

SOUND



COMMUNICATIONS

Volume 36 Number 2

February 23, 1990

WEST COAST INSTALL

Portable and fixed, a hard combination to figure. But the specs for the Pacific Amphitheater were not only met; they were finessed and fine. Our installation profile this month features the installation and the bid process of the Pacific Amphitheater. **34**



CCTV:

Where Is It Going?

Big brother and the security watch. As changes, so does the market. Who's doing what? What are we looking for? Our reports. **39**

MICROPHONE MANIA

The microphone market proliferates. Its history dates back to Edison; its future goes into the great unknown. The choices seem endless; and inside these pages, we talk a bit about the technology, and the market. **17**

SPECIFICALLY LENSES

What special requirements does the security field make on camera lenses? The lens gives the image and the image is paramount. Our special feature focuses on the lens on CCTV. **42**

VIDEO VISIBILITY

Testing for video products takes on new aspects as the product becomes more technologically advanced. Steven Orfield takes us on a trip through the testing procedures for video, and makes some cogent comments along the way. **64**

The Next Decade

What we expect to see in the nineties and where we're headed. The crystal ball is presented inside these pages. **26**

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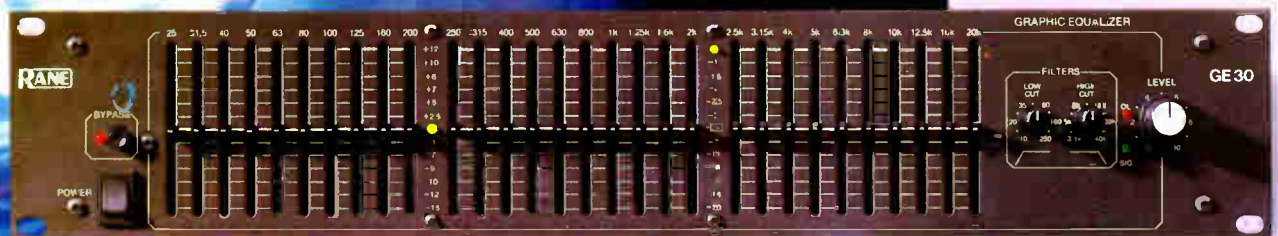
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ature doesn't recognize the ISO centers on graphic equalizers. But with the GE 30 Interpolating Constant-Q Equalizer you maintain proven constant-Q filter performance between ISO centers when two sliders are activated simultaneously. Interaction and unwanted side-effects are minimized.

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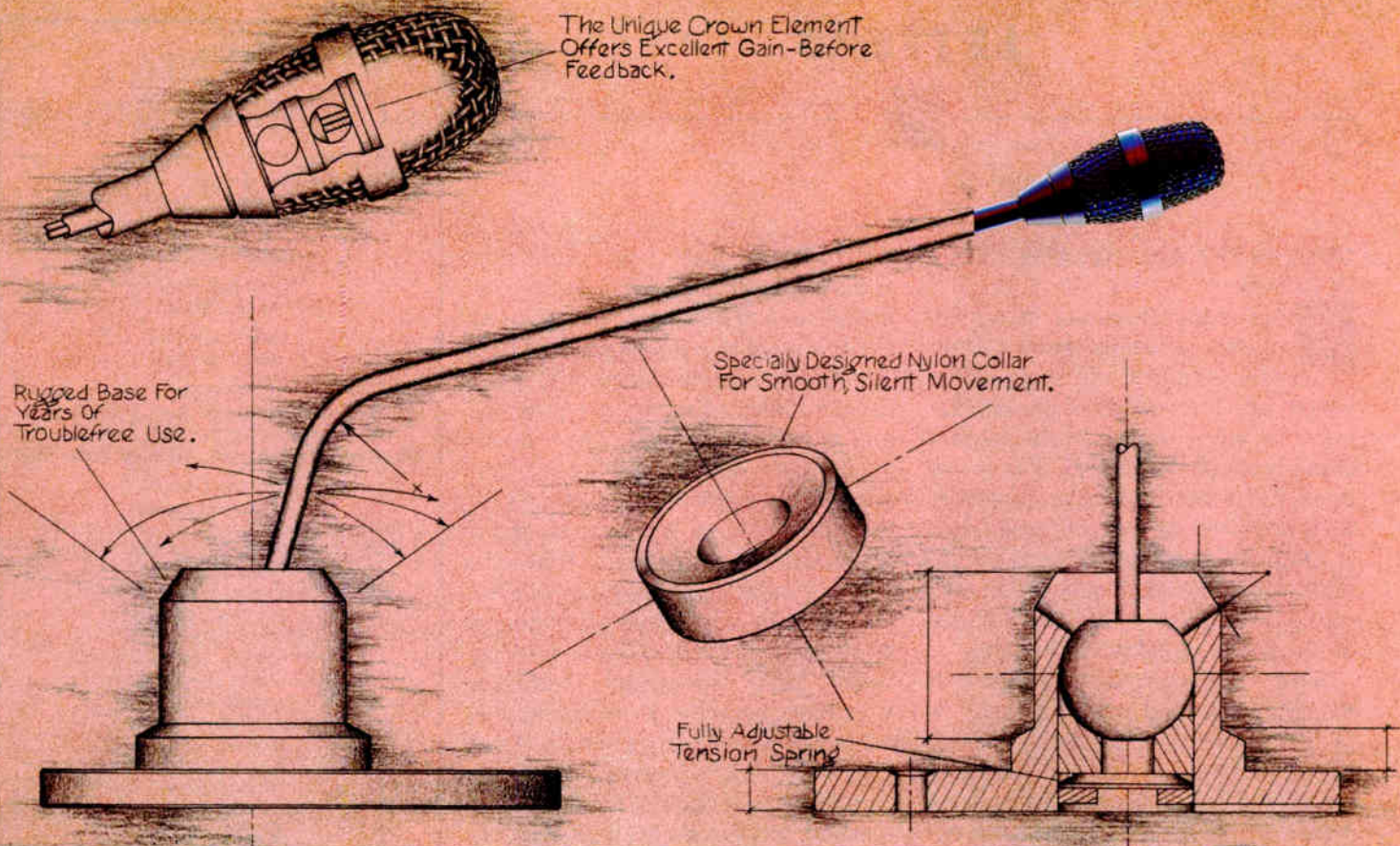
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Specific problems demand simple, elegant solutions.

The most intelligent design, in any discipline, is often regarded as "inspired". The acclaim stems from the designer's ability to recognize and solve the problem at hand, simply.

Podium mikes have in the past exhibited a number of flaws to the installer and to the end user. Crown engineering set to the task of defining those flaws and eliminating them. Further, we wanted to incorporate new ideas necessary to make the LM™ series everything a podium mike must be.

In consulting experienced sound contractors, we determined that to be aesthetically appealing and unobtrusive in use solves only a part of

the problems of past designs; long-term client satisfaction and ease of installation and maintenance are as important as the need for excellent gain-before-feedback and natural, uncolored sound. So is meaningful shock isolation. And there is more . . .

In the LM series, a unique method of keeping proximity effect under control is employed for predictable performance and uniform intelligibility at all distances. Coupling this with thorough shielding and increased RF protection, the LM series is, as usual for Crown, at the forefront of this technology. That's where we want to be, that's our inspiration.



"After 30 years and thousands of church installations, we finally found what we really wanted all along. Thanks Crown for listening, we should have spoken with you first."

Per Haugen
General Communications

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World Radio History



CONTINUITY AND RELATIVITY IN AUDIO

Too many times we in our industry, as well as those in other industries, tend to make suggestions which are supposed to benefit the public at large, but which fall on deaf ears because it sounds foreign to them, or far removed and unrelated to their accepted general interests. This is because those in a particular industry making such a suggestion may not be placing themselves in the shoes of the public outside that industry.

Such a situation may exist with that most credible and worthy article, "A Modest Proposal," written by Clifford A. Henricksen, where he proposes "teaching sound to the citizens of America." His suggestion to advise the educators that they should include in their curriculum courses on distinguishing tonal sounds, decibel level training, and other facets of sound to students from kindergarten through high school is indeed good. But to suggest that this information, aimed at the students in general, as opposed to individual specifically selected courses, should include information on active crossovers and other components, and how they fit together in a commercial sound system, and plotting polar curves, and MIDI recording and playback, and digital sound theory, and so forth, seems to be missing a very important element of continuity and relativity. Without these two elements, such topics don't appear to fit along side the other generally mass-taught subjects to the general school population.

What I feel should be added to Mr. Henricksen's admirable idea, in order to tie it all together, as well as make it more desirable, is the same element included in all other courses. And that is,

history,... the history of sound and audio from man's primitive beginning, to Berliner and Edison, as well as items like the audible phenomena in caves and Greek amphitheatres, and other developments in sound up to today, and plans for tomorrow. Then, by including this missing history into the educational system, sound and its effects on our lives will become more respected and meaningful. Now with such a format, general or basic information about components and sound systems, digital theory, curve plotting and so forth, can logically fit in. The rewarding benefits of including the subject of sound with its history in our education system (from kindergarten through high school) of course is that exposing this generally unknown information to developing young minds will result in greater audio (and video) developments as more students gain the desire to major in this field.

In addition, I would like to see more of us in our industry do as I have from time to time. That is to offer our service in going to public schools and presenting lectures on the subject and history of sound. You would be surprised how genuinely interested they are.

Yale Brevda
Yale Audio of Florida Corp.

A MODEST PROPOSAL?

The proposal for teaching applied acoustics in grammar school is far from being modest and even farther from being sensible. To answer only one of the questions posed, chemistry, when taught, takes precedence over a topic such as acoustics because it is a fundamental branch of science. Acoustics (sound), when taught, is done so appropriately as a branch of physics along with

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SOUND COMMUNICATIONS

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The Man With The Horn

The man was Myron Fulkerson. He started Fourjay Industries back in 1956. From the beginning, Myron's policy was to provide high quality labor saving American made products and to have them *In Stock for Immediate Shipment*.

Today, "the man with the horn" is Fourjay Industries itself. But the policies are still the same including *In Stock/Immediate Shipment*.

Of course, today, *In Stock* means much more than it did years ago. It means a big selection of horns, speakers, mounting rings, baffles and everything else for quality paging, marine hailing and even backyard hi-fi. Yet all of it is still *Fourjay Quality—American Made*.

Immediate Shipment means more, too, because installation delays (actual or anticipated) are more costly than ever.

So, when you're making a sound decision, remember the man with the horn and Fourjay, the company that's been doing it right since 1956.



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C O N T E N T S

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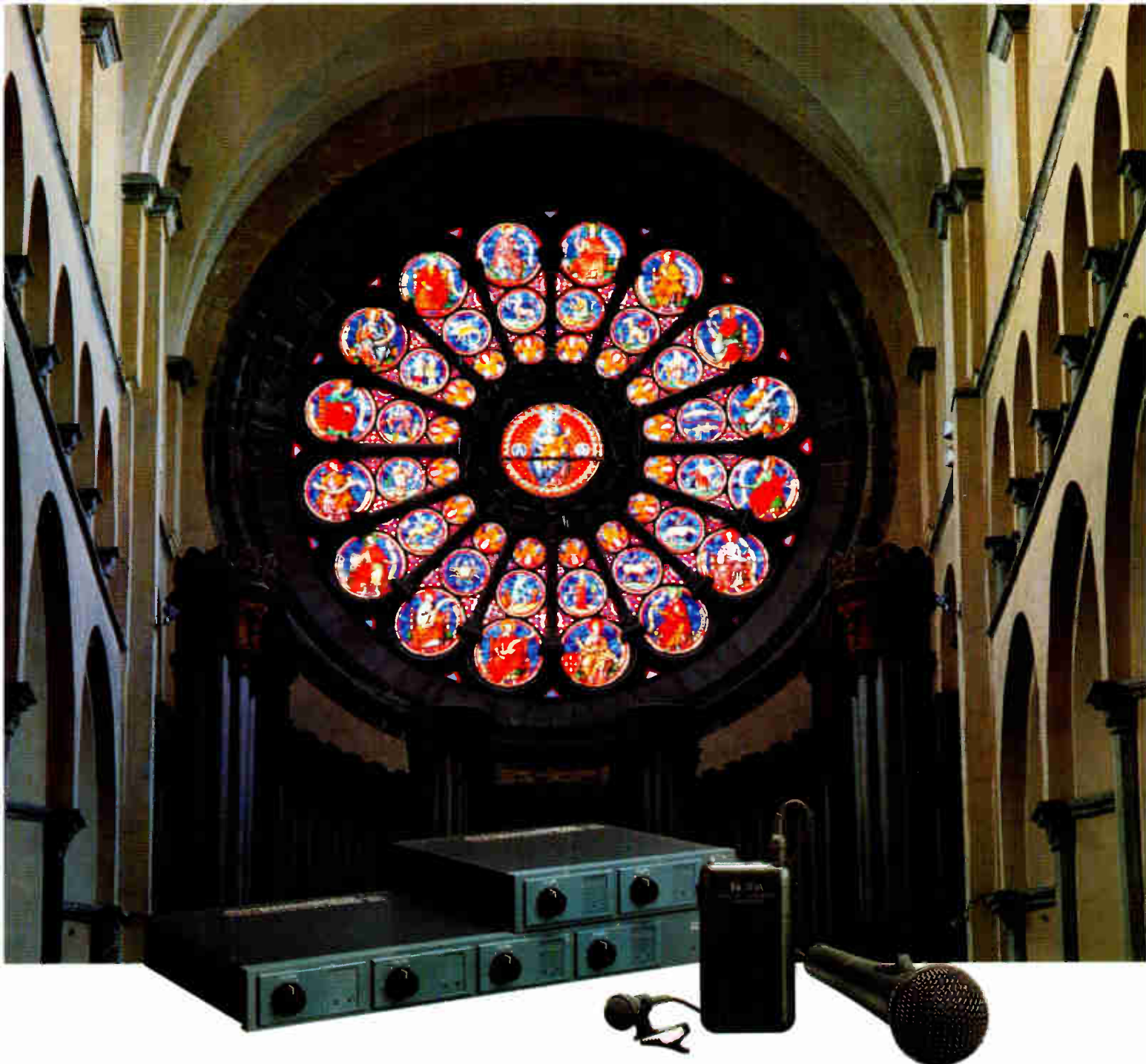
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Toa's New Family of Wireless Microphones Created to Reinforce the Spoken Word

With the introduction of our new vhf hi-band wireless microphones, Toa has redefined the concept of outstanding wireless performance at an affordable price.

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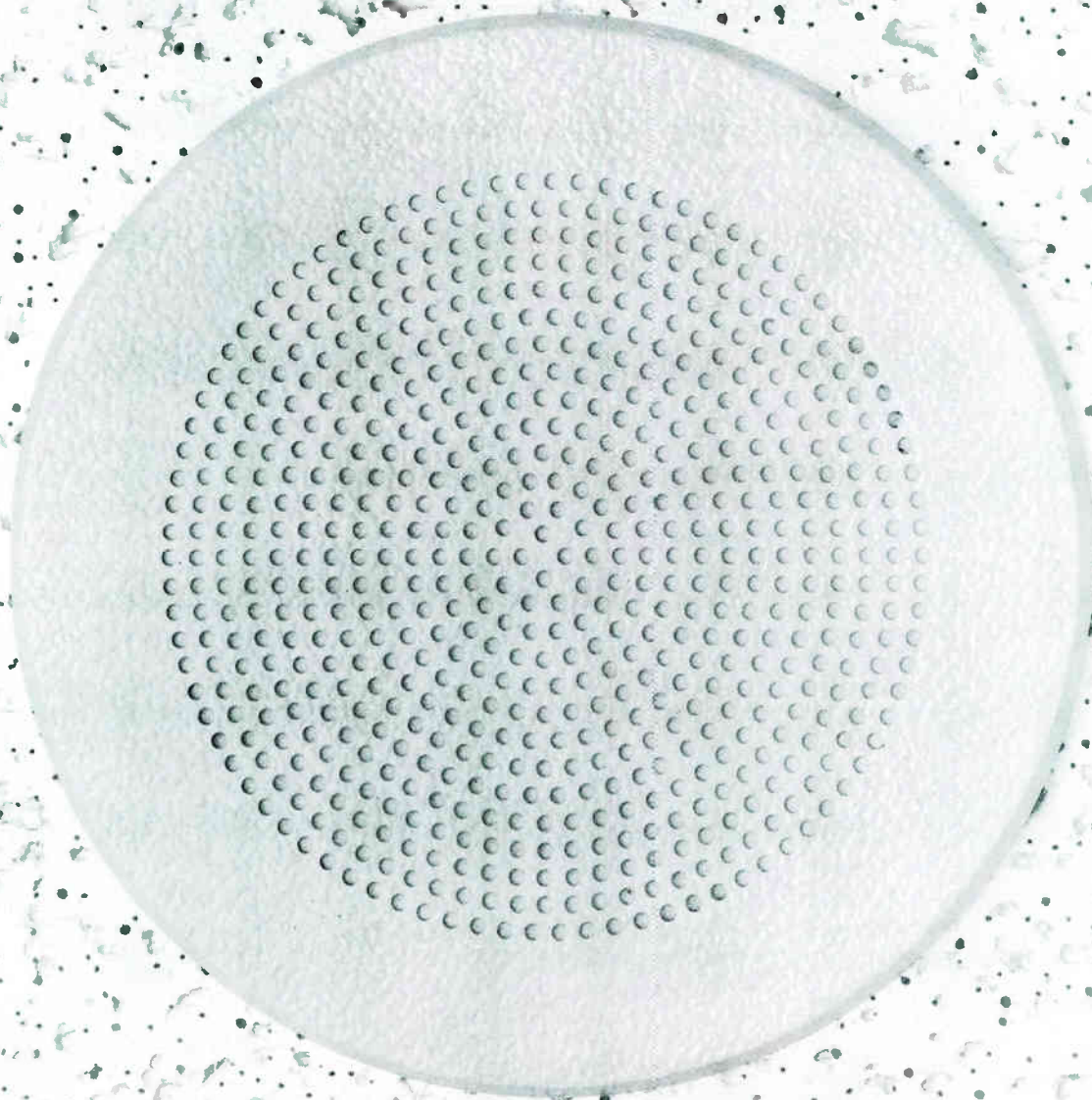
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NEWSLETTER

DOD ACQUISITION

Harman International has signed a letter of intent to acquire DOD Electronics. DOD will, under the agreement, continue to direct its own sales, marketing and manufacturing.

CHANGES FOR SUMMER NAMM

The National Association of Music Merchandisers, following some vocal criticism after the summer NAMM show, conducted a survey of members and non-members to ascertain any changes if any that should occur in the summer NAMM. The findings, released at the winter NAMM, led to the following changes, among others. NAMM will reduce the exhibit space of the 42 level of McCormick Place, to narrow the aisles, and give a "more dynamic environment." Concurrently, far more attention will be paid to a seminar program, a keynote speaker, and more involvement by key businesspeople outside the industry.

SAMSON DISTRIBUTES KLH

The name KLH is back, and it has entered the pro field. Samson is distributing KLH studio monitors at \$160 a pair suggested retail. The name was purchased from Kyocera last year by a California group of hi-fi marketers.

SOUND ON STILL VIDEO

A new medium just got newer. Sony has added an element of sound to the still-video format. The Sound Mavica camera can record an image plus approximately 10 seconds of sound on the two-inch video floppy disk, using the hi-band recording system.

HOME AUTOMATION

The EIA Home Automation Standard is expected to be finalized this spring following a 120-day comment period. The standard works via all household media, including the power line, twisted-pair wiring, coaxial cable, radio frequency and infrared communications links, and fiberoptic cable.

NEW VIDEO DELIVERY SYSTEM

EMC2 has been formed as a video delivery company, delivering programs to the home consumer initially via satellite and later via receiving equipment in a vcr, and fiberoptic cable. The company expects to license EMC2 equipment to vcr manufacturers.

SURVEY RESULTS

The Audio/Video Group of Mitsubishi Electric Sales America, Inc. has released results of a survey on consumer intentions for the "home theater." The survey found, among other things, that one-third of the respondents would consider some form of remodelling work in the home to accommodate an integrated audio/video system. Consumers would be willing to spend between \$7,500 and \$14,000 for a total installation. Forty-one percent thought a television over 30 inches would be ideal.

NEWSLETTER

MUSIC & SOUND AWARDS

The fourth annual Music & Sound Awards presentation was held on January 19 in Anaheim. The awards, sponsored by Testa Communications, are a culmination of a process of nominations and balloting by those working in the musical instrument business. Among the winners this year were: most innovative recording product — Tascam 688; most innovative sound reinforcement and loudspeaker product — Dawn MI-510; most innovative microphone — Shure Beta 58; most innovative wireless system — Shure L Series; most innovative rackmounted effects product — Alesis Quadraverb; most innovative lighting product — Peavey Lite 2400.

In addition, Bob Brennan of Reflex Marketing won sales rep of the year; Daddy's Junky Music won for overall excellence in operations management; Ace Music, Westlake Audio and Rhythm City won for most effective dealers in microphones, recording products and loudspeakers respectively. And Daddy's Junky Music was most effective dealer for sound reinforcement. AST was named the most effective service and repair department. Among the presenters of the awards were Clarence Clemons and Ginger Baker.

DUAL TRANSPORT CD

Numark has unveiled a dual-drive CD player allowing mixing from one disc to the other manually or automatically. The CD6020 consists of a transport module and a control unit. The transport module mounts into a standard 19-inch rack and houses two separate CD transports. The control unit is also rackmountable.

CONTRACT AWARDED

The General Services Administration of the Federal government has awarded a contract for erasable optical disk systems to Intrafed, Inc. of Washington D.C.

FANE ACQUIRED

In a "reverse takeover," Wharfedale has become the owner of Fane and McKenzie, becoming Wharfedale PLC. TTE remains the American marketer of Fane products.

NEW EQUALIZERS

Sony has shown some test products of equalizers and other signal processing equipment for possible inclusion in the product line.

SYMPOSIUM PLANNED

Design Factors, the southern California manufacturer's rep firm, in cooperation with 12 manufacturers, is sponsoring an electronic products, audio, and sound symposium in Honolulu, March first and second. The key speaker and host is Emory Straus of White Instruments.

The concept of the show, according to Geoff Keleher of Design Factors, is "to embrace Hawaii as a meaningful part of our economic environment, and to point out that Hawaii should be entitled to the same technological exposure as the rest of the United States." The event will take place at the Hilton Hawaiian Village, Waikiki.

PHILADELPHIA SHOW

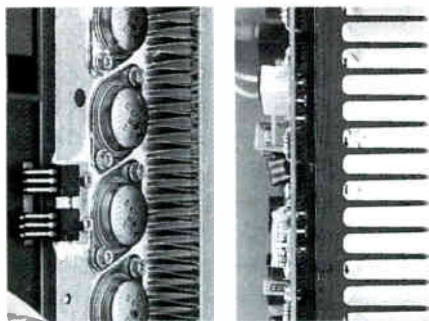
The National Guard Armory in Philadelphia is the venue for Tekcom, Inc.'s show March 3 and 4. Audio Expo '90 is being held in celebration of Tekcom's tenth anniversary, with attendees expected to include end users and contractors. Among the exhibiting manufacturers are Bose, Tannoy, Crest and Karibu.

Warning: To Avoid Risk Of Shock,

Ignore This Amp-To-Amp Confrontation.

