDIOMASTER
Power Conditioning	FURMAN	JUICE GOOSE	TRIPP LITE
Video Projectors	JBL	SONY	GE
Video Screens	DA-LITE	STEWART	DRAPER

* Indicates tie

... IN LAST SIX MONTHS

**P
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	FIRST PLACE	SECOND PLACE	THIRD PLACE
Speakers	JBL	BOSE	PEAVEY
Subwoofers	JBL	BOSE	PEAVEY/ELECTRO-VOICE
Power Amps	CROWN	QSC	TOA
Audio Tape Players	TECHNICS	TEAC	YAMAHA
CD Players	TECHNICS	SONY/YAMAHA*	NAKAMICHI
Microphones	SHURE	AUDIO-TECHNICA	ELECTRO-VOICE
Portable Consoles	RAMSA	TOA	BIAMP
• Racks	• ATLAS/SOUNDOLIER •	ELKAY •	MIDDLE ATLANTIC
VCRs	JVC	PANASONIC	TOSHIBA
Video Monitors	PANASONIC	JVC	MITSUBISHI
Signal Processors	RANE	FURMAN	DOD
Mixers	RANE	TOA	STUDIOMASTER
Power Conditioning	FURMAN	TRIPP LITE	JUICE GOOSE
Video Projectors	JBL	SONY	GE
Video Screens	DA-LITE	STEWART	DRAPER

* Indicates tie

SURVEY METHODOLOGY

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

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Array Series. Designed To Impress Everyone Who Has Heard It All Before.



The competition to produce the "ultimate" sound reinforcement system is fierce. Each new system design brings claims of having *achieved perfection* or touts *this is the one*. Yet, in time, you can expect the very same manufacturers to introduce new models claiming to have further *perfected perfection* or that their *unorthodox* technology has rewritten the laws of physics. Sound familiar? So how do you impress everyone who has heard it all before? Simple.

JBL engineers have drawn upon proven advancements in loudspeaker design and state-of-the-art digital electronics to create Array Series: a comprehensive sound reinforcement system concept with performance second to none. Developed as dedicated array elements, Array Series systems can be easily configured to fill any venue with seamless coverage from a deceptively small package.

Such performance could only be achieved by designing the exact transducers required for the job. The Array Series is the first professional loudspeaker system to use neodymium magnets. The LF transducer's unique motor structure topology also includes proven Vented Gap Cooling (VGC™) and a deep copper-sleeved gap to significantly reduce distortion and power compression.

The 38 mm (1 1/2 in) exit HF compression driver also uses a neodymium magnet structure, a Coherent Wave™ phasing plug and damped titanium diaphragm. The result is effortless and reliable high frequency output with outstanding accuracy. A 45° Optimized Aperture Flat-Front Bi-Radial® horn assures proper matching and summing of multiple Array Series systems.

The 13 ply hardwood enclosure has 45° sidewalls to match the horn coverage in arrays, and is reinforced with integral steel attachment hardware, designed to interface with S.A.F.E.™ flying hardware for quick and secure cluster assembly.

System functions, such as crossover filter points, transducer acoustic center alignment, system equalization and protective limiting are achieved totally in the digital domain by the ES52000 Digital Controller. The ES52000 employs Finite Impulse Response (FIR) filters for zero phase shift and requires no amplifier output sensing cables, so you can expand your system by adding Array Series loudspeakers without having to add additional controllers.

The sum of these parts is Array Series: a complete system providing extremely high power handling, very high sound pressure levels with full dynamic range, low distortion and unmatched fidelity. Truly a system capable of impressing *anyone who has heard it all before*.

Call or write for detailed specifications. Or, for more *immediate* response, you can get current product information on Array Series, the ES52000 Digital Controller and all JBL Professional products, *VIA FAX* by calling (818) 895-8190.

Pictured above, Array Series installation at the Grand Palace, Branson, Missouri.

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