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

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



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

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

TAKING THE HEAT

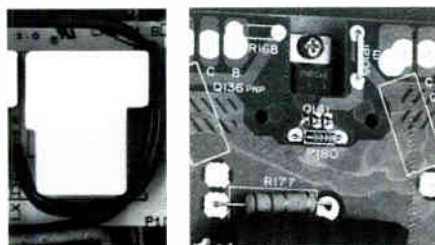
If the MacroTech heat exchanger reminds you of an air conditioner, you've grasped its design. This approach works, at least until dust and dirt clog the fins. But as soon as the air flow slows or stops, temperature rises. Soon after that, the Crown shuts off — it could even fail.

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

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

REAL SPEAKER PROTECTION

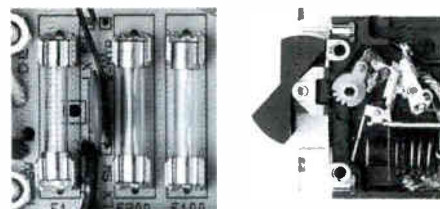
Most amps today are direct coupled, so a blown output transistor (the most common failure) connects the power supply directly to the speakers. Earlier MacroTechs had no protection against DC. Now Crown has learned their lesson — or have they? The sensing circuit and relay they now use shuts off the power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



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

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

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



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

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

MAKE YOUR OWN COMPARISON

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



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Audio and the Economy

By Thomas W. Hope

As part of our special look at the sound and communications industry of the nineties, Hope Reports, Inc. prepared this exclusive presentation of its view of the trends of this market. Thomas W. Hope is the head of Hope Reports, the 20-year-old market research firm, and he has said elsewhere that "history will show that the last quarter of the twentieth century was the communication... revolution."

—Editor

After five straight years of increased sales (both units and

dollars) of pro and audiovisual audio equipment, 1989 sales turned down, based on preliminary 6 months data.

Hope Reports has been tracking the audio equipment market for two decades. Audio sales were essentially flat for 12 years, during the 1970's and the first two years of the 1980's. It was not until 1982 that dollars sales turned up, although unit sales that year were decidedly off.

Outlook for audio equipment sales during the decade of the 1990's is moderately upbeat, according to Hope Reports.

The United States economy has chalked up a remarkable record of no recession for nine years. Since World War II there have been two recessions in every decade. In the 80's, there were two at the outset, in 1980 and 1981.

Besides more skillful managing of our money system by the Federal Reserve System, corporate management has taken a cautious approach in budgets. For example, following the 1981 recession the usual practice of easing up on tight spending was not seen. Instead, further tightening took place. Every week for eight years you read in the business pages that some company offered encouragement to senior employees to take early retirement. This has kept the economy from heating up with inflation.

Coupled with this practice, capital spending was carefully monitored. For example, many of the high ticket AV items such as video edit systems and time-base corrector sales have been off sharply over the past few years. In contrast some of the less expensive audio products have fared relatively well in recent years. This statement can not be taken as a blanket comment for all low-cost audio products, however.

In recent years pro audio equipment sales have out performed the AV lines. How both lines will fare over the next ten years is exceedingly difficult to predict. A breakthrough with some hot new technical advancement can make the difference. Digital audio was certainly a factor in the improvement for audio in the 1980's.

The bottom line comes back to the opening sentences of this piece. We are moderately optimistic. We hope we are proved to have been too conservative, when the year 2000 dawns. ■

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Ease of installation. As sophisticated as our systems are, they're easy to install.

Sales support. We give you all the support you need, from sales brochures to architectural and engineering application guides.



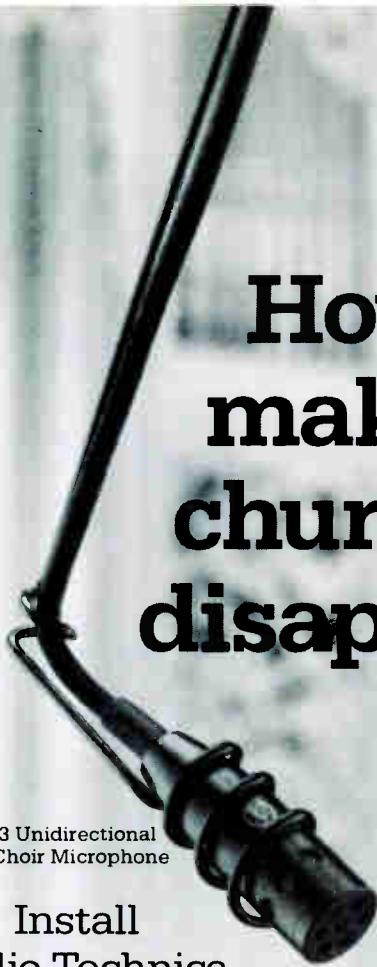
To learn more, give us a call at 816/231-7200. You'll find out why Stentofon is talking your language.

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New Directional Choir Microphone

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

Directional models for altar, lectern, pulpit, plus lavaliers

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Model AT871
UniPlate Boundary Cardioid

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

Better sound is now smaller, lighter, less visible

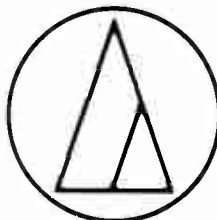
Whether your customer's sound system is solely for sound reinforcement, or is also used for radio/TV or tape recording of the service, UniPoint microphones improve the sound quality while remaining almost invisible.

Our experts are ready to help

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



Model AT857AM
Podium Cardioid



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Maximizing the trade show: Beyond inquiry qualification

By John Stap

No matter what your business, you're apt at some time or another to be exhibiting at a show or convention — either to the trade or to the end user. The cost of your involvement would be charged against your marketing/communications budget. And chances are that your expenditure for the show will rank high in your budget.

Are your trade shows producing the necessary return on investment? Can

you justify next year's participation? How can you make your trade shows work smarter?

These questions strike fear into the hearts and pocketbooks of marketing managers everywhere! Answers to the questions exist; you'll find them in your own marketing department.

How to measure the success of a trade show? Effectiveness is typically measured by counting and qualifying

the inquiries generated. Unfortunately, inquiries are an overused and at times, inaccurate method to justify marketing tools.

A trade show can accomplish much more than just inquiry generation. It can: enhance corporate image, allow a conduit for customer relations, provide an environment for conducting research among customers, prospects, industry opinion leaders, suppliers...

"I WOULD RECOMMEND THE SOUNDSPHERE SYSTEM TO ANYONE.."



Built just after the turn of the century, St. Mary's Church in Monroe, Michigan recently completed an extensive repair and rebuilding program. Fr. Brian Chabala, pastor of St. Mary's, was faced with a completely obsolete sound system since the new facility incorporated a vaulted ceiling. People complained constantly, and various sound adjustments did not make any difference. Echo was a large problem, especially with the people who were seated in the rear portion of the church building.

The sound problem was eliminated totally after the installation of one Soundsphere #2212-2 upon completion of the renovation project. Fr. Chabala stated, "I would recommend the Soundsphere system to anyone having sound problems. I can't speak highly enough about it...in fact since its installation there has not been a single complaint about hearing, even when some of the softest readers serve as Lector at Liturgy."

Last July, former Miss America Kay Lani Rafko was married at St. Mary's before an overflow crowd in the refurbished church. The sound operated perfectly and the Soundsphere helped contribute to the beauty of the occasion.

Write or call direct for further information.

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improve internal morale, introduce new products/technology, afford an opportunity to obtain feedback from various audiences, attract new dealers, demonstrate equipment, generate new application leads, generate actual sales, identify industry trends, collect competitive intelligence, test new markets, conduct public relations events, meet with editors, recruit sales people, and more.

How do you decide which activities to implement at your show? Your show participation must be treated as an integrated component of a complete marketing program. Your activities at the show must be in tune with your corporate mission, positioning, and advertising strategy. A trade show must be another consistent tool of marketing. Your exhibit must present your company's personality and maintain the graphic approach you've used in other external communications tools. Never assume that the trade show is a unique beast, and need not be in harmony with your creative positioning.

Who can help you maximize your return on investment at the show? Your advertising agency or in-house department is a logical partner. This group can help increase your show's effectiveness and ensure that all the elements of the show tie in with your corporate communications strategy.

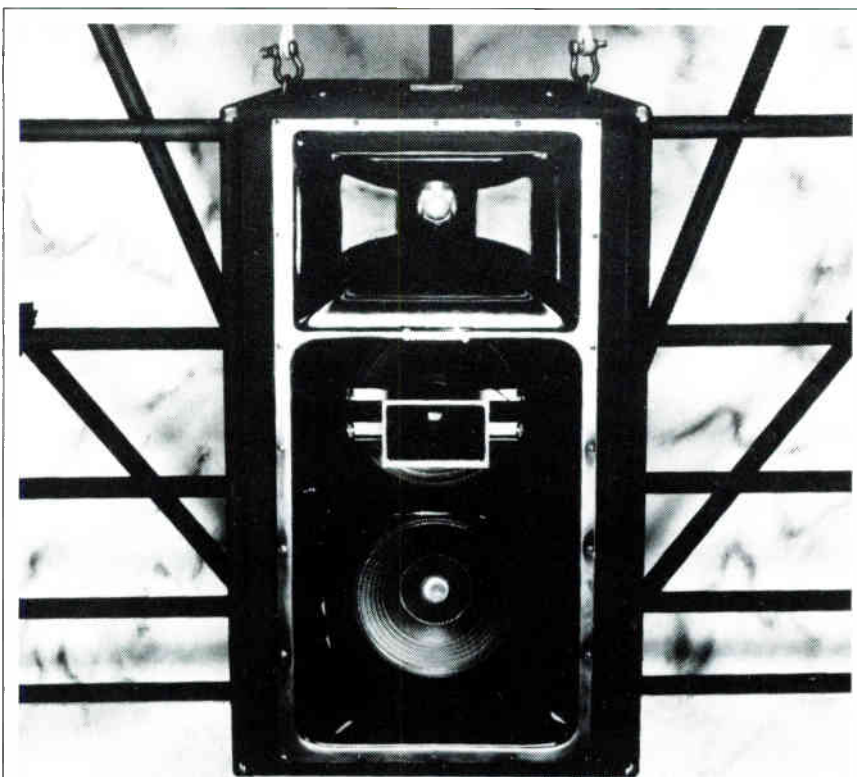
Prior to participating in a show, insist that your agency or in-house department develops a written plan, complete with measurable objectives, strategies and a listing of executions by individual or group responsible. A well thought out plan should consider tactics such as: booth graphics, show theme, pre-show incentives, press opportunities, inquiry qualification, post-show follow-up, press kits for the media room, pre-show advertising, booth snipes in current advertising, pre-show sales meetings, show hand-outs, show give-aways with orders, on-floor interviews, advertising campaign testing, pre-show publicity, pre-show training, post-show publicity, press conferences/break-

fasts, follow-up literature packages, location selection, preferred customer invitations, exhibit house evaluation, and more.

Your advertising source should also develop non-traditional marketing tactics for your show, such as getting client involvement in show seminars, symposiums, and lectures. This is a

highly credible vehicle, especially when accompanied by the appropriate client public relations. Other non-traditional strategies include conducting on-site focus groups of your customers or prospects, and creating sales tools to be used throughout key show locations (hotels, transit, etc...).

(continued on page 52)



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Community's new RS880 loudspeaker system flies heads above all others with its trapezoidal, three-way Wavefront Coherent™ horn-loaded design. Dynamically controlled from a single rack space with our 880EQ, the RS880 additionally features unique feedback-loop sensing circuitry, and reinforced D-rings which can get you off the ground quickly and smoothly. For room-shaking bass response, our VBS415 subwoofer can also be added to extend the system.



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MICROPHONES: Past, Future, and Present

BY PAMELA MICHAEL

From the day in 1876 at the Philadelphia Centennial Exposition when Alexander Graham Bell first demonstrated his liquid microphone, acoustic engineers and designers have tirelessly sought to improve and expand the performance capabilities and usefulness of the microphone. In response to the enormous variety of sound sources and acoustical environments, a similarly great variety of microphone designs has been developed. Modern materials and new electronic and manufacturing techniques have opened the door to increasingly fine tolerances and performance levels unthinkable only a few years ago.

The making of a microphone is both an art and a science, demanding the highest levels of mechanical and technical precision and a delicate balance of parameters. When engineers design a mic to perform well in one area, they often have to make critical adjustments in another because the frequency response, weight, sensitivity, directionality — virtually all the design specifics of a microphone — are so inter-related that even a minor change in the design can yield a totally different sound from an otherwise similar microphone.

Just as the invention of the first microphone grew out of telephone technology (the search for a reliable voice transmitter), many current advances in microphone design are the result of telephone research technology, particularly in the cellular field. Beginning in the 1960s, microphone engineers began to use computer simulation of various acoustical situations in the design process. The resulting data have advanced transducer technology considerably.

THE MICROPHONE'S FUTURE

Materials advanced will bring enhanced



Electro-Voice N/DYM Series II Mics.

performance. Current trends in applying advanced metrological technology will continue as Beryllium and other diaphragm coatings become more common, bringing lighter and stiffer diaphragms with smoother response and higher sensitivity. Dampening films for diaphragms are also being studied, such as VAVCOM from Sims' Vibration Dynamics, which claims to bring condenser microphone smoothness to dynamic elements. New, high vibration loss materials such as NAVCOM and Sorbathane may also begin to be used as internal mic element isolation mounts, reducing handling noise. Ferrofluid, now used in speakers for increased power handling, is being considered by mic designers to reduce distortion, and create faster transient response settling time and reduced wind noise. Super high energy magnets are now being used by Electro-Voice, Beyer, Shure, and others using

technology based on Delco/General Motors Magnequench patents. Cost and performance of these high energy magnets has continued to improve and will begin to appear in medium priced products soon. The potential benefits of Magnequench/NDM magnet material are twofold: higher output, thereby swamping out some of the residual hum and hiss noise of the mic mixer input stage; and allowing some of the increased output to

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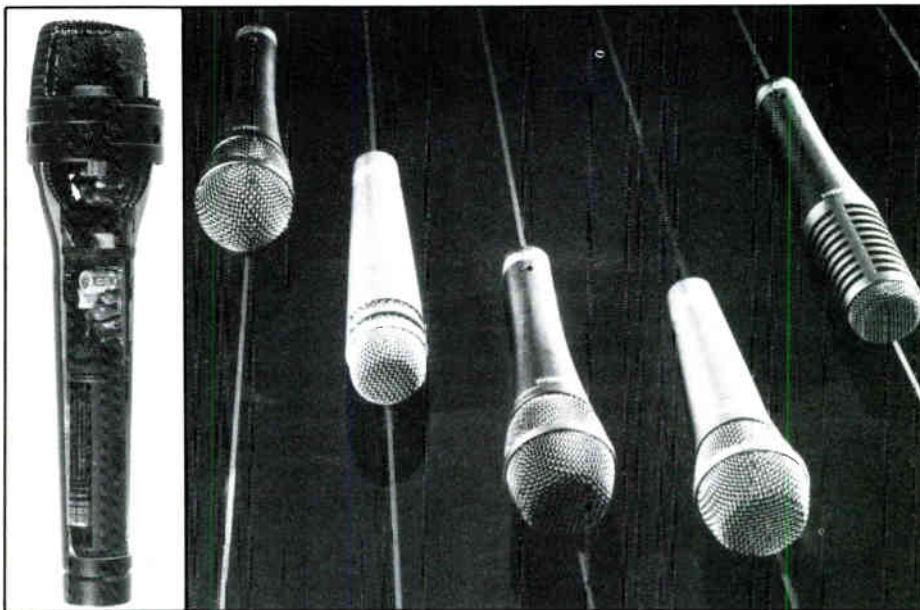
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MICROPHONES

be lost with high loss damping techniques, both for controlling the diaphragm and handling noise isolation. Still another possible improvement is in the microphones that require the diaphragm to be located behind part of the magnetic system (this configuration can be found on both some ribbon and conventional dynamic designs). The thinner magnetic system can enable the designer to achieve more extended and smoother high end response. The smaller magnet also promises greater miniaturization of the entire microphone.

Aside from the nuts and bolts materials advances, more radical possibilities can be seen in the high polymer piezo technology available from Penwalt which is now successfully being used as the pickup in electric guitars and accelerometer type vibration transducers. Another visionary concept in mic development is the "digital"



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Yamaha MZ Series.



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because of durable metal construction and full three-year warranties. Best of all, they're made right here in the U.S.A. For more information about Telex Wired Microphones, write to Telex Communications, Inc., 9600 Aldrich Avenue South, Minneapolis, MN 55420.

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microphone from Ariel (known for their SYS-ID acoustical test system which is starting to gain popularity). Ariel's digital microphone is actually a conventional mic element which includes analog to digital converter electronics within the mic casing. For the moment this mic will only directly connect to the NEXT computer which has an internal DSP (Digital Signal Processing) sub-system. Future possibilities for this type of mic are direct connection to fiberoptic-digital snakes, DAT recorder machines and who knows what else.

Mic interface is also evolving with the commercialization of digital/fiberoptic snakes [which are explored in Sound & Communications next month], automatic mic mixers, as well as super low noise hybrid integrated circuits optimized for mic preamps.

Microphones and speakers are the weak link in the audio chain and you can count on the most dramatic and audible improvements coming from the "nose and tail" of the audio chain.

These predictions, along with the following survey of new products and applications, were obtained through interviews with engineers and product line managers from the microphone manufacturers who

MICROPHONES



Bogen MBS-1000 desk-top. Sony ECM-MS5 stereo electret condenser. Milab VM-44 condenser.

do a substantial portion of their business with sound contractors.

- The AKG C 1000S is a multi-pickup pattern electret design microphone which runs from an internal standard 9-volt battery or from phantom power. It comes with a polar pattern converter (PPC 1000) that converts the C 1000S's regular cardioid pickup pattern to hypercardioid, and is designed to be field installed and removed depending on the pattern desired. The frequency range is 50 — 20,000 Hz, sensitivity is 6 mV/Pa, the impedance is 200 ohms and the maximum SPL for 0.5 percent THD is 137 dB.

- Every microphone in the Uni-Point Series of miniature cardioid condensers has recently been upgraded, increasing headroom by about 10 dB. Audio-Technica is using a brand new patented process in their microphone construction that is a

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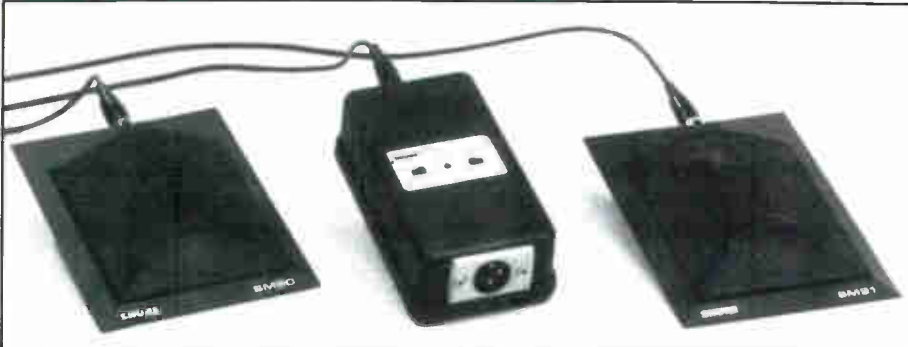
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MICROPHONES



Studio Technologies Mic-PreEminance Mic Preamp.



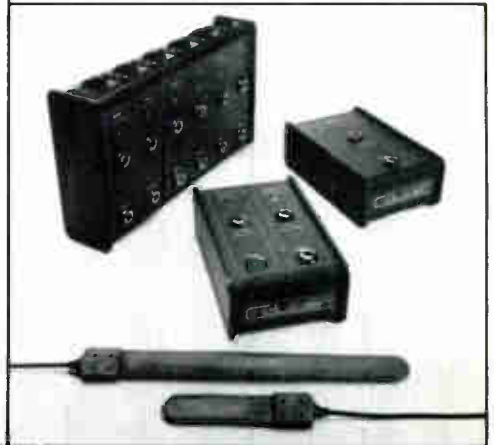
Shure SM90 and SM91 Surface-Mount Mics.



Audio Technica UniPlate and OmniPlate Mics.



FSR two-channel microphone mixer MPA-2.



C-Tape C-Ducer contact condenser mic.



Crown SASS-P mic.



HME PD100 Power Distribution System.

Wireless Solutions

ombination of new electronics and a wave folded diaphragm that minimizes breakup under high sound pressure levels. The 1/2-ounce Uni-Point 853 hanging mic continues to be one of their biggest sellers and is said to be the largest selling church and choir mic in the world. New additions to the line include a power supply for the Uni-Point models that uses standard AA batteries rather than the harder-to-find N-type and the 8414 Music Instrument Clip, foam nest windscreen for use in lieu of mic stand or potentially noisy clamp.

For teleconferencing, Audio-Technica recently introduced three new models including the tiny (1 1/4 diameter) 841-A Omniplate. But it is their nine-month-old wireless system that has generated the most interest and new sales. The full diversity system has two separate antennas, two separate front ends, squelch, and balanced XLR outputs.

Yet another wireless system to keep an eye on is the AT857 AML-AW, a wireless all diversity podium mic with a power pack that clips on underneath the lectern and gives 10 hours of continuous use. The podium can be moved on and off stage for specialized presentations without worrying about wires and hook ups.

Audix recently moved the entire manufacturing operation of its most popular line, the VLM (Very Low Mass) series of dynamic microphones from Japan to the U.S. VLM capsule technology, which is in the process of being patented, is said to substantially improve handling noise due to a change in suspension and a new assembly process that Audix isn't talking about. The new design delivers the crisp highs and presence you would expect from a condenser mic.

The OM-1 and OM-2, mainstays of the VLM line, offer off-axis rejection that Audix avers is the highest in the industry – over 30 dB. These handmade brass body dynamic, moving coil mics utilize a hypercardioid/supercardioid combination polar pattern and provide a frequency response of 50 to 18,000 Hz and 40 to 20,000 Hz, respectively. The OM-1 is the only dynamic microphone of its kind to offer interchangeable frill caps, a ball grille

Hearing Assistance?

The T-72 Auditory Assistance system by Lectrosonics offers more features at competitive pricing. The T-72 RF transmitter has switchable dynamic processing to compress dynamic range to provide better intelligibility. Selectable low and high frequency contours adjust the sound to the listeners needs. The sensitive PRS-72 receiver is easily tuned to a test tone from the transmitter and features a wide band AFC circuit to prevent "drift". The earphone output is user adjustable up to 1 Watt. The T-72 transmitter is built in stand-alone, MAP module or tour guide configurations.



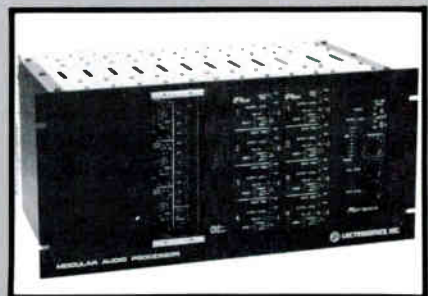
Multi-Channel Headaches?



This is the solution. Lectrosonics wireless systems are available in configurations from simple single channel units retailing for \$399.00 to multi-channel systems for church, conference or theatrical installations. The PRO 4 rack mount system provides 4 simultaneous channels without intermodulation or crosstalk. The DM4 distribution module provides single or diversity antenna/s, helical resonator filtering and maximum isolation between receivers. Additional racks can be stacked for larger multi-channel installations.

Automatic Mixer ...that does more?

The Modular Audio Processor (MAP) offers a complete audio system in a small space. Modules include automatic mixing, auditory assistance transmitter, standard mixing, equalization, crossovers, leveller-limiter-compressor, and several others. The MAP system approach guarantees compatibility, and easy installation. Automatic mixer functions include expansion attenuation, priority channel, last mic on hold, NOM attenuation and phantom power.



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MICROPHONES

or probe cap. Audix's Cliff Castle claims the OM-2 outperforms neodymium.

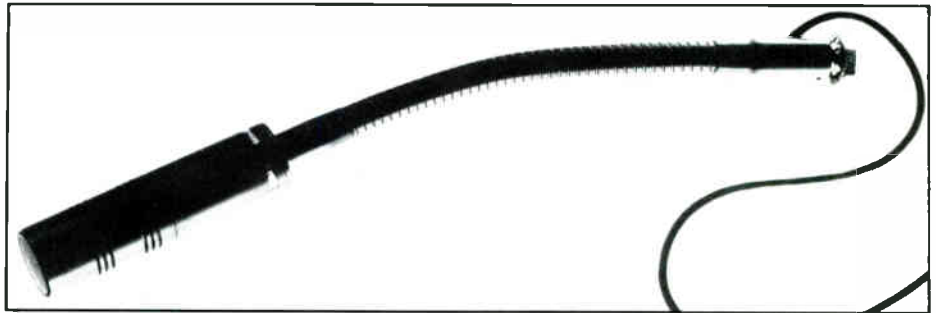
Look for the world's first phantom powered dynamic microphone with line level output from Audix in 1990. Called a "sampling mic" by its engineers, it will plug directly into a sampler.

- Bob Herrold, microphone product line manager for Crown, cites the PCC 160 (a supercardioid, directional boundary mic) as a continuing favorite among sound contractors for altar table, stage floor and similar applications. The PCC (Phase Coherent Cardioid) mics are similar to Crown's PZM (Pressure Zone Microphone) line in that they are also designed to be used on boundary surfaces. Unlike the PZM, however, the PCC uses a subminiature supercardioid mic capsule, which, when surface mounted, creates a "half-super-cardioid" polar pattern and increases directivity 3 dB. A gated version of the PCC 160, the PCC 200, is Crown's newest microphone model. Designed for multi-mic applications or teleconferencing, the PCC 200 features built-in electronics with adjustable gating and mic level out.

Other surface mount boundary mics from Crown, one of the originators of the type, are the LM 190 and the LM 200, which are phantom powered only. One nice feature of these mics is the adjustable tension swivel ball. A new refinement to the line is an added bass boost switch for those situations where there is a very narrow mounting area (like a pulpit) in order to cut down on brightness for a more natural sound.

- CT Audio manufactures the only contact condenser microphone in existence, the patented "C-Ducer," which was developed by an unlikely trio of a medical physicist, a musician and an engineer. The C-Ducer is a flexible strip, 5/8-inch wide, sheathed in a plastic case. A thin microphone cable is permanently wired to the strip, terminated with a 1/4-inch phono plug at the preamp end. The C-Ducer system is used extensively in churches and theaters and can be used to enhance instruments, both at the top and bottom of the sound spectrum, which offers advan-

(continued on page 52)



Beyer SHM 420 podium mic.



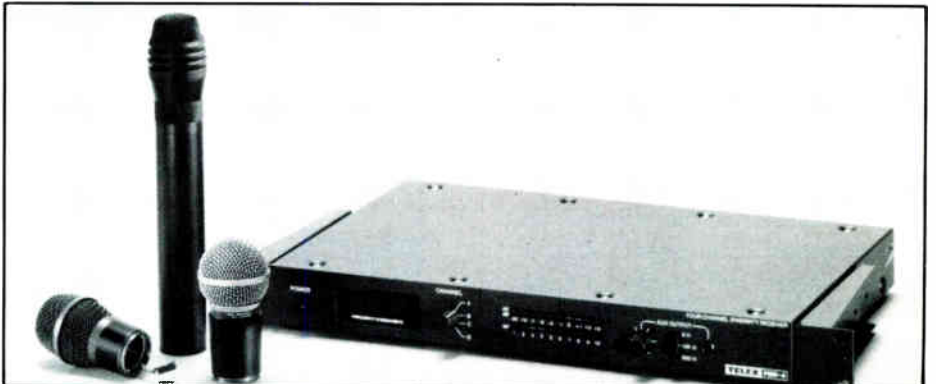
AKG C747 mic.



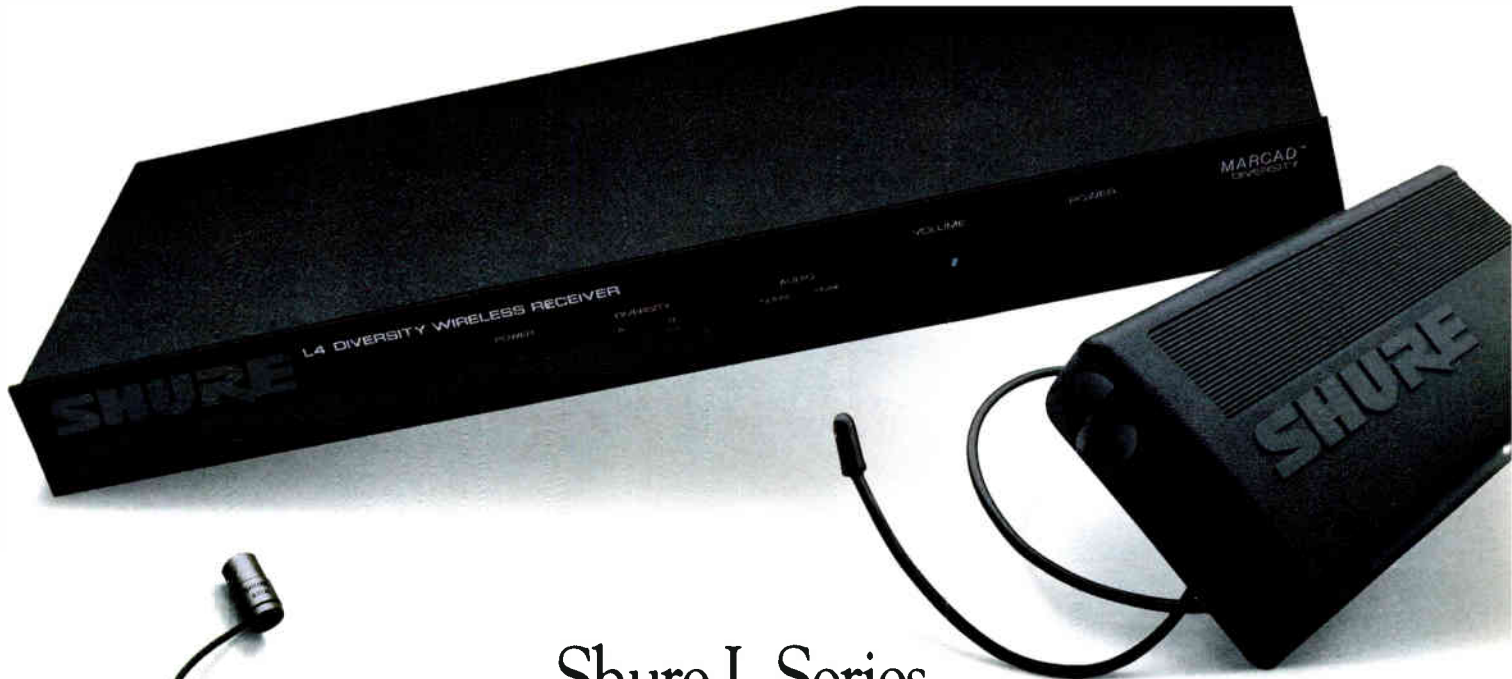
Panasonic mini-cardioid.



Astatic CTM20.



Telex ProStar Two Channel Wireless Mic System.



Shure L Series brings reliability to affordable wireless. Why take chances with anything else?

If you're providing wireless microphone systems to churches, schools, or other value-conscious users, you need reliable equipment you can sell at an affordable price—and make a profit doing it.

That's what the new L Series from Shure is all about. The L Series sets a new standard of value in its price range, offering features, performance and reliability other "economy" systems can't match.

We didn't forget the details.

Designed and built by Shure in the U.S.A., L Series systems include many of the features that set professional-quality wireless systems apart from the "toys." L Series receivers are sturdy, metal-cased, and rack-mountable. Antennas are detachable and may be placed in remote locations, providing excellent performance in situations where many other wireless systems have trouble.

Our L1 Body-Pack Transmitter has features like a separate audio mute switch and a universal 4-pin "Tiny QG" connector that accepts a variety of microphone and musical instrument sources. And L Series

lavalier systems come with the 839W, a reliable Shure condenser microphone designed for clear, natural vocal pickup.

Performance meets economy.

Even though L Series components are economically priced, they incorporate sophisticated RF technology. The L4 Diversity Receiver utilizes "intelligent" MARCAD™ circuitry to monitor signals from its two independent RF sections, blending them in the optimum proportion—not merely switching them. The result is reliable, uninterrupted audio with no clicks, no pops. And all L Series systems feature Shure "Mirror Image" companding, plus high-gain, low-noise MOSFETs, a high-fidelity quadrature detector, and a 3-pole Chebyshev audio low-pass filter. It all adds up to outstanding audio quality with exceptional freedom from noise and distortion.

Why risk callbacks with anything else?

Other systems may not meet expectations. But you can recommend a Shure L Series system with confidence. So why risk callbacks—and your reputation—with anything else?

For more information about the Shure L Series, call Shure Customer Services at (312) 866-2553.

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World Radio History

WHITHER THE NINETIES: THE CONSULTANTS' VIEWPOINT

In our general hopes for profit and prosperity, and greetings of the new decade, we asked some of our consultant-readers to equip us with their insights and their answers to the question: Whither the nineties?

Consultants are a hearty bunch, and they answered, we're pleased to say, with alacrity, with thoughtfulness and with a sense of humor.

Some of them phoned, many of them faxed, and most of them wrote us letters—some quite detailed—of what they see in store for the sound and communications industry as we move toward the next century.

We thought we'd give our respondents an open forum, and print many of their responses verbatim. We're grateful for their input. But first, to summarize: Most consultants, as we would expect, see increasing movement toward computer control, digital processing of all sound signals, and modular equipment. In addition, many of our correspondents saw the advent of digital sound in the home as of prime importance in upgrading commercial installations. The sophisticated consumer expects good sound wherever he goes now.

Multi-media will become increasingly important, but the jury's still out on its importance to the sound industry. "There's no magic to it," said one consultant.

A surprising number of consultants saw importance in the growth of the third world, and in the common market for increased opportunities in the sound and communications industry. And two consultants indicated peace as a prime mover of equipment—because of a decrease in the war budget and a corresponding growth in education and the arts.

Our consultant correspondents were so verbal, we thought we'd let them speak for themselves. Here then is the consultants' view of Whither the Nineties.

William C. Matthews
SOUND SYSTEM SERVICES,
Bellwood, IL

My thoughts for the '90's:

The communications business will continue at about the same rate as it did in the '80's, but "hi-tech" will play a much more important role.

Concepts for board rooms will become so sophisticated that pre-programming (with executive override) using computer technology will mark every sizable system. Finally top management will recognize that full-time employee(s) are necessary to program and operate such systems (rather than a mail clerk).

"Top management will recognize that full-time employee(s) are necessary to program and operate such systems (rather than a mail clerk)."

Contractors must provide a company-wide education in computerization or die.

The one-man operator will continue to thrive, however, and handle small non-sophisticated systems which will prevail in the non-megabuck companies, small churches, etc.

Erich Friend
TECHSPACE, Fort Worth, Texas

How do we see the market of the 90's? Growing. We see our clients needing consulting that encompasses much more than sound and acoustical consulting. Their needs have grown, and will continue to grow, towards more multi-disciplined requirements. People are finally realizing that it takes more than just sound and lights to put on a show; it requires a complex ar-

ray of integrated systems; systems that have been designed into, and as a part of, a complete facility. Video, lighting, A/V, rigging, sound, musical, and acoustical elements have all become computer operable, synchronizable design tools. A technically complex Broadway show like *Starlight Express* is an excellent example of the "electroillu-mechanacoustic" sets and systems that are possible. More communication between SMPTE/USITT/AES/NSCA/NAMM will be required to effectively link up the varying control standards and protocol now in use.

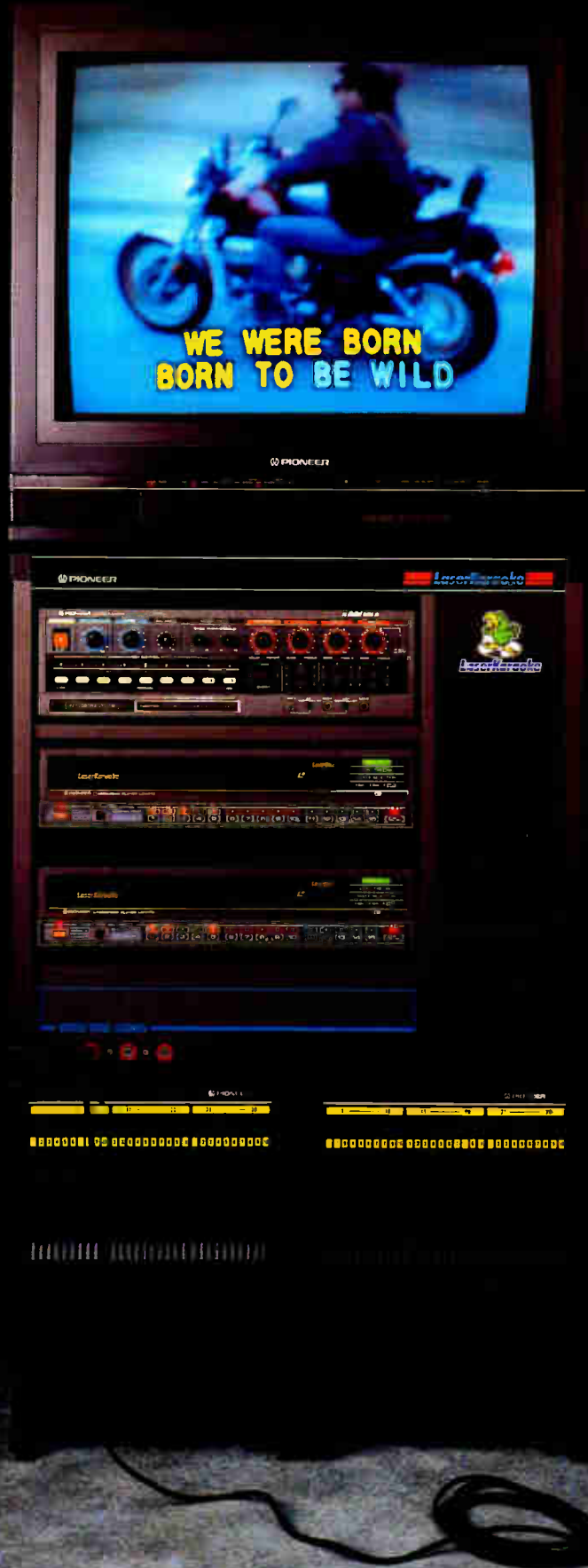
The sound system market will grow for two reasons: more facilities are continuing to be built, and older existing facilities will be upgraded as owners feel pressure from their users for better, more flexible systems.

The system components will change toward more digital signal processing as the technology becomes more affordable. TOA's new digital equalizer/filter/delay unit is just the tip of the iceberg. I think the digital filter technology will eventually allow us to compensate for the gross over all time smear of transducers and electronics. The neutralization of both time and phase related errors will add new levels of clarity and depth to sound reproduction not previously attainable. I would expect an affordable "TEF-like" test system to be available that works within the IBM and/or Macintosh computer environment. This system will eventually be able to download user modified test results to the digital filters directly—Ah, meaningful feedback!, exact compensation for time, phase, and level.

Probably late in the '90's the "wonder box" PA systems originally intended for portable touring use will evolve to the level of engineered systems. After all, it has been the touring industries' demands that have fostered much good product

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CONSULTANTS

engineering. Until then however, unsuspecting owners will continue to have "marginal-at-best" sound systems shoved down their throats by the media and misinformed contractors that don't understand the difference between "ease of installation" and "appropriate technology". Eventually, engineering facts will outshine marketing hype...nah, just a dream....

Jerry Hyman

HYTEC SERVICES, Aurora, Illinois

The retail stores opening in burgeoning population centers of the suburbs are a perfect opportunity for background/paging systems. We must get these into "pro" hands and keep car speakers out of the pizza parlor!

Ron Smith

RS AUDIO-VIDEO, Los Angeles

The 90's = DIGITAL everything! And better products for less money.

Lawrence W. Tedford

CAVANAUGH TOCCI ASSOCIATES, INCORPORATED, Sudbury, MA

One obvious area that we see as an ongoing source of innovation and integration with respect to acoustics is that of

"It is apparent that the computer will continue to progress as a control-oriented component of sound systems."

computerized control. It is apparent that the computer will continue to progress as a control-oriented component of sound systems, and will enjoy even greater use in sound system design. More importantly from our particular perspective, we see the potential for advances in "electronic architecture," where computers will allow real-time control of the acoustical parameters of a listening environment. One example of such an approach is the Decoustics electronic reverberation system, where perception of the acoustical environment is altered electronically.

We foresee continued interest and development in this area, and computerization will be the driving force. More importantly, price will be a less prohibitive factor over time, and will allow computer integration to be a viable alternative.

Another area that will continue to benefit from sound and communications

technologies are educational facilities. We have already seen how communication systems are less a "rudimentary" part of a facility and more a part of the overall educational offering, particularly at the secondary school level. Therefore, the logical progression would be to utilize communication technologies to heighten the



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

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educational experience. We have found increasingly that it is our responsibility to educate those in the teaching profession in order to heighten their perception and awareness about the effective use of the available technology. This has become a substantial part of the services we offer, and others in the profession should continue to recognize the importance of minimizing technological complexities so that the client will understand, and make better use of, such technology.

Laird Pospisil
ISR INC., Naperville, Illinois

I see the communications industry becoming more and more competitive. Unfortunately, this encourages the "low bid" mentality and squashes any chance for innovative quality systems.

As much as individuals may complain

about the quality or functionality of a system, the corporation will seek the low bidder.

Ian R. Wolfe
ACOUSTICAL DESIGN SERVICES, INC.
Mission, Kansas

Computer Control: I foresee a major influx of computers into sound systems. The primary function will be *control* of the audio and not necessarily the passing of audio signals. I have already seen computers used extensively in facilities such as convention centers and stadiums where maximum flexibility is required.

I see numerous items of equipment, from various manufacturers, operating together under the control from one computer system. All of these devices will talk via the same protocol standard.

In addition to the operation of the

system, the computer will also assist in the initial configuration of the system. Part of this will involve adjustment of equalizers, adjustment of audio delays, and adjustment of loudspeaker levels.

"I see a greater need for educational programs in the audio field."

Digital Signals: I see that by the end of this century the audio signal from microphone capsule through to the power amplifier will be completely digital.

Education: I see a greater need for educational programs in the audio field. Technology is rapidly growing, and highly knowledgeable people will be required to design, install, and operate these systems. The above two items attest to that. This is one particular aspect of our industry which is severely lacking and one of the main reasons that sound systems are given little priority by both architects and building owners. I hope that university programs will be available solely for this purpose.

As the current chairman for the Kansas City area chapter of the AES I see that there is a strong desire by the members to learn more. At present there is no easy way. Experience takes a long time (and the clients have to live with the mistakes in the meantime!).

Product: I see the manufacturers creating more product designed for specific applications and less for multipurpose applications. This would be especially true in the loudspeaker area. I hope the marketing people will also indicate for *what* specific purpose the product is intended!

I see "smarter" product becoming more prevalent. Self-diagnostics, LCD readouts assisting the installer/operator, etc.

I see the modular concept becoming commonplace. Possibly equipment from numerous manufacturers will be made to fit into a standard cardframe for total flexibility.

Listeners: I see an increasingly more intelligent listening audience accepting only

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high quality audio. Home entertainment systems and the compact disc have sharpened the listening abilities of the general public. Sound system designers and operators are going to have to be very exacting in their efforts to satisfy the audience. This is another reason for a quality educational program.

CAD: Computer-aided design will be commonplace. Interface with the architects will involve modems and the sending and transmitting of drawings stored on diskettes. CAD is only a tool and we still need *brains* to make it all come together.

Dominique J. Cheenne
C&C CONSULTANTS
Lincoln, Nebraska

I hate to use the crystal ball...but I like

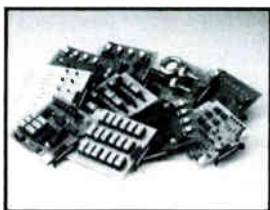
your magazine so much that I am going to take the plunge. "Whither the '90's?", good title; it should be a good decade too. Let's see what the ball has to offer. The picture is a bit blurry, hold on, here we go.

The historic events happening in Europe will of course require large scale international media performances and that should benefit the big sound companies. Demand for western-made entertainment will also result in mega-venues and business for the major companies in the sound industries.

The 1990 audience has better ears and better eyes and wants more quality. This means the demise of the low class movie theater which is unable to meet the requirements imposed by the movie companies for playing their multimillion dollars productions. Batman III actually packs

some 12 Hz frequencies when the new Turbo Batmobile takes off! Wow! Holy subwoofers! For an average \$9.00 per ticket in 1995, the new movie theaters better offer tremendous audio-visual quality! And what about popcorn at \$12.00 a tub?! Of course such movie theaters will need to be properly designed acoustically and the major movie houses will provide such services via "licensed" designers and installers. The small architectural firms will see closed doors when trying to enter this market, unless of course they are willing to have their designs approved by the licensing authorities (5 figure fees required).

The "kinder and gentler" nation is emerging. Less money for bombs does not mean less bang for the buck but increas-



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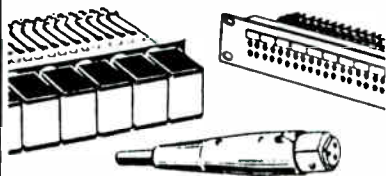
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ed spending for education and the arts. Good news for the sound industry since that translates into increased budgets for auditoriums and performing art centers. Plenty of business available for the acoustical consultants but they will need closer ties with architectural firms; the reason being that the vast majority of the projects will be funded by public money and the bids will be offered only to the major firms who can demonstrate that they can handle such large endeavors.

“Companies have to trim the fat off travel budgets and start to realize that teleconferencing is not that bad of an idea after all.”

The economy does not really grow that fast in the 90's. Companies have to trim the fat off travel budgets and start to realize that teleconferencing is not that bad of an idea after all. Good business opportunities for telephone and security companies.

Increased security in the 90's? Not really. Larger budgets, along with better recruiting, for state law enforcement agencies will take a bigger bite out of crime and lead to decreased demand for security at a consumer level. Corporate security will be reinforced as far as data processing is concerned, and some industries (like aviation and transportation) will offer unprecedented levels of security throughout their operations. Good opportunities here for former defense consultants who will be able to use their expertise, and for defense contractors who will be able to declassify some of their technology for use in the commercial sector.

Mergers and consolidations will increase as small companies find it harder to effectively bid on large projects. The small installation companies will team with the local builders to provide “intelligent” housing with local area networks, some level of security, and audio video rooms (the “rec room” of the 90's). No real big

money here since consumer price awareness will yield to smaller available margins for the suppliers, but a constant need for the services as most of these features will be offered in a modular fashion. With the median new family home costing \$130,000.00 in 1995, the buyers will need a modular approach in order to keep up with the Joneses!

Great news on the equipment front. The 80986 chips offering a true parallel architecture with 64 bits will provide a fantastic platform for new acoustical analyzers. The latest entry by AcoustiVision allows for the design of an acoustical space in 3 D on the computer screen, and then by plugging headphones in the unit, lets one hear the expected sound from anywhere in the space! The unit costs \$24,000.00 and plugs into a standard IBM X3A equipped with a high resolution holographic 3D monitor. At the lower end of the spectrum, the AcmeSound Model I unit offers the basic RT60 and RASTI measurements for \$1195.00 in a hand-held unit powered with a 9 V battery. This is the unit of choice for the basic security installer now dealing with audio video rooms.

“This means the demise of the low class movie theater which is unable to meet the requirements imposed by the movie companies for playing their multimillion dollars productions.”

Wait a minute...the picture is getting fuzzy...some strange stuff is happening...the Dallas Cowboys have won Superbowl XXX and our firm is given the design of the new Gorbachev Center in Washington, D.C.! That's impossible, the Cowboys could never make the play-offs! The picture is gone now (did I mention that it was a digital picture? Like in the new HDTV standard which emerged in 1992?), too bad. This seems like an exciting decade! I can't wait.

CONSULTANTS

David Bellanca
COMMUNICATIONS TASK GROUP
Buffalo, New York

People are spending more. We're doing more turnkey operations with architectural firms and electrical contractors. You can't be an out-of-the box company. You can't design, install the system and then leave.

The advent of better home audio has led to better professional audio. There is more work in FM wireless, in hearing assistance systems, in recording services for churches.

Neil Shaw
PAUL VENEKLASEN ASSOCIATES
Los Angeles, California

There will be a consolidation of markets; increased computerization and increased interfacing of pro sound equipment with a computer and other equipment.

There will be the pressure of M.I. people becoming pro.

Allen H. Shiner
SHINER & ASSOCIATES
Skokie, Illinois

In the 90's the control of sound is mandatory, *i.e.*, the ability to control audibility, privacy and general noise levels.

What has been a luxury in the past is a definite requirement of today. I see acoustics in the 90's market as important a factor in the make-up of our interior environment as is currently lighting, heating, ventilation and air conditioning.

Whether it be in a corporate boardroom, office, institutional facility or residence, the ability to hear, as well as the concern for not being overheard, has become a prerequisite in every building structure.

Angelo J. Campanella
CAMPANELLA ASSOCIATES
Columbus, Ohio

Communications will continue to integrate country and world. Expect third-world growth in all our known technologies.

Business transaction characteristics will never change, but transactions we thought to be remote will now become com-

monplace: *e.g.*, "treat the client in another country as you would a client in the next city"...etc. Watch for 1992 common market opening!

"Mergers and consolidations will increase."

Computers will be as commonplace as TV sets. Information exchange will be by floppy, compact disc (slow), and phone (modem-fast).

Video conferencing will be popular among government and industries where group (and committee) meetings are pandemic.

Paging and L.A.N. - data exchange will grow worldwide.

Plan now to interface with contractors and manufacturers worldwide. They move

slower and more carefully than we Yankees, but are more faithful.

Dollar volume will grow with experience and accomplishments.

Airport security will increase, then mature (standardize).

Noral D. Stewart
STEWART ACOUSTICAL CONSULTANTS
Raleigh, North Carolina

My business is primarily structural acoustics rather than electro-acoustics — trying to provide the best possible environment in which electro-acoustic products can function. I believe and hope the 90's will see architects and builders making better use of acoustical consultants to assure better acoustical environments. Better measurement and prediction techniques will allow us to do a better job. ■

More next month — Editor



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SOUND SYSTEM DESIGN FOR OUTDOOR PERFORMANCE

Designing a high-quality sound reinforcement system for outdoor situations is not without its own inherent set of difficulties. Add to this exacting specification the fact the removeable system will be used specifically for classical performances, and the design parameters become even more critical. What are the best mic'ing and reinforcement techniques to carry the sound of a large symphony orchestra to a wide audience area, while still retaining its delicate sound texture? And would such a system withstand the rigors of being installed prior to and then removed at the end of each performance date? The Pacific Symphony Orchestra's recent 1988 and 1989 summer seasons at the 15,000-seat, open-air Irvine Meadows Amphitheater, located in Costa Mesa, California, involved the design and implementation of a sound-reinforcement system intended specifically for outdoor classical concerts.

The system was installed and operated by audio producer Joseph Magee, president of Joseph Magee Audio Engineering, Culver City, California, and sound reinforcement director David Scheirman, president of Concert Sound Consultants, Julian, California. Sound Image of San Marcos, California, served as primary sound equipment rental subcontractor for the two seasons, and supplied an innovative, modular loudspeaker system, companion signal electronics, interconnect cabling, and four-man crew.

"My intention was to present a symphony orchestra in an outdoor setting for large audiences," Joseph Magee explains, "and have it sound very open and natural. The sound we normally hear in a concert hall results from the orchestra acoustically coupling with the hall's ambient signature.

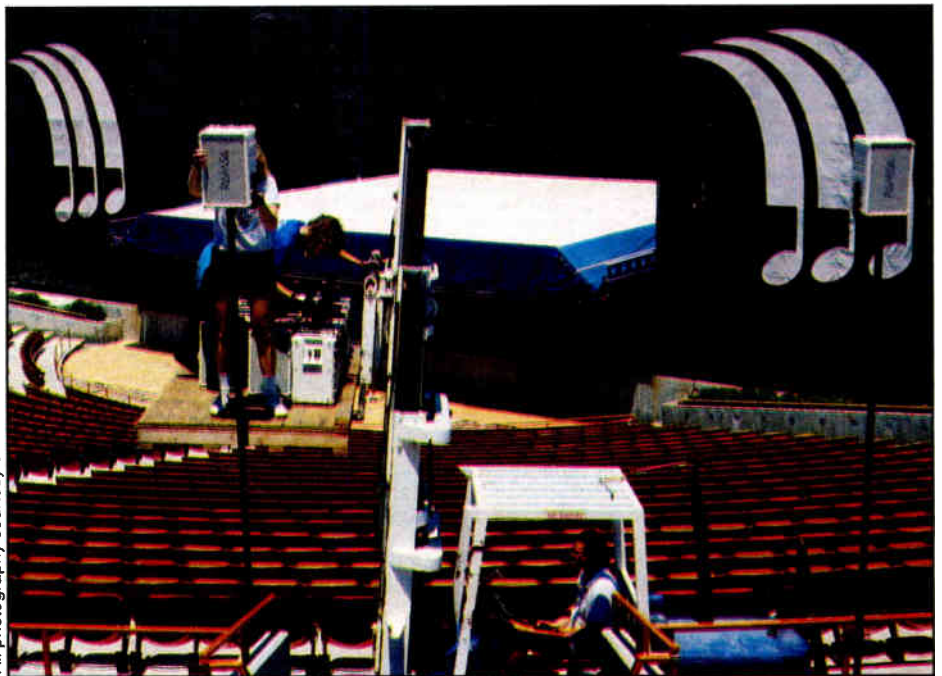
"My design brief for the Pacific Symphony Orchestra's summer seasons at the Irvine Meadows was to simulate this con-

cept in an environment where believable orchestral sound reinforcement had not previously been achieved. I wanted to design a system that would recreate the ambience of a concert hall, without the usual outdoor problems of uneven coverage, feedback, and artificially sounding reinforcement. To achieve this goal, we

would be a problem because Joseph planned to use a minimum number of open microphones on stage to pick up a large ensemble."

A Panasonic/Ramsa WR-S840 console was used during the 1988 Pacific Symphony season to provide the necessary left and right mix outputs; the center speaker

All photography courtesy of David Scheirman/Concert Sound Consultants.



A view of Irvine Meadows Amphitheater

decided to make use of current touring concert sound-system technology so that setups and loadouts could be done as quickly and smoothly as possible. I also specified portable acoustic shell with hinged panels that would contain the on-stage sound."

At the same time, Magee and Scheirman realized that a new approach to speaker system format would be important. "If only large, traditional left and right loudspeaker stacks were used," Scheirman says, "we would have ended up with a poor stereo image throughout much of the soundfield. Also, gain before feedback

array was fed from a combined mono (left plus right) mix output. For the 1989 season, however, Magee selected one of the new WR-C900 Series consoles, which allows for dedicated center-channel assignments and full-function panning from each input channel, in addition to master group faders. The C900 mixer was equipped with 20 mono channels, four stereo input channels, 12 submixes, 16 matrix outputs and master LCR sends.

"Summing mono to the center speaker cluster is the accepted practice," Magee considers, "but with the Ramsa WR-C900 I can specifically pan information to the

Contract Bidding for the Pacific Symphony's 1989 Season at the Irvine Meadows Amphitheater

center array to copy the acoustic image of the stage orchestra.

"The soundstage created by a true left-center-right, panning assignment and speaker arrays resembles the orchestra for all audience perspectives. This, I feel, is one of the secrets to the success of the Pacific Symphony's symphonic presentation at Irvine Meadows Amphitheater."

LEFT-CENTER-RIGHT SYSTEM DESIGN

Magee's left-center-right system was designed to create a soundfield across the entire audience area, and to offer a dramatic sense of both height and depth. The primary reinforcement setup was specified as a direct-radiating system — rather than predominantly horn-loaded — and one that offered excellent sound fidelity. The three main speaker stacks comprised four-way Sound Image Phase-Loc two-box modular



All photography courtesy of David Schierman/Concert Sound Consultants.

A total of 24 Panasonic RAMSA WS-A80 two-way enclosures served as delay speakers, arranged in an arc some 120 feet from the stage and equipped with custom pole mounts.

Following the success of the Pacific Symphony's 1988 Season at the Irvine Meadows Amphitheater, the decision was made to finetune the system, and possibly develop a more consistent and controllable setup. To this end, audio producer Joseph Magee, president of Joseph Magee Audio Engineering, and sound reinforcement director David Scheirman invited proposals and bids from four different firms, to both explore what other types of large-scale sound systems might be available within the Southern California region, and to carry out a price comparison against the supplier of the 1988 system.

All four companies were located within two hour's drive of the Irvine Meadows Amphitheater, Orange County, California. They comprised:

- Maryland Sound which, in late 1988, had just opened a West Coast facility in North Hollywood, California. MSI specified a two-box, three-way, custom-built, direct radiating system, using JBL drivers for the high-end, and a custom crossover located at the console.

- McCune Sound, which operates a regional office in Anaheim, California, specified a two-box, three-way, custom-built system with direct radiating bass, horn-loaded midbass, JBL drivers, no HF tweeters and a custom crossover located at the console.

- Schubert Systems Group, also based in North Hollywood, specified a two-box, four-way, custom-built, direct-radiating system that used JBL HF tweeters and a custom crossover located at the console.

- Sound Image, hardware supplier for the 1988 Summer Season, again specified a two-box, four-way, custom-built system, direct radiating system with Fostex or JBL tweeters and Brooke Siren Systems crossover

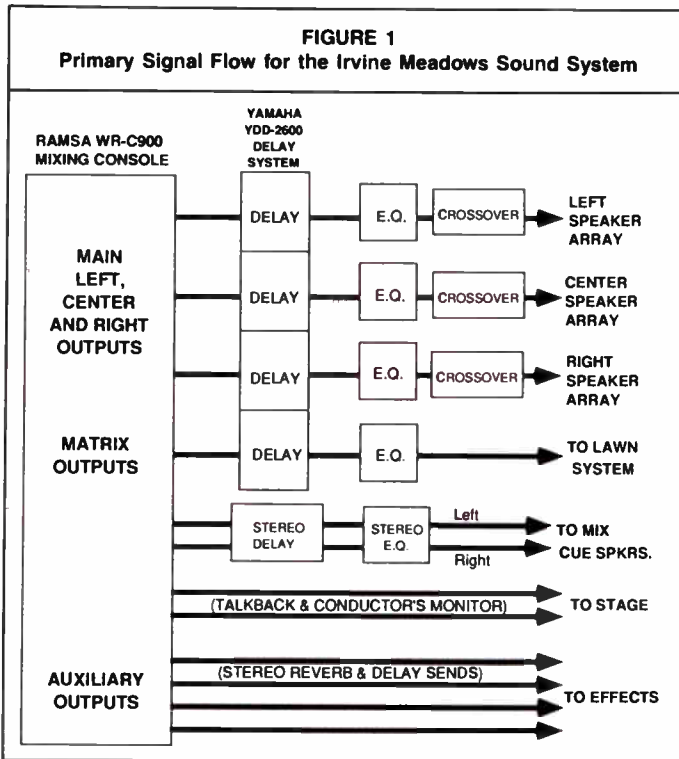
located at the console.

Packaging of the four systems was similar, although both McCune and Schubert Systems use smaller, half-wide boxes than Maryland Sound and Sound Image, and would need to use a pair of the enclosures to equal one of the latter's enclosures. Three of the systems rely on direct radiating 18-inch subwoofers, with MSI specifying 4-by-15 cabinets for low-end on its custom system, and 2-by-18 boxes on the JBL Concert Series system.

All four systems are direct-radiating in the LF band; McCune's system relies on a 2-by-12 deep horn-loaded chamber for the mid-bass band. Three contractors specified the use of crossovers located at the house mix position, while McCune selected units installed in the power-amp racks. Direct access to the crossover controls from the mix position was considered essential, to reduce the need for intercom communications each time a level or frequency setting change became necessary.

In terms of cost bids, the final recommendation, according to sound reinforcement director David Schierman, president of Concert Sound Consultants, was between Schubert Systems Group and Sound Image. "With a year's experience under their belt, and closer proximity to the [Orange County] venue," he says, "I tended to lean in Sound Image's direction. From an equipment standpoint, the systems are very similar for this low-level application. In a direct-radiating design, both offered 18-inch cones, 15-inch cones crossing into 2-inch compression drivers, and high-frequency tweeters.

"My final recommendation was that we continue to work with Sound Image [during the 1989 season] for two reasons: client familiarity, and lower price."



SYSTEM COMPONENTS FOR THE IRVINE MEADOWS AMPHITHEATER

COMPONENT	BRAND AND MODEL
MIXING CONSOLE	<ul style="list-style-type: none"> • Panasonic Ramsa WR-S840 console (1988 season). • Panasonic Ramsa WR-C900 Series consoles with panning and center-channel assignments from each input channel (1989 season).
SPEAKER CABINETS	Four-way Sound Image Phase-Loc two-box modular systems: <ul style="list-style-type: none"> • Lo-Q bass enclosure with four 18-inch loudspeakers. • Hi-Q mid/high cabinet with four 15-inch drivers, a pair of two-inch horn compression drivers, and four HF tweeters.
INNER DELAY RING	Ramsa WS-A80 two-way bass reflex enclosures, on poles with removeable brackets and wiring looms.
POWER AMPLIFIERS	<ul style="list-style-type: none"> • QSC Model 3800 and Model 3350 units, providing a total of 36 kW for the main system. • Ramsa WP-9220 units for the delay system, via a Klark-Teknik graphic equalizer.
DELAY SYSTEM	Yamaha Model YDD-2600 units to provide individual delay and level settings for the main left-center-right speaker arrays, plus the inner and outer delay rings.
EFFECTS PROCESSING	<ul style="list-style-type: none"> • Ramsa Model 9375 digital delay. • Lexicon Model 480 stereo digital reverb.
STAGE MIKING	<ul style="list-style-type: none"> • Matched pair of Sennheiser cardioid MKH-40's above the stage center as an ORTF pair with capsules spaced 12 inches apart. • Matched pair of Sennheiser cardioid MKH-40's around six feet behind the podium. • Pair of Sennheiser omnidirectional MKH-20's as the outer pair, spaced 20 feet apart. • Matched pair of Schoeps cardioid MK47's, suspended 10 feet above the stage as extra "spot" mics. • Coles stereo ribbon Model 4038's for solo vocals. • Three Sennheiser omnidirectional MKH-20's for larger choral groups. • Boulder Twin-servo pre-amplifiers. • Monster Cable M-1000 interconnect cable between stage microphones and pre-amps. • Pro-Link Series 1 cables between the pre-amps and house mixing console.

systems, whose identically sized modular trapezoidal enclosures ensure wide coverage angles with minimum horizontal spacing. Four 18-inch loudspeakers are housed within the Lo-Q bass enclosure, while the separate Hi-Q mid/high cabinet features a quartet of 15-inch drivers, a pair of two-inch horn compression drivers, and four high-frequency compression tweeters.

A total of eight bass enclosures and 11 low/mid/high enclosures were used for the Pacific Symphony Orchestra's summer season. Each vertical left/right array included three levels of cabinets, with the lower level containing two Lo-Q bass and two Hi-Q mid/high enclosures (a pair per side); the mid level; two more Lo-Q and Hi-Q enclosures; and the top level; a pair of Lo-Q and Hi-Q cabinets per side. The

central overhead array of three Hi-Q mid/high enclosures was hung at a higher level than the left and right stacks.

A separate equalizer, crossover and delay was specified for each of the three left-center-right loudspeakers stacks. QSC model 3800 and model 3350 power amps provide a total of just over 36 kW for the main system. Each amplifier was run at approximately 25 percent of maximum to prevent speaker damage (in the event of an accidental feedback from the on-stage mic setup), and also to provide optimal headroom and signal-to-noise performance from the system.

INNER DELAY SYSTEM

To supplement the main LCR arrays, and to help reduce the burden on the

stage-area speakers to cover the entire audience area, an inner delay system was designed. Located in a ring some 120 feet from the stage, a total of 24 Ramsa WS-A80 two-way cabinets were specified for this second system, each bass reflex enclosure having a quoted 65 Hz to 20 kHz frequency response and a 160 W continuous power rating. "The WS-A80's 11-by-17-inch dimensions, and weight of just 16.5 pounds," Schierman considers, "made them an ideal component for a supplemental delay system." Custom-designed 10-foot poles, removeable brackets and wiring looms enabled each loudspeaker to be installed quickly and adjusted for both the horizontal and vertical orientation.

(continued on page 44)

BOARDROOMS: ENHANCING THE CORPORATE IMAGE

ONE COMPANY'S EXPERIENCE

BY BARRY KATZ

The boardroom represents the zenith of the corporation's power and purpose. That involves integrating interior designs that reflect the corporate culture, in a showcase environment. Boardroom presentations can be as fancy as you or the client can imagine, with custom remote controls and computer controlled operation of the whole array of presentation products including speech reinforcement, video and data monitors or projectors, multi-image slide systems, white boards, audio teleconferencing, video teleconferencing, etc. We at TSI find that usually, executives prefer a boardroom that is well equipped and well appointed.

But audiovisual and sound systems for boardrooms can of course range from the very simple to the elaborate. Simple systems might include a mobile cart containing a monitor and video cassette recorder, and maybe a screen for slides and overheads. Mobile systems can be put away when not in use, which is a good thing if the cart is unsightly and a tangle of wires is showing.

One of the more elaborate speech reinforcement systems TSI has engineered and installed is in the Philip Morris boardroom on Park Avenue in New York City which uses differential amplification. Each seating position has a microphone and speaker built right into the table. The table is electronically divided into five zones. Using mix-minus-one matrices and careful equalization, the conversation is made to

sound as natural as two people talking in normal discussion. The boardroom also contains rear screen projection of multi-image slides and video, and remote control of lighting, window shades, and drapes.



Philip Morris Boardroom.

At American Express' offices, in Manhattan's World Financial Center, is another impressive boardroom. The systems contains side by side video projection for multi-standard 1/2-inch and 3/4-inch video tapes and computer data and graphics, multi image slide projection and VideoShow. (VideoShow is a computer generated image presentation system designed to work with IBM PC or compatible.) The system also contains a tabletop speech reinforcement system for over 50 people and an overflow speech system for an adjoining room.

Coordinating installation of the electronics with the general contractor, electrical contractor, and the building trades was a major concern. American Express needed its multi-room system operational in the shortest possible time. By using Auto-CAD to render the equipment

layout, cable runs, and reflected ceiling plans, the contractors were able to meet the deadline.

American Express' media oriented training and communications has spawned smaller video systems throughout the company. Media has become so crucial to their operations, that TSI now provides them with a full time maintenance technician on their premises.

Ernst & Young's (formerly Ernst & Whinney) New York City headquarters has a speech reinforcement/teleconferencing system in the boardroom. The system features tabletop microphones and ceiling speakers. In designing the installation, esthetic considerations were crucial. System users wanted the ability to easily remove the microphones from the boardroom table (a 32-foot x 12-foot table con-



Boardroom — Union Trust, Baltimore.

structed of solid cherry veneer). Corresponding jacks were installed in the table at each microphone location. When the microphones are not plugged into their jacks, attractive brass inserts are placed over the jacks.

Barry Katz is TSI's Marketing Director. TSI (Tamco Systems, Inc.), located in Mineola, New York, is a designer and builder of corporate audiovisual systems.

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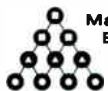
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BOARDROOMS

Control systems are an important part of any boardroom audiovisual system. TSI's audiovisual control system, the Syscon 200, offers plug-in cards that can generate whatever control signals are required, such as relays, logic pulses, or voltage ramps, complete with indicator lamp following. Each system is equipped with a custom designed operator's panel with hinged front for easy access to cards. The system can accommodate up to 75 functions per unit and three remote operator panels with up to 48 switches per panel. Syscon 200 units can be grouped together for even more functions.

Control systems can be mounted in a lectern, a mobile console, a pull-out drawer in the conference table, or on the wall either in the AV booth or in the boardroom itself. Finishes for the panels can be matched to any finish specified by the architect/interior designer or the client. These finishes can be bronze, anodized aluminum, blackcore, whitecore or even 24 carat gold!

**"Media oriented training
has spawned smaller
systems throughout the
company."**

In addition to controlling audiovisual functions, Syscon 200s have been used to control lighting, allowing a variety of lighting presets for different applications. One bank in Baltimore has a button that the chairman presses about ten minutes before the end of the meeting that starts a coffee pot at the back of the room... Smaller versions of the control system can be incorporated into a wireless controller. These functions usually are play and stop for the video tape and audio tape machines, forward and reverse for the slide projectors and source selection. Using a wireless controller enables the presenter to move around the boardroom to make more effective presentations. For this reason a wireless microphone is also used.

In the design of an audiovisual system for a boardroom one of the most impor-



Philip Morris Equipment Room.

tant things to take into account is esthetics and the general look and feel of the room. This frequently is accomplished by having doors to match the walls that close over any exposed equipment or screen surfaces. In addition, it is desirable and more attractive for the microphones to be removed from the table. We have solved this problem through a modification of the Shure AMS22 low profile microphones. After removing each microphone's cable, TSI installed two 3-circuit 1/4-inch phone plugs in each unit. One plug carried the audio. The second plug ensured proper positioning of the microphone. Using only one plug would have allowed the microphone to rotate moving doors to match the walls that close over any exposed equipment or screen surfaces. Speakers can be hidden behind acoustically transparent fabric panels. TSI uses a TEF (Time Energy Frequency) computer to test the fabric's acoustic transparency.

The boardroom is a company's nerve center, where its most important meetings and presentations are held. The proper use of audiovisual and sound systems makes meetings efficient and presentations effective. ■

TRENDS IN CCTV

BY RICHARD J. GRULA

As with most electronics-based industries, CCTV is going through a period of rapid technological growth. Yesterday's innovations are today's standards and tomorrow's antiques. Even if it is an old cliché, the only thing certain in the CCTV security and surveillance markets is change. *Sound & Communications* recently surveyed representatives of leading CCTV manufacturers, inquiring where the industry is right now, where it might move in the future and why.

Nearly all agreed on CCTV's sales figures — they're on the upswing. Estimates for yearly sales increases range from five to 30 percent, with every size installation market expanding, from two-camera systems in C-Stores to 500-camera casino systems. Julian Fino, sales manager, Electro-Mechanical Imagineering (EMI) best summed up this optimistic feeling on growth saying, "It's going to continue...possibly even grow more."

Much of the growth is credited to the impact of smaller, ever-less expensive and more reliable chip cameras, which have virtually replaced tube cameras. They are no longer seen as an alternative, but as the only choice in most every situation.

"It's only a matter of time before tube cameras are eliminated completely," predicts Irv Rossman, chairman and CEO, Crest Electronics.

Aaron Chesler, national sales and marketing manager, Ikegami says that time has already come. "As of 1989, we've virtually sold off all our tube inventory," he says. "With 1990, we're all solid state."

Manufacturers agree chip camera sensors will continue their march to miniaturization — from 2/3-inch to the now common 1/2-inch to the recently introduced 1/3-inch. But on the subject of color, opinions vary.

"We're going to see a lot of growth in the color camera," claims John Schulte, vp marketing and sales Javelin Electronics,



Javelin Electronics Omni 2000 Security Management System.

who pins his prediction on the need for better documentation in airports, museums, government buildings and surveillance applications in retail stores. "In the final analysis, you're trying to get your man. Color adds a whole new dimension of identification — instead of the suspect having a grey jacket, you'll find the jacket is actually tan."

Other manufacturers aren't so certain. "We see a very small, increasing demand," says Kim Mizumo, administrative manager, Koyo International Inc. "People would like to have color, but there are difficulties. Number one is light conditions — a color camera requires high quality lighting."

"Color cameras are a lot more expensive than black and white," adds Chesler, "and color monitors are way higher. The color market's growing, but not as fast as everyone expected. Japanese manufacturers pumped through a lot of color products because they assumed the US market would go color just as in Japan. But they were wrong. Color will creep in when it gets equal in quality with black and white

products."

The advancement of the camera's chip technology may yield another interesting benefit. Aaron Chesler believes as chips become more affordable, manufacturers will eliminate their extensive camera lines and opt for a few, low cost cameras with many features.

"I don't see a lot of specialized inventory in the future," Chesler says. "Why bother to exclude features from cameras just to have separate model numbers? Every major manufacturer may wind up with only two or three models in their lines, rather than the 10 or 15 they have now."

Use of audio in CCTV is another point of contention. While many manufacturers say audio is not needed in the applications they deal with, others claim there are few applications that won't make use of audio in the future — especially since CCTV now often means more than a simple camera and monitor set-ups.

"Sound is becoming a bigger part of CCTV because it's being blended into CCTV systems," explains Schulte. "We're

Genlock Input.
Separate BNC connector allows external synchronization of camera to composite video or composite sync.

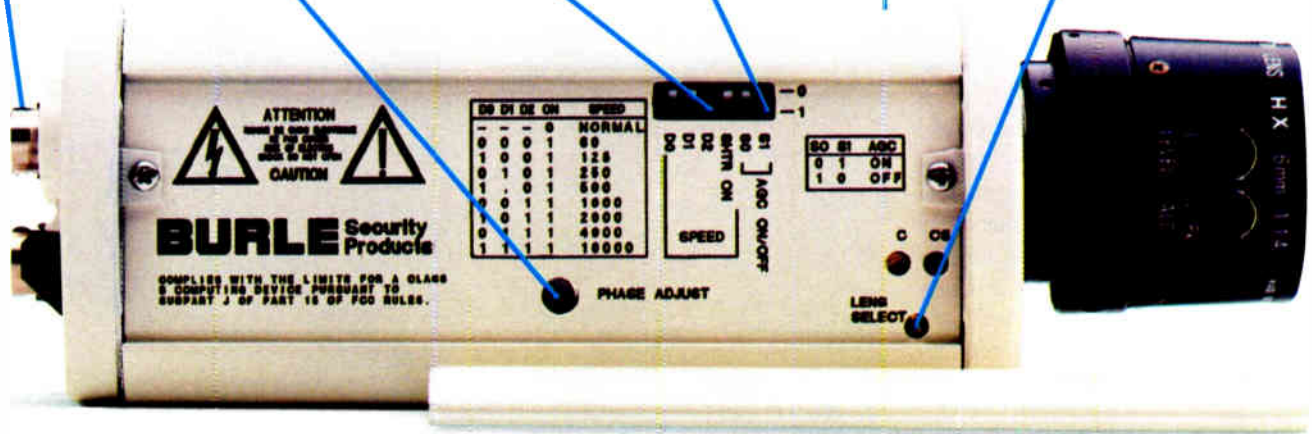
Phase Adjustable Line Lock.
Compensates for power line phase differentials to permit easy synchronization of multi-camera systems for roll free video switching.

Shutter Speed Enabler.
Easily accessible switches permit selection of 8 shutter speeds for "photo-finish" clarity of fast-moving objects.

Automatic Gain Defeat.
On/Off Switch enables camera AGC to maximize video gain when viewing low light level scenes.

Automatic Gain Control (AGC).
Built-in 20dB amplifier produces usable video down to .2 lux scene illumination. No other 1/2" CCD offers greater sensitivity or better picture quality.

Lens Mount Selection.
Flip a switch to easily adapt the camera to use either the new CS lens technology or a wide range of industry standard C-mount lenses.



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BURLE presents the best all-around camera in its class. The new TC650 series. The new design blends well into all environments. The TC650's compact size and rugged build are evident at a glance. Engineered specifically for compatibility with multi-camera systems, the TC650 offers unsurpassed ease of installation, flexibility in operation and dependable service. For instance, our camera's

Solid State Imager uses the latest CCD chip technology which virtually eliminates transfer smear, image lag and retention. We incorporated advanced 4-layer printed circuit board technology to pack more features into a smaller, more powerful unit. The TC650 camera is designed and manufactured in Lancaster, PA, comes in universal power supply options, and meets the standards set by UL, CSA,

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Circle 206 on Reader Response Card

making moves in the direction of integrating our products with our sister company, Atlas/Soundolier, addressing issues like switching sound with video, tying intercoms into video systems and using audio alarms.”

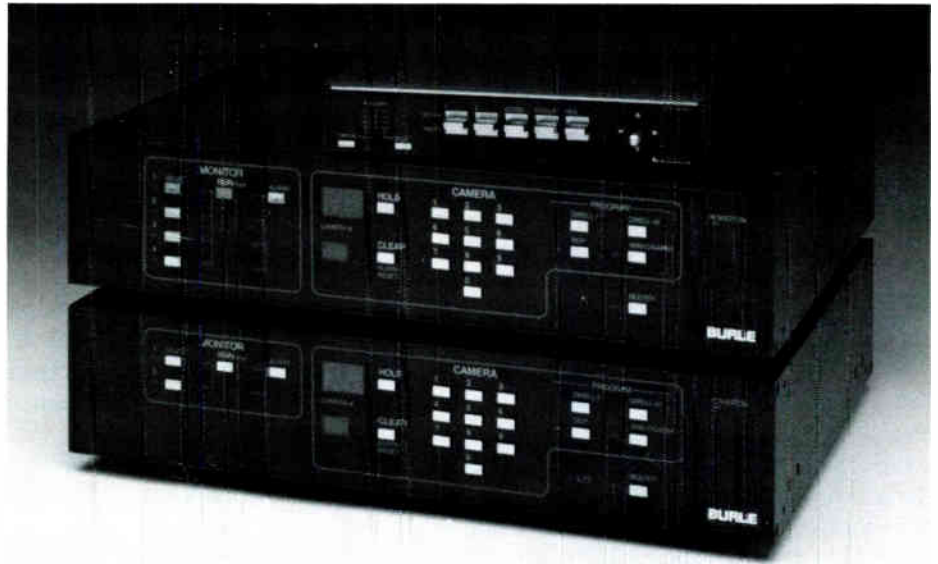
“Elbex has always believed in sound,” concurs Chris Locascio, East Coast sales manager, Elbex America. “We believe it’s a very important part of an installation, so every camera we manufacture is available with the option of sound.”

“Sound is coming, but very slowly,” cautions Chesler. “It’s a nice selling tool and eventually, when the technology gets better with lower cost, it’ll probably be accepted more.”

“For most industrial applications, like C-stores, audio is not too important a point,” says Rossman. “It’s not required — people just want a picture of the transaction.”

Expected advances in audio are logical — smaller and better mics, often mounted directly onto cameras, the ability to send audio signal through the same co-ax or fiber-optic cable as video and switchers with built-in amplifiers and audio switching abilities.

Since CCTV is increasingly featured as an integral part of new buildings, the preferences and desires of builders and architects are taking on new importance. Unlike engineers, who wax poetic on a camera’s specs, architects care more



Burle Industries Controller/Follower.

about appearances. The result is a new concern for esthetic qualities, even in retail situations where the presence of the camera serves as a deterrent. Smaller, less bulky chip cameras are only part of the answer.

“People want cameras to be housed inside some type of enclosure that not so much hides the camera, but makes the cameras fit the esthetics of the environment,” says Schulte. “Even in retrofits, people are more concerned with not just having some camera hang off the wall. Thus the move to cameras being placed inside track light housings and domes and

things that look like smoke alarms.”

As for the deterrence factor, Chris Locascio adds bluntly, “We don’t believe a camera has to be ugly to achieve the results of being a deterrent.”

Another advantage of better looking CCTV is its increased value as a sales tool. “To sell a house today you need a gimmick,” explains Jim Morrison, vp/national sales manager, Aiphone Communications Systems, “anything to get a potential buyer attracted to a particular house. Interior designers figure anything that looks like a camera or an intercom does not enhance the appearance of their work, but builders are interested if it helps them sell a house. Remember, once, if you wanted a microwave, you bought it and put it in your kitchen. Now you can’t buy a house without a microwave. That’s where the trend is for intercom and security systems.”

The desire for clean-looking systems is also affecting cables and how they’re installed. “The big thing now is making cables disappear,” says Alan Jorn, western regional sales manager of Pelco. “In the past, pan, tilt, zoom systems were all pretty much hard-wired. Now a lot of systems are being incorporated over the co-ax. You control pan, tilt, zoom and accessory func-

(continued on page 44)



Panasonic WV-BL600.

CHOOSING THE SURVEILLANCE LENS

BY KEITH W. BOSE

The CCTV security camera may be ordered with or without a lens. The CCTV installer, therefore, has the unique challenge of having to choose a lens that adequately encompasses the surveillance scene and ensures the security function. A good video security system will require a plan which includes a survey to determine lens requirements. There are many criteria for locating the camera and establishing the field of view. A security camera in some cases must be capable of recognizing human features at a distance and over a wide range of lighting conditions. In other cases it may only be required to detect movement or observe an object. At some point the installer must choose between a fixed focus or zoom lens, the focal length, lens f-stop and means of iris control. The following is a summary of factors which govern lens selection.

The performance of a video surveillance system depends not so much on the relative optical quality of the lens as the ability of the lens to cover the scene under all conditions and produce an image on the monitor which meets surveillance needs. The inherent resolution of a video camera is much less than that of a photographic camera. Although the same lens may work for both, the lens of a video security camera is required to function continuously in various environments and is less protected throughout its lifetime than the photographic lens.

Although several optical aberrations are considered in a lens with photographic applications, the only aberration with appreciable effect in video security applications is distortion. Distortion is nonlinearity of the image. "Barrel" distortion is false enlargement of the image toward the center. "Pincushion" distortion is the op-

posite. Wide angle lenses exhibit barrel distortion. Such distortion may sometimes be neglected in a given installation in favor of more important surveillance requirements.

The video lens uses the same physical standard as a photographic lens. The rear of the lens is one inch diameter with 32 threads per inch. It screws into the standard camera "C mount" with the banking shoulder of the mounting thread and the image plane .690 inch apart. This standard assures that the image will be in focus on the image plane whether it is the image face of a vidicon or a photographic film

"The performance depends on the ability to cover the scene under all conditions."

In the past, most lenses used in video surveillance were simply conventional photographic camera lenses. In recent years specialized surveillance lenses have become available on the open market. It seems likely that they were once only covertly available to law enforcement and intelligence agencies. One such lens is the "pinhole" lens. The pinhole lens is used with a concealed camera. The forward viewing port of the lens may be as small as .1 inch, thus making it possible to conceal the lens in a wall or object. The camera remains hidden and the small lens port is barely noticeable. The effective aperture of the pinhole lens may range from $f/3.5$ to $f/16$. Pinhole lenses adapt to the standard C mount. The forward portion of the lens ends in a cone with the small viewing port at its apex.

The right angle lens has also been developed for surveillance. Focal lengths

are kept short and the camera is at right angles to the viewing direction. Both pinhole and conventional compound lenses are available with right angles. The right angle lens can be an advantage in cases where the surveillance scene must be panned from a vertical mounting.

The f-stop (aperture) is an important lens characteristic. The lower the f-stop, the less light required to view a scene. At lower f-stops, objects remain in focus at only one distance from the camera. The range of distance at which objects remain in tolerable focus is the depth of field. The lower the f-stop, the narrower the depth of field. If a camera pickup tube operates at low light levels, higher f-stops are permissible, hence, wider depth of field is obtained.

Where the light level varies over a wide range the best solution is a sensitive camera with a low f-stop setting. A sensitive camera cannot operate at the higher light levels, however. The lens may, therefore, be provided with an automatic iris that adapts to change the f-stop to suit ambient light. Even this may not work at all ranges from daylight to dark, however. One solution is to automatically place an attenuating filter across the lens at high light levels, thus giving two levels over which to adjust the iris. The next step is to employ a spot filter. This is an actual spot in the exact center of one lens component with carefully designed optical characteristics. The small spot is most dense in the center and grows less dense toward the outer portion. With the lens wide open the presence of the spot is practically insignificant. As the iris closes on the spot, however, attenuation increases. The iris is electronically controlled by sampling the overall light level as revealed by the camera signal.

The focal length of a lens determines the field of view. The viewing area decreases as the focal length increases, but the image is magnified with increasing focal length. Focal length is measured in millimeters. Lenses are often classified by focal length characteristics as follows: long focal length, telephoto; short focal length, wide angle; variable focal length, "zoom."

The zoom lens is a cleverly designed assembly of lens elements that can be moved to change the focal length from wide angle to telephoto while the image remains in focus. A zoom lens is rated by its focal length range. A lens with adjustable focal length from 100 mm to 20mm would be a 5x zoom. A lens with focal length range from 150mm to 15mm would be 10x zoom, and so on. Zoom lenses are more expensive. The lower the f-stop and greater the focal length range, the greater

the cost. Although a zoom lens is designed so that the image remains in focus as the focal length changes, a separate focus adjustment is provided to allow for tolerance.

In a security system the camera is at a remote location and the lens must be con-

"Now the video-optical system of the camcorder has excellent potential."

trolled in zoom or in some cases the iris can be manually controlled. A lens equipped for remote control uses miniature dc motors which are turned on and off and reversed from the control point. A standard photographic lens is used and the motor assembly added. Optical

specifications of the lens are the same as those for photographic purposes.

The foregoing briefly summarizes the conventional factors in choosing a lens for video security. The video security industry grew as a result of the wide availability of the CCTV camera and the adoption of mass-produced camera lenses intended for consumer use. With few exceptions, there has been little basic development of video components specific to video security. Now the video-optical system of the camcorder, which has become a popular consumer product, has excellent potential for video security applications. It can be expected that the widely available components and technology of the camcorder will soon be widely applied for specialized security use. This will suggest a new look at the video security field. ■



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INSTALLATION PROFILE

(continued from page 36)

Connected in six groups of four, the inner delay speakers were powered by three Ramsa WP-9220 stereo amps situated at the mixing position, to enable individually controlled level control. Overall equalization for the delay system was provided via a dedicated Klark-Teknik third-octave graphic EQ unit.

To provide additional coverage to audience members on a distant grass slope, Irvine Meadows has installed a permanent delay system that hangs from lighting towers. A separate delay unit and system equalization was necessary to provide coverage to this seating area.

"Ideally, our original design would have offered an additional delay ring located another 100 feet back [from the inner ring]," Scheirman recalls, "with nearly twice the density of speaker units. This configuration would have offered consistency, helped preserve the soundfield's integrity, and given us complete control over the entire audience area from the mix position. To stay within the available budget, however, we ended up deleting that last delay ring and relied on the installed tower speaker system for each performance."

"Yamaha model YDD-2600 delay units were specified to allow adjustment of individual delay and level settings for the main left-center-right speaker arrays, plus the inner and outer delay rings. A full-function remote control unit was connected from the delay rack to the mixer's position.

At the sound mixing position, a Ramsa model 9375 digital delay and Lexicon model 480 stereo digital reverb were available to provide additional ambience, in an attempt to duplicate the sound of a concert hall. Magee specified one of the model 480's various Concert Hall programs with an RT60 of around three seconds, and boosted the high frequencies while rolling off the low-mid bands. Suspended in front of the mixer, a pair of Ramsa model WS-A80 speakers were used for close-field monitoring and for cueing.

MICROPHONE COMPONENTS

Veteran audio producer Joseph Magee, who has handled literally dozens of live classical recordings and radio broadcasts for KUSC-FM, Los Angeles, and the American Public Radio Network, also selected the on-stage microphones, and techniques to be used during the Pacific

Symphony's summer recitals. Magee specified his familiar primary and secondary stereo microphone arrays, using matched pairs of cardioid Sennheiser MKH-40's above the stage center, and omnidirectional Sennheiser MKH-20's as the outer pair spaced 20 feet apart.

Magee says that he sets up two of the inner Sennheiser MKH-40's as an ORTF pair, with their capsules spaced 12 inches apart, while the other MKH-40's are located upstage, some six feet behind the podium.

Monster Cable M-1000 connects the microphones to Boulder Twin-servo pre-amps located on the stage area. Line-level outputs from the pre-amps are run via Monster Cable Pro-Link Series 1 cables to the main Ramsa WR-S840 (1988 season) and WR-C900 (1989) house mixing console, located 120 feet from the stage.

Magee specified a matched pair of Schoeps MK47 cardioid models, suspended some 10 feet above the stage, for use as extra "spot" mics as necessary on timpani, harp, piano, etc. Coles model 4038 stereo ribbon mics were specified to cover solo vocals, while three Sennheiser MKH-20 spaced omnidirectional mics were available for larger choral groups. Special discs made from foam rubber were used on the rear of most microphones to reduce wind noise, and to also cut back on the microphone's off-axis high-frequency response.

Aside from one extra setup day prior to the season's first performance, the entire sound reinforcement system was installed, used and removed on the day of show. "Fine adjustments of the crossover band-pass alignment, amplifier channel balancing, delay speaker zone synchronization and such, had to be done prior to the afternoon rehearsal," Scheirman recalls. "Fine-tuning such a complex system 'on the fly' with limited time is not the most advantageous way to do it, but having the right parts and right crew available gave us an extra edge." ■

CCTV

(continued from page 41)

tions from the same wire as the video. The cable may go from the enclosure down through the pan and tilt, through the mount and into the wall so you never see it."

Others are finding the future in older-style cables. "We no longer use co-ax cables," says Morrison. "Our TV system

can use ordinary lamp cord or 20 or 22 gauge zip-cord. That makes it easier to wire, easier to put together and lower priced."

Several manufacturers agree the future of cable lies in fiber-optics—especially the newest generation of fibers made of plastic. Alan Jorn explains, "Because of its advantages, like the better picture and longer distance it can be run, fiber-optic cable at some point in the future will come close to eliminating co-ax. It's definitely the preferred way to go if it can be made cost-effective. We'll see it happen in this decade, but I don't know when."

According to some observers, all too often resistance to fiber-optics is coming from the very people who will eventually use it—dealers and installers. As Dr. Jerry Jacobson, director of marketing program for Vicon Industries says, the reason is the all-too-well known education curve.

"A certain number of people in CCTV," suggests Jacobson, "came into it from let's say the alarm industry, which doesn't have the same sophisticated electronics requirements. The idea of transmitting anything with light pulses over a piece of glass is an even newer generation of technology. Terminating the ends of fiber-optic cable with connectors and splicing different pieces together requires significant expertise. You can't take a guy who's used to connecting doorbells and have him handle fiber optics. A person is faced with learning about a new technology before he can use it."

Another boom in CCTV is the expanding use of time lapse and conventional VCRs in almost every application relating to security or surveillance. "Naturally it's going to be very prevalent in retail," predicts Jorn. "Even in the Mom and Pops or fast food stores. They're trying to find one machine that's going to allow them to record certain time periods over a week, as opposed to having change tape on a regular basis. And a lot of people are incorporating VCR's in alarm systems, so they're only recording when there's activity to trigger it."

VCR quality is improving to match the higher resolution of new cameras, but how to get that quality is a point in question. "The move right now has pretty much already taken place to four-head machines to improve recording, playback and still quality," says Schulte.

"To a certain extent, four-head versus
(continued on page 49)

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AcoustaCADD

Part 2

BY MIKE KLASCO

Last month we examined the project management room modeling and acoustical analysis modules of AcoustaCADD. This month and next, we will explore the sound system engineering module which is comprised of selecting/aiming the speakers and the performance simulations. The program offers the most sophisticated 3-D room modeling techniques and the highest resolution color graphics available of the IBM compatible MS/DOS sound system design programs. Since the program does not support monochrome graphics, users of laptop portables will need a screen utility program that emulates EGA or VGA. While a few laptops offer VGA grey scale displays, the highlighting scheme used in AcoustaCADD will make the selected menu item disappear into the background (although this isn't a real problem after you become familiar with the menus). Another solution is NEC's color VGA laptop, if you can afford the \$9000 price. I found some of the user interface menus a bit awkward at first but you become familiar with the program quickly and painlessly. Generally the user does not have to refer back to the manual, as the screen contains most of the relevant instructions. The manual is comprehensible and comprehensive although many chapters are still being prepared. As of mid January the manual is completely devoid of any graphics, diagrams or screen images.

PROGRAM FLOW FOR DESIGNING THE SOUND SYSTEM

The first step is to orient the 3-D wireframe model. If the room has decent acoustics you may have only created a floor plan rather than a full 3-D model. The special function keys are used with the cursors to select the location of the room

model within the screen window, the viewing angle and the magnification (zoom) factor. Speakers are selected and aimed using isobeams.

The design then proceeds to the performance simulations. Sound pressure level distribution (uniformity) is shown on

SELECTING/AIMING SPEAKERS AND EVALUATING THE PERFORMANCE

Once you have defined the acoustic environment you can select a speaker and proceed to test it in the room model you have created. Defining the acoustic en-

The screenshot displays a wireframe model of a room with a speaker's isobeam overlaid. The interface includes the following text:

```

Cluster: MAIN Device: HF-1
Speaker: ALTEC MHI1564 + 299-8A/-16A
Freq: 2000 Contour: -3 dB
Loc: X = -5.0 Aim: EL = -6.0
      Y = +0.0      AZ = +104.0
      Z = +45.0     ROT = +0.0
Beam Center:
SPL = 82.3 dB (Re: 1M/1M)
Distance = 120.3 ft.
Path time = 107.8 millise.
Edge Points:
-7.7 dB re: center
-4.2 dB re: center
-0.3 dB re: center
-2.9 dB re: center
  
```

Clipping: OFF

Boundary Surface No. 2

Press <ESC> to Abandon and Exit to Menu.

F1 = ACCEPT & SAVE DATA	F4 = Change Aim	F7 = Change Surface
F2 = Change Device	F5 = Change Location	F8 = Toggle Clipping
F3 = Change Isobeam	F6 = Change View	F9 = Change Ear Height

Working screen of the Loudspeaker Selection and Aiming Module. The Isobeam outline of the current working loudspeaker is shown.

color sound intensity maps of the direct sound and optionally the contribution of the reverberant field. By viewing the uniformity of coverage, the aiming, location, quantity of speakers, selection of components, etc. can be optimized.

At the point where the sound level pressure maps look reasonable, you continue on to the intelligibility predictions. These are shown at user selected points.

environment entails entering the architectural geometry of the room (for just the floor plan), entering the absorption coefficients or reverb time and possibly studying the effect of echoes in the room.

Selection of speakers and testing the results are two separate functions, although it is an interactive process as the design is optimized.

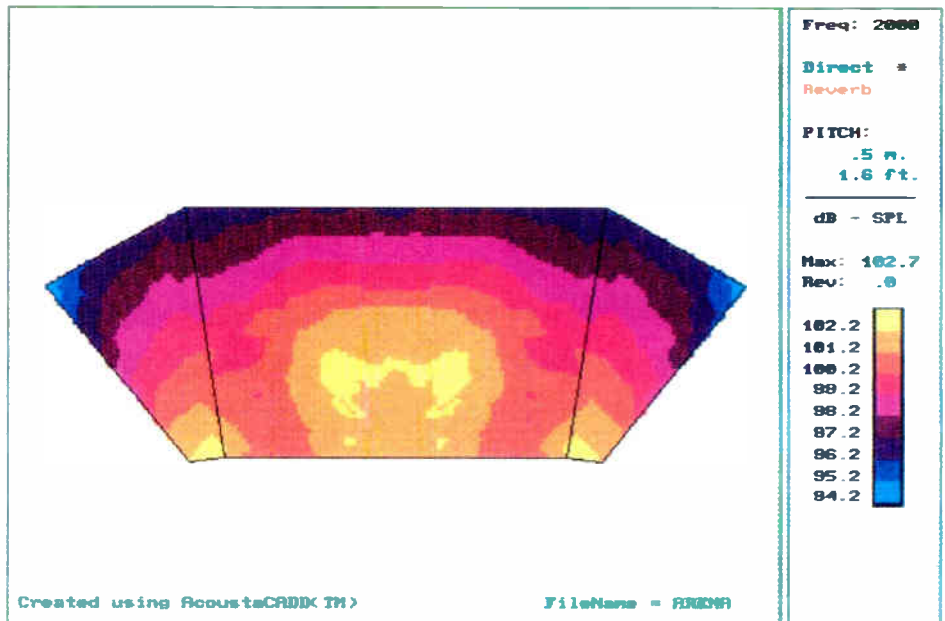
Selection of speakers includes driver

selection, coverage pattern of the horn locations, aiming, and the quantity of speakers. How does the designer go about determining these factors?

AcoustaCADD lets you aim speakers using the main beam of sound coming from the front of the speaker. The developers of AcoustaCADD have called this technique Isobeams. The Isobeam shows where the speaker is projecting most of its sound energy. An Isobeam is not exactly the same as an isobar projection. An isobar projection assumes the viewpoint of looking out from the horn onto an imaginary sphere outside of the speaker cluster. The isobar contours of each speaker are imposed onto the sphere. The room is also mapped onto the sphere. The isobeam projects the speaker's radiation all the way to the boundary surfaces of the room. This technique is also used in University's Easy-VAMP overlays design aid (reviewed in the November 1989 issue *Sound & Communications*).

While the isobeam is a clearer representation than the spherical projection of isobars, the display of the isobeam outline on the boundary surfaces is no longer a true -3 dB (or -6 or -9 dB) contour any more. It is only an estimate of where the beam of the loudspeaker has been aimed. The center of the beam is marked with a cross and four color coded bullets mark the top, bottom, left and right sides of the beam. The SPL at the beam center is calculated (considering inverse-square loss) and listed on the display. Also the SPL at each of the four marked edge points is calculated considering both the inverse-square loss and the off-axis loss of the contour in use.

Using this technique, the calculation of only 72 points is required for the drawing of the isobeam outline. The time to



A color SPL Distribution Map printed from AcoustaCADD using a Hewlett-Packard PaintJet color printer. Tile resolution is 0.5 meter; db resolution is 1 dB per color.

calculate and draw is very rapid. If a true contour line of all points that were 3 dB down was to be drawn, it would be necessary to establish a grid of points then calculate the SPL for each grid point, then search the entire grid to find those specific points that were down 3 dB. This process can require substantial time depending on the size of the model and the density of the grid. This is, however, actually what is done in the SPL mapping module.

On the other hand, isobeams tell the designer much more than a simple x mark indicating where the center of the horn is aimed. In my opinion isobeams offer the horn selection and aiming advantages of isobar projection techniques without the awkwardness of mapping on a plastic sphere, nor the fish eye view of flap mapped isobar projections which can be especially confusing to clients even if you have gotten used to them. The program flow is such that the use of the isobeams is optional, so if you do not like isobeams you can just skip over their use.

AcoustaCADD's isobeam technique is basically the same as the Easy Vamp technique, except instead of physically manipulating overlays by hand, you use the computer's keyboard to enter aiming coor-

dinates. I was a little disappointed in AcoustaCADD's use of manual keyboard entry of data. Pointing and clicking or dragging images of speakers with the mouse or even aiming by use of the cursor keys would have been more efficient and less tedious. The software's developers point out that real-time manipulation of the isobeams is too computationally intensive and would result in a longer wait for the computer processing time than the operator time for manual data entry. As the number crunching speeds of personal computers increase, the program will evolve in its user interface. AcoustaCADD does support limited use of the mouse in a few aspects of the program, but only to point to a selection or toggle a function.

After the view is selected you guess which wall or other room boundary surface the speaker should be aimed at. Part of the isobeam may fall out of the wire-frame display outside the room. This is shown or optionally the isobeam can be clipped at the edge of the boundary surface. Other boundary surfaces can be selected in order to examine spill over of the isobeam.

In the present release of AcoustaCADD obstructions are not accounted for.

SOFTWARE REVIEW

Shadowing of beams, balconies, etc. must be determined externally to the program. The ability to model obstructions is an important capability and would be a meaningful enhancement to AcoustaCADD.

The next step is to select the first speaker and aim it. A specific cluster is selected (up to 30 are permitted) and the clusters can be located at one point or spaced apart.

You are next asked to name the first speaker, with 15 speakers allowed per cluster, which would permit 450 speakers total in 30 clusters. This generous quantity ought to be adequate for even the largest designs.

In a distributed system a cluster would be a zone within the same delay tap with each speaker in the zone at a different position covering a different floor area.

Loudspeakers may be turned on or off, levels of individual speakers changed, or you can change levels by cluster.

Although you have named the speaker with some designation, you now must select a specific brand/model from the database speaker library. As of mid January, only Altec Lansing and Electro-Voice speaker data is provided. University Sound components will be provided soon. If you select a horn from the database, then the program will prompt you for a compression driver and vice versa.

In the case of horn driver combinations the program will ask you for the EQ module you desire to use. You can bypass this request. If the driver and horn do not match then the program will alert you. Situations such as the Electro-Voice Manifold driver combinations are accounted for, but data sets for the Altec Lansing special dual-driver Y throats are not currently provided.

Unfortunately, competitive products are not supported. Entering data for a loudspeaker is an ambitious project with AcoustaCADD. The required data (thousands of data points for each octave band) are obtained using a computerized data acquisition system. These data are then post-processed into AcoustaCADD data file formats using a series of utility

```
Speaker Systems Data Table for Project Name = ARENA
-----
Cluster Name = MAIN      Device Name = HF-1      Status = ON

Speaker is ALTEC MR11564 + 299-8A/-16A
Description: SMALL MANTARAY HORN
Location: (feet)        Aiming Angles: (degrees)
  X Coord. =      -5.00  Elevation =    -6.0
  Y Coord. =      +0.00  Azimuth  = +104.0
  Z Coord. =      +45.00  Rotation  =  +0.0
Set Power = 50.0 watts.  Max. Power = 50 watts.
Delay Set at 0.0 milliseconds.
-----
Cluster Name = MAIN      Device Name = HF-2      Status = ON

Speaker is ALTEC MR11564 + 299-8A/-16A
Description: SMALL MANTARAY HORN
Location: (feet)        Aiming Angles: (degrees)
  X Coord. =      +5.00  Elevation =    -6.0
  Y Coord. =      +0.00  Azimuth  =  +76.0
  Z Coord. =      +45.00  Rotation  =  +0.0
Set Power = 50.0 watts.  Max. Power = 50 watts.
Delay Set at 0.0 milliseconds.
-----
Cluster Name = MAIN      Device Name = HF-3      Status = ON

Speaker is ALTEC MR115124 + 299-8A/-16A
Description: SMALL MANTARAY HORN
Location: (feet)        Aiming Angles: (degrees)
  X Coord. =      +0.00  Elevation =   -35.0
  Y Coord. =      +0.00  Azimuth  =  +90.0
  Z Coord. =      +45.00  Rotation  =  +0.0
Set Power = 44.2 watts.  Max. Power = 50 watts.
Delay Set at 0.0 milliseconds.
-----
Cluster Name = MAIN      Device Name = HF-4      Status = ON

Speaker is ALTEC MR11594A + 299-8A/-16A
Description: SMALL MANTARAY HORN
Location: (feet)        Aiming Angles: (degrees)
  X Coord. =     -60.00  Elevation =   -20.0
  Y Coord. =      +0.00  Azimuth  = +112.0
  Z Coord. =      +45.00  Rotation  =  +90.0
Set Power = 50.0 watts.  Max. Power = 50 watts.
Delay Set at 0.0 milliseconds.
-----
Cluster Name = MAIN      Device Name = HF-5      Status = ON

Speaker is ALTEC MR11594A + 299-8A/-16A
Description: SMALL MANTARAY HORN
Location: (feet)        Aiming Angles: (degrees)
  X Coord. =      +60.00  Elevation =   -20.0
  Y Coord. =      +0.00  Azimuth  =  +68.0
  Z Coord. =      +45.00  Rotation  =  +90.0
Set Power = 50.0 watts.  Max. Power = 50 watts.
Delay Set at 0.0 milliseconds.
-----
```

The detail selected loudspeaker data table as printed from AcoustaCADD.

programs. The utility programs and data on the file formats are available on request from the AcoustaCADD support office. Perhaps a third-party file conversion program will translate (import and export) from some of the other new sound system programs to be introduced this year.

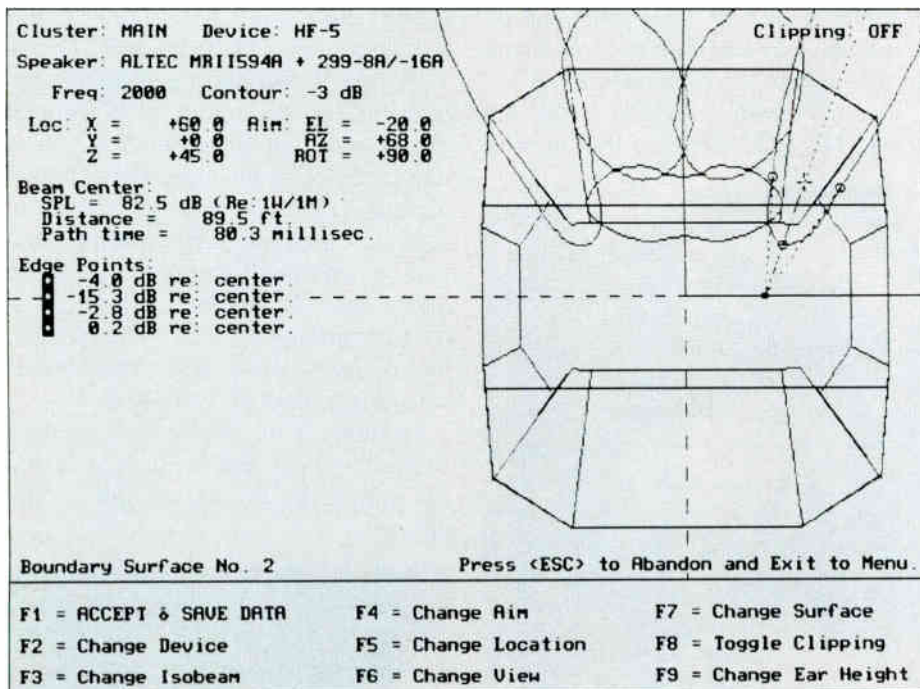
The next step in the program is to position the speaker you selected. A query from the program followed by a user response format is used. X,Y,Z coordinates are used as with the room model but O,O,O origin is now going to be at the first speaker position. Subsequent

speakers added to the project have the last speaker location entered as a default. Although the query/response format makes filling out a cluster fairly easy (but tedious), using a spreadsheet would be faster once the user had some experience. The best approach is to offer the user a number of ways to enter the data question/response, mouse point/click, and spreadsheet. The user can then choose whichever is most appropriate depending on personal preference, experience level, initial data entry versus revising the job and job complexity. It sure is easy for a

(continued from page 44)

user (and reviewer) to ask for everything, but much harder for the poor software developers to implement. Keep in mind that this is the first release of AcoustaCADD and we believe that numerous enhancements and refinements are already being planned by the software developers.

surface are all visible on the screen. Any coordinate angle, speaker, etc. can be changed by selecting the designated special function key. Unlike some of the other sound system design programs (such as Bose Modeler and the PHD Program) the entire cluster cannot be moved, requiring each component to be moved



The "Multi-Mode" feature is ON. Isobeam outlines.

Back to speaker aiming. The aiming data are displayed on the screen. Elevation, azimuth and axial rotation must now be specified. All these choices are made using common sense and your best guesstimate. The screen will now show the aiming display. On the wireframe model a square appears on the speaker position you have selected. A dotted line runs from the speaker to where the beam center strikes the ear plane above the selected surface. The isobeam is drawn (on the screen) where it intersects the ear plane above the selected boundary surface.

If you inadvertently left out a minus sign on the elevation or made some other data entry error, the isobeam may not even be on the display. This can be tracked down as the speaker, dotted line and boundary

separately.

The screen displays what each special function key does. The isobeam contour can also be controlled by the special function keys. Typically the -6 dB contours are considered to be the edge of the coverage pattern. If the inverse square law losses are ignored we could aim speakers so their -3 dB isobeams touched, assuming phase random (non-coherent) adding. With coherent adding, that is aligned horns of the same family, we would want to touch this -6 dB isobeam. The only way to confirm that the attenuation contour/overlap you are using is appropriate is to go check with the performance simulations after you have entered and aimed a few speakers.

Next month we will explore the performance simulations of the sound system engineering module. ■

three- or two-head VCRs is partially marketing and partially reality," contends Dr. Jacobson. "The fourth head is more of a marketing feature than actually offering a concrete additional benefit in image quality. If you do a lot of special effects, the fourth head makes that work better, but if you add a third head, you're going to get about the maximum quality you can get out of the image processing. If you've got a good recorder, that will give extraordinarily clear still frame images."

Improvements in monitors have been oddly lagging behind other products. "Physically, they're a little cleaner looking with square tubes and better resolution," says Chesler. "They're coming down in cost, but basically, monitors have stayed pretty much the same and I think they'll remain that way for a while."

Probably the most intriguing trend in CCTV involves sequencer processors and Digiquad systems. Digiquad systems, already in operation, permit users to simultaneously view and record up to four cameras on one screen. Manufacturers are now coming up with new ways to blow up one portion of the tape for better viewing.

Sequencer processors (also known as fast switchers and multi-video recording systems) are pushing time lapse VCR to its extreme. John Schulte explains, "Presently, we have conventional tape switchers tied in with VCR's so they switch video cameras in one second intervals. The deficiency is once you've seen Camera One, you've got to wait eight seconds to see it again. Fast switching systems switch on frame rates, so you can sample every camera in an eight-camera system nearly four times a second. You don't lose any action. The trick is not only do you do the switching, but you have to be able to play back each camera individually, which means you have to encode the signal when it's recorded so you know which camera is which."

"It's something I think will take the whole market by storm," predicts Schulte. "There are still some price barriers, but I think those will be overcome. Right now, it costs \$6,000 to \$8,000 more for the fast switching system versus a conventional system. I think it'll have to get down to \$2,000 or \$3,000 more for it to be attractive on a real wide scale." ■

Applications from the Consumer Electronics Show

The Consumer Electronics Show is a cornucopia of goodies not always applicable to the professional sound and communications industry. But there is enough crossover technology — along with products for a small business — to make the trip to this mammoth trade show (800,000 square feet, 1,400 exhibitors) in Las Vegas each winter well worth the visit. Here are our impressions of relevant exhibits at CES this past January.

Handheld calculators are getting bigger and smarter while laptop computers are getting smaller, with a number of new products at the show meeting somewhere in between. One nifty handheld gizmo from Seiko Instruments is ideal for contractors. Aside from mundane calculation of area, volume and other arithmetic functions, it has a built-in *sonar* system to measure distance just by aiming at a target. Imagine using this shirt-pocket device for determining wire runs, ceiling heights and room volume, for calculating reverb time, setting delay lines, etc. — all for \$100 retail!

Handheld organizers were strong at the show, especially the Sharp Wizard, Casio BOSS and Psion Organizer. These devices store phone numbers, schedule appointments, have clock/calendar/alarm functions and more. The Casio has an adapter that links it to the Mac. Unfortunately, I found that they are time consuming to program (enter all the info), and the tiny-funky keyboards are a pain to use. I suppose some people will find them useful.

From the computer end, laptops have shrunk to palmtops. Atari's Portfolio (\$400 retail) is an MS-DOS compatible for wordprocessing and spread-

sheets on the go, but the lack of CGA graphics, only half-page-width screen and small non-standard keyboard limit its usefulness for serious work.

Psion showed a slightly larger 4.5 pound MS-DOS palmtop that is a lot



Mitsubishi 120-inch "big screen monitor."

closer to a fully functional computer. The keyboard was almost normal size and the screen displayed 640x400 resolution, allowing for decent text and double CGA resolution, which means that aside from wordprocessing and spreadsheets, you can run many sound system design programs such as JBL's CADP, PHD and Umbulus.

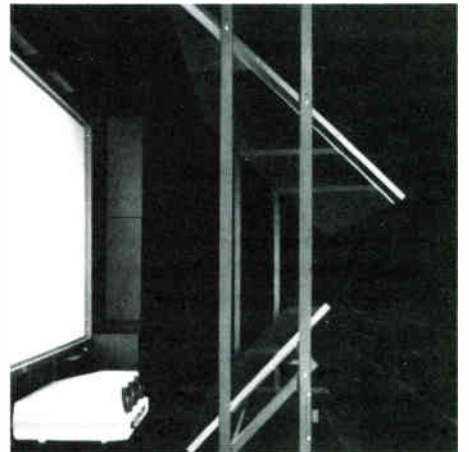
Poquet has a new computer for \$2,000 which is under 1 pound, as is the Atari, but offers more functionality (at a price).

Portable computers are becoming more powerful and more portable with the introduction of mobile fax and modern devices that interface with cellular and pay phones. Access by Mitsubishi is 7 pounds and includes

battery and car cigarette adapter. Nessei offers an 8 pound unit. Other suppliers include Medbar's Porta Fax III.

Pioneer's new marine speakers appear to be the result of a serious design study on materials for outdoors and other tough environments. Unique materials for the basket, surround, cone, and even the coil warrant a close look for speaker designers in the pro audio field. Contractors will find that these components may be the answer for medium sound level installations with environmental problems.

Pioneer also showed a six-well cassette player which will sync with a CD player to be introduced in the spring.



VS-12001 Projection Area

During the CE Show, International Jensen acquired Acoustic Research. At one time Jensen and Acoustic Research were at opposite ends in hi-fi philosophies, with Jensen's Novack's work on vented design predating Thiel, while AR's Villchar (and Kloss) invented acoustic suspension. (Jensen also owns Advent, which was founded by Henry Kloss.)

Sherwood has an autosound amplifier series designated Bp for Bullet Proof. The Bp series uses sensor circuitry that monitors impedance, temperature, air flow, etc. and controls its switching power supply to limit the available current/voltage for the amplifier to remain functioning reliably.

Carver introduced its 10 CD changer featuring 18 bit D/A converters and 8x

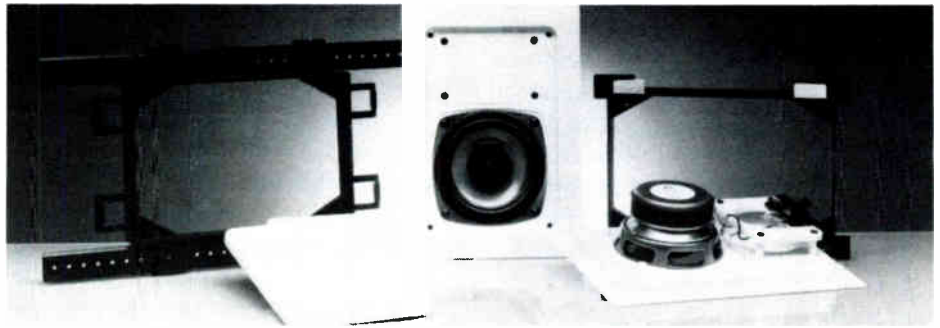


JBL Video TC-1 Tuner/Controller.

sampling, joining other manufacturers of CD changers. Six-CD changers are a commodity item, available from almost all consumer hi-fi suppliers at dirt cheap prices, less than \$300 retail list. Considering that they provide over 6 hours of music, auto repeat, hiss- and hum-free reproduction, there is real potential here as an inexpensive foreground music front end. In commercial applications there are now two music libraries which offer license fee paid CD libraries.

Technics, Sony and TEAC announced commitments to shipping consumer DAT machines, with the rest of Japan, Inc. expected to follow. \$1200 is the target price for now, with \$800 for the end of the year. If all goes well and production yield and sales are good, expect prices to drop to \$400 for the end of 1992.

Sharp showed its color LCD projection TV system featuring a 20-inch to 100-inch picture, tiny projector, non-direction screen — for under \$6,000. Hughes developed this years ago for the U.S. military, at a price that only the military could love. At this CES, Mitsubishi introduced a 120-inch rear projection television for the home, to be "custom installed."



Sonance M10 in-wall speaker, with brackets.

Harman Electronics' JBL Video Products Group introduced the RSVP series floor standing video projectors featuring a built in tuner. The company also announced that production models of its TC-1 tuner/controller, shown in prototype last summer, are now shipping.

The disco kids were in Las Vegas with Numark, Gemini, and Gem Sound showing upscale products. The electronics products from these firms have become progressively more sophisticated in the last couple of years in contrast to the low-end products these firms entered the market with originally. Numark has an 8 second sampler (DD-800) for disco effects such as looping which mates to their DM 1975 mixer. This combination is capable of post-production effects previously requiring use of studio time.

FMX, the noise reduction system for FM that was attacked as faulty by Dr. Amar Bose seems to be commercially dead, but Sprague, the IC maker, was making a valiant push for it.

A new organization for home installers has been formed, called Custom Electronic Design Installer Association. CEDIA held its third meeting during the CE Show. As some of our readers are in this business, we will be writing more on this development.

B+O displayed (off-site) its Beolink 7000 infra-red multi-room controller which is incredibly sophisticated, controlling room lighting, audio components, programmable timing, VCR programming and more.

AKG launched its K1000 Reference Headphone system which allows hinged earphones to be angled away

from the ears and incorporates "acoustically transparent" transducers.

Recoton featured an FM house wiring system designed by Larry Schotz (the well known RF engineer). The device sends stereo through the house wiring, and special receiver/speakers can be plugged in at any outlet. By using advanced design techniques and noise reduction, this appears to be a workable system with some commercial applications.

Sonance was one of the originators of in-wall quality speakers and has just about the most comprehensive product line up. New products include water resistant speakers for outdoor and bathroom areas, powered in-wall subwoofers, jack plates, brackets, back



Carver TLM-3600 ten-disc CD changer.

boxes for speakers (now required by some building codes), controls etc.

Tripod showed the Omnispeaker, a 2-way speaker system that is buried in the ground (outdoors). The Omnispeaker is familiar to many sound contractors as a decent solution to outdoor sound.

This covers what we found the most interesting, but with over 1400 exhibits, after about 1,000, the microwave ovens look like TVs and the remote controls look like calculators and the stun guns blur into cellular phones. ■

COPING

(continued from page 15)

One of your key objectives in a show is visibility and memorability of your exhibit or showroom. Clutter is unfortunately the name of the game at shows. Basketball hoops, popcorn machines, models, kite giveaways and other gimmicks abound. How can you make your exhibit create a unique and memorable impression amidst the sea of logos, gadgets, and other traps?

Make sure your agency is in touch with your exhibit house. By allowing the two companies to work together, you'll avoid misunderstanding and miscommunications. Each group plays an important role in the success of your show. Ask the exhibit house to brainstorm with the agency on show tactics. Both companies are credible sources of information.

Think of your exhibit as you would any other sales tool. The booth must graphically convey your corporate personality through colors, design, and copy and provide you with an effective sales environment. The area must be designed to attract and handle traffic flow, while communicating a simple message. Your show theme must be visually communicated for continued reinforcement. The creative principles that govern the development of your advertising material applies to your exhibit as well.

Unique exhibit design, pre-show mailings, and a host of other options exist for you to maximize your return on investment. However, developing pre-show, show, and post-show activities should be preceded by one major activity, asking questions. Questions on expenditures, booth size, theme issues, and more will enable you to set the stage to create a solid and effective trade show plan. ■

John Stap heads up the Deur/Stap Company in Grand Rapids, Michigan.

MICROPHONES

(continued from page 24)

tages in many micing situations, as when compensating for shortcomings of an existing speaker system, for example.

- The newest offering of the Astatic line at CTI audio are the CTM 20 and the CTM #18, flange mounted electret condenser

microphones. Both have built-in INR (Impact Noise Rejection) shock mounts to eliminate handling noise and both can be powered by 9-volt phantom power or a 12-volt AC adapter. The CTM 20 features a high-end boost and bass tilt switch allowing the user to adjust frequency response to eliminate problems with proximity noise. The CTM 20 has a variable length gooseneck that adjusts from 5-25 inches. The CTM 18 has a 13-inch gooseneck.

- Fostex's Olin Wolford identifies the top-of-the-line M-20 RP mid-sized stereo mic as an excellent choice for large group situations, like choruses. The M-20 RP is often used as an overhead mic and is said to maintain its stereo stability very well. Little brother to the M-22 RP, the M-22 incorporates two different capsules oriented at 90 degrees — a mid capsule facing front and a bidirectional capsule above at 180 degrees. The combination of the two capsules gives a matrix of three different outputs. Going into a mixer, the user can custom-build a stereo field by bringing up the mid capsule to a nominal level. Then, the stereo field widens as the side capsules are brought up. Maximum SPL on the M-20 RP is 120 dB.

- Shure continues to maintain a large share of the market with diverse offerings. The SM 58 is an extremely popular dynamic vocal mic, with the Beta version introducing high-energy magnetic technology for higher sensitivity. The SM87 is a super cardioid for better feedback control and is used for lectern applications. The SM91 boundary mic is used for teleconferencing applications and Shure's dual element boundary mic technique for smart sensing of talker location is gaining acceptance. The SM11 is a miniature lavalier mic which is often used with wireless body pack transmitters. Shure's new wireless products now feature "true diversity," an improvement over the earlier dual antenna system with a single tuning section previously offered.

- The biggest news at E-V is their second generation of N/DYM mics with improved pop filtering and less handling noise. Handling noise is now attenuated with Dynadamp, a proprietary material, in addition to a change in the mounting of the element. Series Two microphones are designated by an A suffix; such as 757 A, 457 A, 357 A, 408 A, etc.

A new series of condenser mics is also in the works, but not yet ready for release.

- Sony first entered the mic field years

ago with expensive condenser mics for recording studios, following with broadcast wireless mics which introduced easy transmission channel switching. Recent introductions are the WRT-28 and WRR-28, which are UHF band designs. The ECM-77 lavalier is used, Sony's top-of-the-line model. The compander system is defeatable to eliminate noise reduction artifacts when clear reception permits. The ECM MI-5 is a three-capsule stereo mic which can be used for ambience pickup, single point chorus micing, or other applications where the M-S mic technique is desired. Stereo directional pattern is adjustable, an unusual feature.

- Although Panasonic is one of the largest manufacturers of microphones in Japan, they sell only four special purpose microphones in the United States, all miniature and primarily designed for music. The WM-S1, a clip-on mini cardioid condenser which uses 48-volt phantom power, is a good choice when you have a close micing situation, a phantom power supply and need high SPL. It has its own preamp assembly (for buffering the electret condenser for a longer run) that hooks on the end of a 5-inch slender tube with an XLR at the end which the user can stick in a pocket or wear on a belt. SPL capability has been verified at 148 dB, with frequency response of 50 to 18,000 Hz.

The WM-S2, also a cardioid condenser, is designed for even closer micing situations. Frequency response is 120 to 15,000 Hz, with 138 dB maximum SPL. It can be phantom or battery powered. Panasonic also offers a headset mic, the WM-S10, with the same performance as the S2, but with a box rather than tube-type preamp.

The WM-S5, another cardioid condenser, is phantom powered only and has a maximum SPL of 158 dB, with frequency response of 70 to 16,000 Hz.

- Samson has replaced its Concert TD with the Super TD System that is said to increase its effective transmission range in crowded RF environments by 25 percent through the use of powered FM antennas. These antennas are housed in plastic and can be mounted through the use of brackets.

The system's Super TD receiver has a "Cavity Tuned" design that is claimed to have twice the sensitivity of the Concert TD receiver. It also includes a plus 15 and minus 15 volts power supply. The Super TD is accompanied by a belt pack

(continued on page 62)



News from around the Industry

New Installs; Upgrades; Meetings

Equalizers in Orlando

MicroAudio has announced that 82 of their Model 1.1 EQ POD computer controlled equalizers are being installed at Universal Studios Florida. According to the company, the products were chosen because of their "tamper-proof design" coupled with their ability to interface correctly with IED multi-zone systems. The installer is Maryland Sound.

Yankee Stadium Upgrade

Norcon Electronics completed another upgrade to the sound system at Yankee Stadium. Altec Lansing reports that the upgraded involved the installation of Altec 817B weatherized black LF horns, Altec 8551B programmable equalizers. Work also included the press box, luxury box and control room, all of which included Altec equipment.

Reps Appointed

Telecall America, a division of J. Bushfield's Inc., has appointed two rep firms: Levy, Grams & Lassers for northern Illinois and eastern Wisconsin; and S&F Northwest, Inc. for Oregon, Washington, western Idaho, western Montana and Alaska.

Frequencies Added

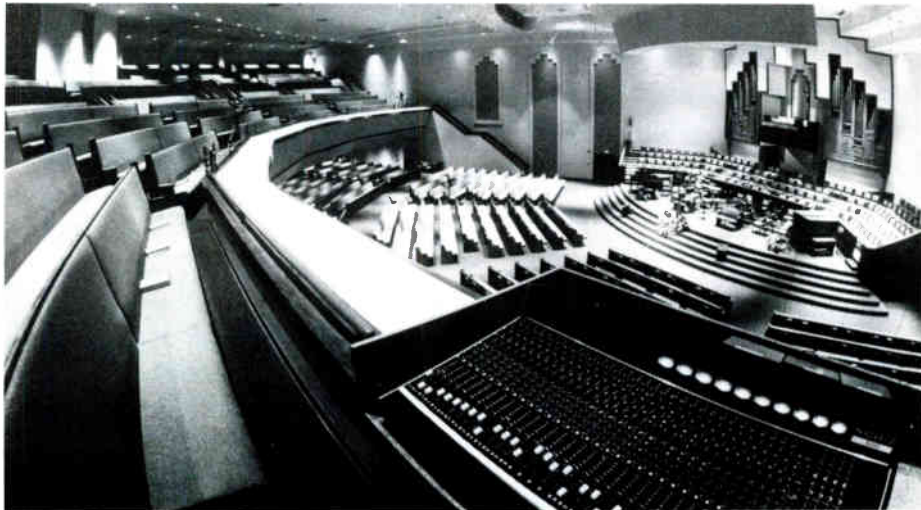
Samson Technologies has announced that as of this month, all Samson crystal controlled wireless systems will incorporate four additional frequencies, to a total of 14. The added frequencies are all above 200 MHz.

New Move for I.E.D.

Innovative Electronic Designs has moved to a new 13,500 square foot expanded facility. Part of the new expansion includes a seminar training room that can handle 20 people. Training sessions are planned by invitation.

Senate Meeting Rooms

Wah Systems Corporation has announced that it has installed the Moderator Conference System in three California State Senate Committee Rooms. The contract for the installation involved over six miles of wire, 62



Interior of the North Jacksonville Baptist Church.

Church Console

The North Jacksonville Baptist Church in Jacksonville, Florida has installed a 24 channel Soundcraft 500 console for the house mix. Florida Sound Engineering Company was the contractor on the installation.

Workshop Planned

SPARS is planning a second Digital Work Station — Audio for Video Post Production workshop/seminar/conference in May in Nashville. The association has also approved bylaws providing for a new membership category for Firm or Corporate Associate Membership.

speakers, 18 power amplifier channels, 56 distributed audio channels, 84 anodized color matched control panels, 80 channels of automatic microphone mixing, 63 microphones, six channels of equalization, 43 intercom stations, automatic power sequencing and custom casework. The project was completed in 80 days.

Move in Austin

National Instruments Corporation is moving its corporate headquarters to 90,000 square feet of office and manufacturing space in the Millenium Building in Austin, Texas.

Trenton Installation

JBL Professional has announced that Kimberly Theatrics, Inc. in Trenton, New Jersey has installed a new sound system for the Geiger Reeves Auditorium at the Peddie School in Highstown. The system includes JBL graphic equalizers, digital delay, crossover, studio monitor and speaker components.

Test Systems to Stockholm

Sound Technology, Inc. has been awarded an order for 25 St 3100/3200 Automated Audio Test Systems to be supplied to Swedish Local Radio Company, Stockholm. The 3100 system uses FSK codes through the audio link to automatically program the 3200 audio analyzers.

DAT Software

Sony Classical, the record company formed January 1 by the new owners of CBS records, is entering the pre-recorded DAT market "to coincide with the introduction of DAT consumer hardware in the United States" (now expected in late spring). The first releases will include recordings by pianists Vladimir Horowitz and Murray Perahia, and singers Dietrich Fischer-Dieskau and Placido Domingo.

Conferencing Phones

Gentner Electronics has introduced two telephone hybrids for on-air broadcast, call recording and audio conferencing use. An adjustable caller control gives the announcer any desired amount of dominance by reducing the caller level when the announcer speaks. In conference room settings, the units replace conventional speakerphone type systems, allowing two-way audio conversation with switching or gating. Both units are compatible with microphone mixers.



AMS Expands

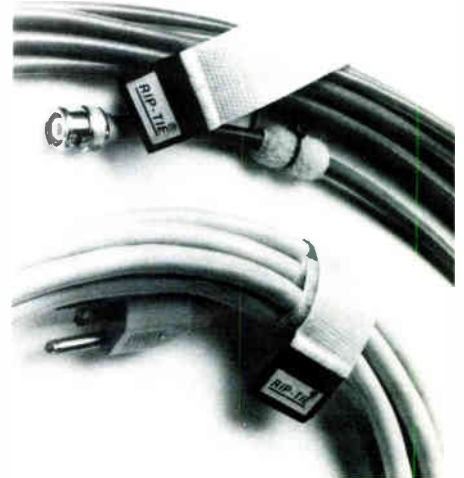
AMS is expanding its U.S. operations and is relocating AMS Industries Inc. to northern California under the control of Jim Stern, president and ceo. Nigel Branwell remains in Seattle and becomes the representative for AMS products in the northwest. The new U.S. office is at 1180 Holm Road, Suite C, Petaluma, California 94954. Nigel Branwell is at Soundings/Electrotech, P.O. Box 10004, Winslow, Washington 98110.

Lighting Show "Successful"

The Lighting Dimensions Show in Nashville last November had a 65 percent increase in exhibits over the previous year, with an 18 percent increase in attendance. Next year's show is planned for November 17 through 19, 1990 in Orlando.

Cable Wraps

Seam-Tech has developed Rip-Ties, industrial Velcro cable wraps. One end of the wrap permanently attaches to the cable; the other end has a pull tab. Company names and logos can be printed on the pull table. The wraps are available in six sizes and ten colors.



People

EIA Re-elects Little; Steighner Directs Phonic Ear

Chairman of EIA

The Electronic Industries Association Board of Governors has re-elected William G. Little, president of Quam-Nichols Company, Inc., for a second

term as EIA's chairman. Little became vice chairman of EIA's Board of Governors in 1987, and has also served as chairman of the association's Membership and Scope Committee and its Distributor Products Division.



William Little

Little became Quam-Nichols Company's president in 1981, has served as director of the Electronic Industry Show Corporation, and was instrumental in the formation of the National Sound and Communications Association.

Phonic Ear Appoints Steighner

Phonic Ear has appointed Rick Steighner Director of New Business Development. Steighner joined Phonic Ear in 1985, and used his background



Steighner

in audiology and speech to provide direct product sales and service to Phonic Ear's customers.

In his new position, Steighner will develop new markets for Phonic Ear FM Technology in large area amplification and personal FM systems.

Moskovitz at Genesis

Gary S. Moskovitz has been appointed President and CEO, and elected a director of Genesis Electronics Corporation, a provider of voice mail systems to small and medium-sized businesses, and individual units of larger corporations.



Moskovitz

Prior to joining Genesis, Moskovitz was executive vice president and chief operating officer of Westec Security, a residential security systems and services firm. Moskovitz previously headed Xerox Corporation's Artificial Intelligence Division, and has also held senior marketing and product management positions with Mattel Incorporated and RCA Corporation.

Market Development at Panasonic

Roman Kitka has been appointed market development manager for telecommunications products for the Panasonic Communications & Systems Company's Telecommunications Division. Kitka is responsible for directing cellular marketing and market development, product planning, distribution development, long-term strategic planning and new business development.

Kitka previously served as marketing and product manager for the cellular products division of Goldstar Products Co., Ltd., and as product programs manager with Oki Telecom.

Dismore at Ultimate Support

Ultimate Support Systems, Inc. has announced the selection of James A. Dismore as president/CEO. Dismore



Dismore

comes to USS with management and marketing experience with several top Fortune 500 companies. As a first step, Dismore recently initiated a new logo, formally announced at the January NAMM.

Bergles Named ASME President

Arthur E. Bergles, Ph.D., P.E., dean of engineering at Rensselaer Polytechnic Institute, Troy, N.Y., has been elected president of the American Society of Mechanical Engineers.

Dr. Bergles served the staff and faculty of M.I.T., the Georgia Institute of Technology and Iowa State University before moving to RPI in 1986. Bergles will assume the presidency in June 1990.

CALENDAR

Upcoming Events

MARCH

National Association of School Music Dealers: Fort Lauderdale, FL. Contact: (414) 734-1969. March 3-7.

Interface '90 Plus: Dallas, TX. Contact: (617) 449-6600. March 6-8.

ENTELEC (Energy Telecom & Electrical Conference & Expo): San Antonio, TX. Contact: (301) 468-3210. March 12-14.

88th AES Convention: Montreux, Switzerland. Contact: (212) 661-8528. March 13-16.

EL-TECH: Charlotte, NC. Contact: (803) 686-3737. March 14-15.

National Computer Graphics Association: Anaheim, CA. Contact: (703) 698-9600. March 19-22.

Fiber-Optic Splicing and Termination Workshop: Sturbridge, MA. Contact: (508) 347-8192. March 19-23.

Midlantic Electronics Show: King of Prussia, PA. Contact: (215) 828-2271. March 20-21.

Southcon: Orlando, FL. Contact: (213) 772-2965. March 20-22.

NAMM: Frankfurt, Germany. Contact: (619) 438-8001. March 21-29.

Manufacturing International '90 Conference: Atlanta, GA. Contact: (212) 705-7740. March 25-28.

Course in Vibration Analysis, Georgia Institute of Technology's Education Extension: Atlanta, GA. Contact: (404) 894-2547. March 27-29.

RF Technology Show: Anaheim, CA. Contact: (303) 220-0600. March 27-29.

VOICE '90 Conference & Exposition: Anaheim, CA. Contact: (800) 888-2188. March 28-30.

Mobile Communications Expo '90: Dallas, TX. Contact: (303) 220-0600. March 28-30.

NAB (National Association of Broadcasters): Atlanta, GA. Contact: (202) 429-530. March 31-April 3.

APRIL

NSCA (National Sound & Communications Association): Las Vegas, NV. Contact: (312) 598-7070. April 17-21.

EDS (Electronics Distribution Show): Las Vegas, NV. Contact: (312) 648-1140. April 23-26.

Products

Compact Speaker System

Modular Speakers

Ramsa/Panasonic has introduced its 500-Series Speaker System. A compact, modular component system, the Ramsa 500-Series is housed in high-pressure, injection-molded resin enclosures that are acoustically inert, and light in weight.

The WS-A500 is a two-way modular system component covering the mid-high frequency range of 100 Hz to 20 kHz. It is intended to be used with Ramsa WS-A550 modular low frequency systems and the WS-SP2A to deliver 30 Hz to 20 kHz power bandwidth performance. The WS-A500 components consist of a twelve-inch, ported, direct radiating cone-diaphragm transducer, a 44mm compression transducer on a twin-Bessel wave guide and a precision frequency dividing network.

The WS-A550 was designed as a modular component for low frequency system use. Each module houses a twelve-inch, ported, direct-radiating transducer, designed specifically for large volume displacement and high thermal power capacity-criteria for low frequency operation.

Circle 1 on Reader Response Card

"High Utility" Speakers

The CM (Cluster Module) Series from Renkus-Heinz features two full-range speakers that can be clustered in several different ways, and one 12-inch subwoofer. The CM-61 is a 6-inch two-way speaker covering from 80 Hz to 20 kHz. The CM-81 is an 8-inch two-way with a one-inch compression driver with a frequency response of 72 Hz to 17 kHz. The Sub-121 provides additional low-end response to 42 Hz.

High utility is obtained with a multi-



The Ramsa 500-Series Speaker System.

angled box design: two sides are at 15 degrees and one end is 30 degrees. The cabinets are made of birch plywood. In addition, the horn coverage pattern can be "flipped" upon ordering to maximize the horizontal and vertical coverage options.

Circle 2 on Reader Response Card

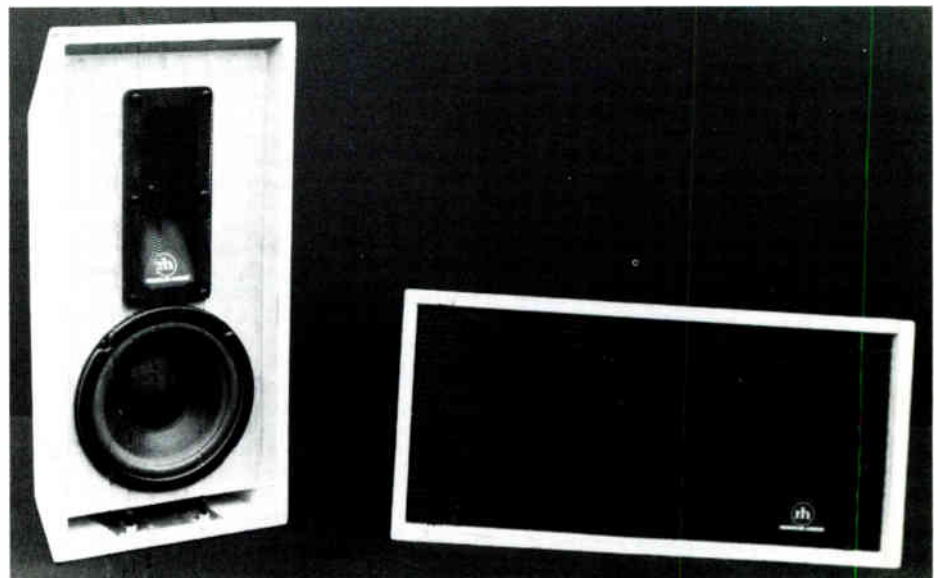
Video Low Pass Filter

North Hills Electronics has made available its video low pass filter, designed to pass the entire video band (0-4.2 MHz) and suppress the audio carrier (4.5 MHz) and higher frequen-

cies. Applications include use with video cameras and character generators to suppress spurious output prior to signal insertion on Broad-band TV.

This low pass filter is available in both 50 ohm and 75 ohm impedances. It is also available in either BNC or Type F connectors.

Circle 3 on Reader Response Card



The Renkus-Heinz CM (Cluster Module) Series.

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Drive-Thru Speaker

Fourjay Industries, Inc. has introduced a drive-thru speaker, model 410-8BK. Rated at 10 watts, this compression driver has a 1½-inch voice coil. The speaker is claimed to provide high speech intelligibility and penetration, along with talkback sensitivity. Its construction, size and color make it suitable for outdoor applications and concealment, and use within menu boards and pedestals.

Circle 4 on Reader Response Card



Small Security Camera

The ChannelPlus CCD Camera is now available from Multiplex Technology, Inc. of Fullerton, CA. The Model CCD-1 camera is a small, solid state camera that offers plug-in connection to a ChannelPlus modulator for viewing on all televisions within a complex. It can also be connected to a video amplifier or directly to a monitor. Features include solid state monochrome MOS sensor, 78-degree viewing angle, and "high tolerance for low light conditions." Audio pickup is attained by a built-in omnidirectional condenser microphone.

Circle 5 on Reader Response Card



Digital Announcement System

Bogen Communications, Inc. has introduced its DAS Series Digital Announcement System, which provides from two to eight minutes of digital recording capacity and a choice of continuous or one-time playback. The systems are suitable for user recording of speech or prerecorded program material. Connected to a public address system, they are designed to furnish repetitive announcements, recycling continuously so there is no interruption. In addition, they can be set for single playback, when triggered, to deliver commentary.

Four models are available providing two, four, six, or eight minutes of recording time. The solid state digital technology employed uses no moving parts. It operates on a standard 120-volt AC and features a battery back-up cir-

cuit which can continue to operate the system for up to an hour in the event of a power outage.

Circle 6 on Reader Response Card

Three-Way Behind-Screen Loudspeaker

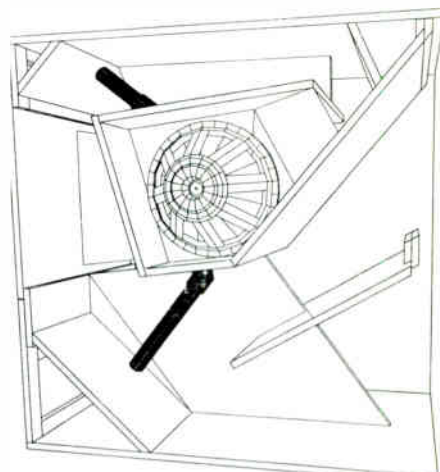
Measuring four feet by 20 inches deep, Community's TheatreStar III is a three-way loudspeaker design built for behind-the-screen cinema applications. The phase coherent system is passively crossed over at 400 and 3500 Hz. The low end is provided by twin 15-inch woofers coupled to low frequency horns. Directivity is attained by a Community M200 compression driver coupled to a 90 x 40 pattern control horn. Above 3500 Hz, a 1-inch throat driver attached to an asymmetrical horn works on a dual axis plane to provide wide-angle coverage.

Circle 7 on Reader Response Card

Subwoofers

Intersonics, Inc. has introduced its Bass Technology Series subwoofers. The speakers are based on the Servo-Drive operating principle, which replaces the traditional magnet and voice coil with a high speed, rotary motor, drive shaft and active cooling system. The Bass Tech 7 has more than twice the output of previous ServoDrive Loudspeaker models and flat response to 28 Hz is claimed.

Circle 8 on Reader Response Card



Cutaway of Bass Tech 7



Top: Community's Surround Star II (left) and Surround Star XII.
Bottom: The Theatre Star III.

Hotel Audio Combining System

FSR, Inc. has begun production on the ML-112A Hotel Audio Combining System. This system combines the independent audio systems of up to ten rooms in any combination with a touch of a button. The new version of the system includes paging capabilities, in-room control panels with bar graph displays, a computer interface, and a master graphic control panel.

Circle 9 on Reader Response Card

R. F. Receiver

Seco-Larm has introduced its SK-915 series single channel receiver equipment, designed to allow the creation of customized remote control alarm systems. The receiver comes in two styles: a transistorized momentary ground output version (SK-915RM), for

momentary controlling relay activated devices, and a programmable maintained (shunt) or momentary Form-C dry relay contact output version for on/off control applications. Both models are FCC approved, include a built-in status LED to show RF receiving signals for easy troubleshooting and operate on 12 volts D.C. with low current consumption.

Circle 10 on Reader Response Card



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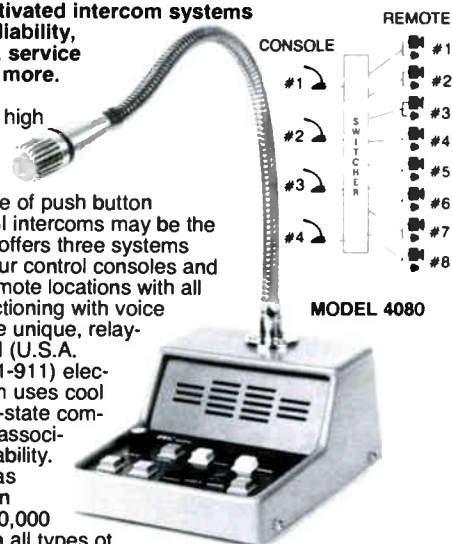
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Circle 274 on Reader Response Card

MICROPHONES

(continued from page 52)
transmitter.

• Sennheiser manufactures both wireless and handheld microphones. In the handheld category, the MD 430, a supercardioid dynamic mic, is of particular interest. Especially designed for speech transmission in very noisy environments — airports, train stations, trains or tour buses — it is optimized for the vocal range. Frequency response is 200 to 20,000 Hz.

Two other handhelds which are popular with sound contractors, according to Sennheiser, are the MD 908 and the MD 518, both dynamic type mics. The MD 518, with a supercardioid polar pattern, is said to have high tolerance of ambience and is often used on stage floors and in PA systems. The cardioid MD 908 is a fixed location, talkback lectern mic that is also used in intercoms. Frequency response is 50 to 15,000 Hz.

In the wireless category Sennheiser offers the single channel EM-2007 and a pocket-type SK-2012 mini transmitter with the MK E-2 small clip-on omnidirectional mic.

Sennheiser has just introduced a new line of RF condenser mics featuring an unusual FM detection system. Designed to suit the needs of ultra low noise applications, the new models, MKH 20, 30, 40, 50 and 70, offer two types of power supply — phantom 48 volt power or 12-volt AC power.

• Using an IC designed for the cellular telephone industry, Telex developed its popular FMR 25 economy wireless receiver. Both a single antenna model and a patented diversity technique (Pos-1-Phase) model are available. Frequency response is 85 to 15,000 Hz.

The high-end FMR-4 wireless offers true diversity and frequency response of 50 to 15,000 Hz. One of a handful of units on the market that is crystal controlled and frequency agile, the FMR-4 allows the user to switch to an alternate channel in case of an interference problem. The system constantly combines the two antenna connections and recombines at a different phase if there is a degradation in the signal to noise ratio.

Telex also reports that its 750 HL dynamic paging mic continues to be among the most popular in the industry. It features dual impedance, die cast metal construction and a frequency response of 60 to 10,000 Hz.

• By incorporating the latest advances in miniaturized surface mount components, TOA Electronics claims to have improved battery life in its wireless systems substantially — more than 30 hours of continuous operation on one AA battery. In addition, its tone-key circuit design protects the high frequency and reduces power demands on the system due to reduced need to block out external interference. Tone-key technology is implemented by means of two frequencies sent out by the transmitter, a VHF high band and a 30 kHz “handshake” frequency. If the receiver doesn’t “see” a 20 kHz signal it mutes itself like a tone squelch circuit, which helps to eliminate external interference. Tone-key circuitry also prevents pops and clicks when turning the system on and off, because the system mutes itself until it finds transmission.

TOA offers wireless receivers in both diversity (WT-8400, WTU-84U) and non-diversity (WT-740U, WTU-740U) models. Two wireless transmitters are available, the WM-240U, handheld cardioid, designed for systems where intelligible, high-quality speech reinforcement is needed, and the WM-340U, a bodypack transmitter equipped with a lavalier microphone. Both feature modular construction; components can be removed without chassis disassembly and shipped to the manufacturer for replacement.

TOA’s K Series (models K1, K2, K3, K4, KV) cardioid condenser microphones all use a very low mass diaphragm which is said to improve transient response. In models K1, K2 and K3, the diaphragms are gold vaporized, only 4 microns thick.

Newly introduced is the HY headphone mic with a unique belt pack that preamps mic and has stereo headphone amp built in for two-way communication. The user can mix in a variable amount of mic, which gives a basic monitoring mix. The HY also has a swivel and pivot to swing the microphone away from the mouth, as well as a latching cough switch with an LED on the mic element that indicates whether the element is activated or not.

The J series (models J1, J2, J3) of dynamic cardioid microphones feature a three-position switch: off, music, voice. J series mics have a special EQ curve that kicks in to increase speed intelligibility.

• Light metal beryllium, used in products ranging from golf club heads to nuclear components, has been put to good

(continued on page 67)

LETTERS

(continued from page 4)

mechanics, heat, electricity and light. A more basic problem we now have in education is that not enough of our students are taking mathematics, chemistry and physics in our secondary schools because our society rewards those who choose nontechnical occupations such as business, law and athletics.

Raymond M. Brach
Associate Professor
University of Notre Dame

ACCREDITED COURSES

I just finished reading the letter from Professor James Chalupnik in your December 1989 issue. I feel I must point out that he is mistaken when he states that “...there are no accredited courses in Audio Engineering offered in the U.S.”

In fact, the Audio Engineering Society has a special publication, *The Directory of Educational Programs* (revised 1988 edition) prepared by the Education Committee of the AES; it lists numerous Audio and Recording programs offered by colleges and universities, many of which are now fully accredited degree programs. Listings include foreign as well as U.S. institutions. Also included is an article by Martin Polon, outlining the various career opportunities in the world of Audio.

There is a \$3.00 charge for the booklet, which is available from the Publications Office of the Audio Engineering Society, 60 E. 42nd Street, Suite 2520, New York, NY 10165.

Ron Streicher
Western Regional Vice President
Audio Engineering Society
Monrovia, CA

CORRECTION

In December 1989’s issue of *Sound & Communications*, Mike Klasco’s article “Computer Aided Mechanical Design Programs...” included an incorrect phone number for VDP (Video Design Pro) on p. 49. The correct number for VDP is (505) 524-8959. They can also be faxed at (505) 524-9669. ■

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Visual Presentation Quality Part One: Theory

By Steven J. Orfield

Presentation technologies have been developing at an incredible pace over the past five years. A decade ago, a sophisticated visual presentation was a well done slide show; now, it is more like an automated, interactive video presentation. Similarly, image evaluation methods and views of human perception have been changing rapidly, although not necessarily in parallel with the developments of visual presentation technologies. In the decade of the '90s, these two movements should begin to converge into a rational result of higher quality product design and systems engineering.

Perception and “Significant Benefit”

The last decade of test methods and standards development in the acoustics, A-V and lighting fields has moved clearly away from simple physical measurement. An interest in “noise” has given way to the evaluation of “annoyance” and “speech interference,” an interest in “decibel levels” has given way to the evaluation of “intelligibility,” and an interest in “footcandles” and “lumens” has given way to the evaluation of “visibility” and “visual comfort.”

The respective professional societies, the ASA (Acoustical Society of America), the AES (Audio Engineering Society) and the IES (Illuminating Engineering Society) have all been in discussions regarding moving from the use of metrics describing direct physical measurement of energy to metrics related to the measurement and calculation of perceived results. To put it another way, they have moved from an interest in the source characterization (noise, loudspeakers and light) to an in-

terest in the receiver (human) perception characterization. While most current standards in these fields are still phrased in terms of source energy, an increasing number are now oriented toward descriptions of the perception of that energy.

Additionally, this interest in perception has been accompanied by an interest in “significant benefit.” Both hearing and vision can be described in terms of minimum perceptual thresholds (smallest detectable signal) and in terms of sensory compression (point of maximum detection of overload of signal beyond which little further benefit is available). In other words, much is known about the “benefit envelope” for acoustic and visual stimuli. Finally, perceptual research is beginning to suggest minimum useful benefit increments. Thus, the performance and relative benefits of both acoustical and visual stimuli can now begin to be characterized. These concepts lend themselves very well to the basic question of the A-V consumer, and that is: “What type of system do I need to maximize potential benefits available within my

“They have moved from an interest in the source characterization to an interest in the receiver perception characterization.”

budget, and will an increase in my budget provide a significant increase in benefits?”

With regard to visual presentation technology, this question about benefits is a complex question due to five main issues. First, the environment in which the products are used has a complex effect on their

performance. Second, the images projected by these devices may have widely varying visibility and quality. Third, the graphic presentation of visual material (screen format) may be ordered or confused. Fourth, perceptually-based measurement is, as yet, uncommon in this field. Fifth, the manufacturers and suppliers of visual presentation technology do not characterize their products via perceptual metrics but rather use physical source descriptions.

The Visual System

The characterization of complex visual response is based on a number of important characteristics of the visual system and on the demographics of the sighted population.

The most important characteristics of the visual system, with regard to seeing visual displays, are:

- Relative Contrast Sensitivity
- Visual acuity
- Visual accommodation
- Transient Adaptation
- Photopic versus Scotopic Vision

Relative contrast sensitivity is the relationship between the task contrast at threshold luminance and the background luminance. Typically, this would be the contrast between characters and background, and this contrast value is measured in percent.

Visual acuity describes the eye’s ability to resolve visual task detail by size, luminance contrast and time. The characteristic reference is the Landolt Chart or the optometrist vision testing chart.

Visual Accommodation refers to the process by which the visual system changes focus from one distance to another. This



is clearly affected by age. Adaptation and transient adaptation refer to the ability of the visual system to respond to gradual and instantaneous changes in the luminance of the visual field.

Finally, photopic and scotopic vision refers to the difference between day and night visual response, respectively.

In the simplest of terms, the visual system, in order to see, needs:

- A comprehensible task
- Adequate detail size
- Adequate luminance
- Adequate contrast
- Adequate adaptation period
- Limited glare
- Limited veiling reflections (reflections on the task)

Interestingly, it is easy to construct two examples of visible tasks which are both able to be seen but vary by a factor of 2:1 in the speed with which they can be seen

and processed.

The Lighting Environment

In considering a presentation room or auditorium, the lighting environment has a crucial impact on the presentation of a visual image via performance of a set of well defined variables. These variables, as

“The lighting environment has a crucial impact on the presentation of a visual image.”

noted in Table 1, can radically affect the quality and even the basic perception of the visual presentation.

These variables affect the quality of the visual presentation in these ways:

- If the lighting or daylighting is too bright, the eye will adapt to the room, lighting or daylighting and not to the

screen.

- If the room is too dark, the eye may perceive the screen as “too intense.”
- If lighting or daylighting reaches the screen, it may cause a “veiling luminance” which reduces the visibility and color perception of the image.
- If room surfaces are too light or dark,

the eye may adapt to those surfaces rather than the screen.

- If room surfaces are specular (glossy), they may cause very bright reflections of either the image or other sources of lighting in the room.
- If the screen characteristics are incorrect, the screen may gather ambient

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light as veiling reflections or project most of the screen luminance at the wrong angle.

All of these issues must be balanced against the fact that the occupant in a presentation room would like the greatest amount of daylighting which is comfortable, outside views or visual distractions and a visually stimulating environment.

Additionally, the presenter at the podium or presentation position wants mainly two things, an excellent room and set of A-V technology, and control over the illumination, daylighting, room and A-V technology.

In order to control the lighting environment in the presentation room or auditorium, these guidelines are representative of what is required:

- Design the room with good side-daylighting and insure control of daylighting by blinds, draperies, etc. which do, in fact, control light.
- Insure that the room finishes fall within a light reflectance range which allows for a low contrast environment:

a. Ceiling	75%
b. Walls	50%
c. Blinds	50%
d. Floor	20%
e. Furniture	40%

- Use only low-brightness lighting systems, ideally avoiding exposed large

TABLE 1		
Illumination Variable	Example	Metric
1. Illumination Level	Horizontal Level	Lux *
2. Illumination Control	Switching/Dimming	
3. Illumination Color	Bulb color temp	deg K
4. Daylighting Level	Horizontal/Vertical	Cd/m
5. Daylighting Control	Blinds/Draperies	
6. Surface Luminance	Wall/Ceiling	Cd/m
7. Veiling reflections	Light spill on screen	Cd/m
8. Glare	Bright light sources	Cd/m
9. Surface Reflectance	Surface "lightness"	%
10. Surface Specularity	Surface "glossiness"	%
11. Surface Optics	Gain, Focus, Diffusion	

* Lux (and Footcandle) generally refer to measurements of light source. Candelas/m (and Footlamberts) generally refer to measurements of reflected light (typically, surfaces).

scale (2 x 4) fluorescent systems due to surface brightness and dimming problems. Also, avoid shallow incandescent lighting "cans" with exposed sources.

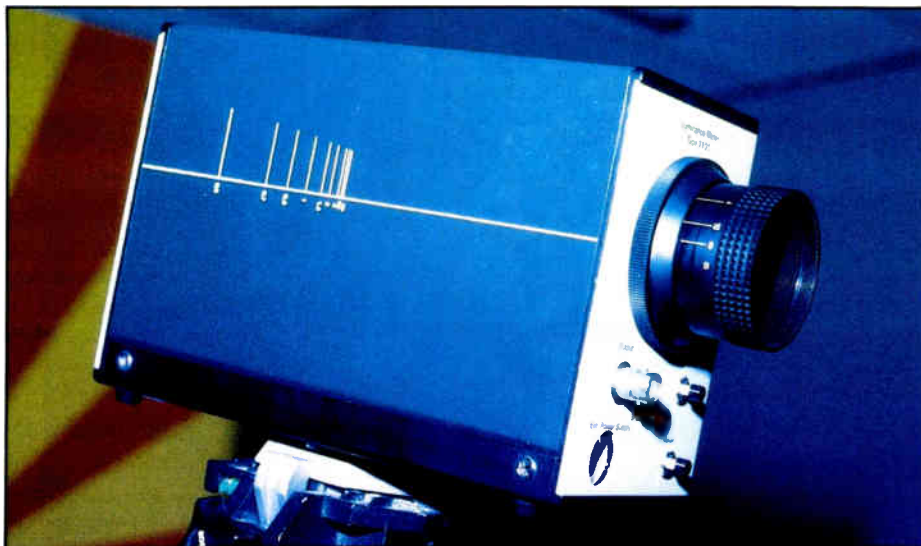
- Light both vertical and horizontal surfaces with dimmable illumination and provide separate control zones for all surfaces.
- Insure that control room lighting and rear-screen room lighting are deeply recessed, down directed "can" lighting systems with no spill of veiling luminances.

Visual Presentation Product Evaluation

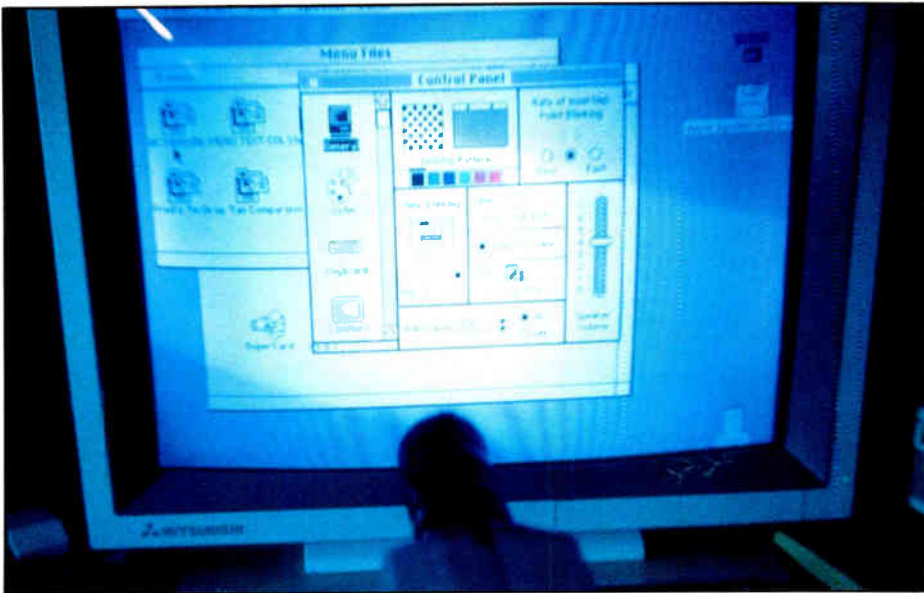
In the evaluation of the performance of any visual technology, it is important to develop a program which defines typical uses which are intended for the system. Those uses may then be considered in selecting the technology. For example, if video projectors are being considered, the question of computer input to the projectors may dramatically affect the quality of projector selected for use, due to the higher resolution needed for computer output, especially if text is used significantly. Additionally, the brightness of the screen should be determined for average and worst seating positions; the same screen brightness project used in a small and large room may be a success in one and a failure in the other. Finally, the color output adjustment may be quite accurate or may, more likely, be grossly inaccurate and may be in need of adjustment.

New Testing Devices

In the evaluation of the image quality of visual presentation technology, there are currently available or emerging some very interesting analysis devices. Among these are:



Bruel and Kjaer Spot Photometer



CapCalc Visibility Analyzer & Camera



MICROPHONES

(continued from page 62)

use by Yamaha in the world's first beryllium diaphragms, used in their MZ series of dynamic microphones. The compact, unidirectional MZ205Be has a frequency response of 40 to 18,000 Hz and is used often in confined areas where mic placement can be a problem. A unique mount adapter permits a wide range of positioning angles. The MX204, one of the first microphones designed specifically for percussion mic-ing, has high overload capability.

• Comtek is introducing two new models, the MR180 wireless bodypack system and the M180 wireless mic. Both units use a compander noise reduction

system, are powered by standard AA type batteries and operate in the VHF band. The MR180 is an especially small and lightweight bodypack system and operates for 50 hours on a set of batteries. The M180 handheld wireless mic is both very quiet in handling noise and in RF stability. Both units have proprietary mic elements, but optional alternative elements will be offered soon.

• Countryman Associates reports that it is currently very successful with its Isomax IV podium microphone, the Isomax II choir microphone and the EMW and TVH lavaliers in the sound contracting and broadcast fields. The Isomax IV

- The photometer (illuminance meter)
- The spot photometer (luminance meter)
- The chroma meter (color meter)
- The CapCalc System (video photometer and visibility system)

The photometer, more commonly known as the light meter, is a simple and usually inexpensive device (\$50-\$1000) which can be used to measure the lighting level received at the measurement position (*i.e.*, horizontal footcandles, etc). The spot photometer is used to measure a more narrow area and typically is used to measure the reflected lighting from surfaces.

The chroma meter is a bit more complex, in that it is usually a spot photometer with additional color filters to measure the XYZ coordinates which describe the color of the surface being measured. Finally, the CapCalc system is an image capturing video photometer which captures a visual image and assigns luminance values to all points in the image. It is also used to calculate the RVP (Relative Visual Performance) of the combined image and visual environment.

In summary, while presentation technology is developing very quickly, the formal evaluation of the quality of this technology is just coming on stream; next month, the actual measurements currently being used by the A-V field and some more sophisticated and accurate options will be discussed. ■

has "active vibration isolation" which electronically cancels handling noise and is installed with its own desk mount. The Isomax II Hypercardioid and the Isomax IV are both directional hypercardioids.

• Beyer's SHM series consists of three basic models, including the SHM 420 dynamic hypercardioid, the SHM 422 dynamic supercardioid and the SHM 10 condenser hypercardioid. Each model is finished in a non-glare black anodized finish and is supplied attached to a low noise, low profile matte black gooseneck. The low profile gooseneck has minimal visual impact. ■

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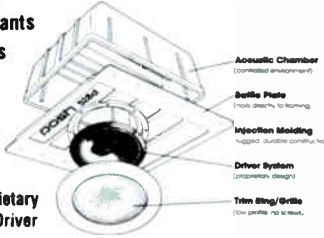
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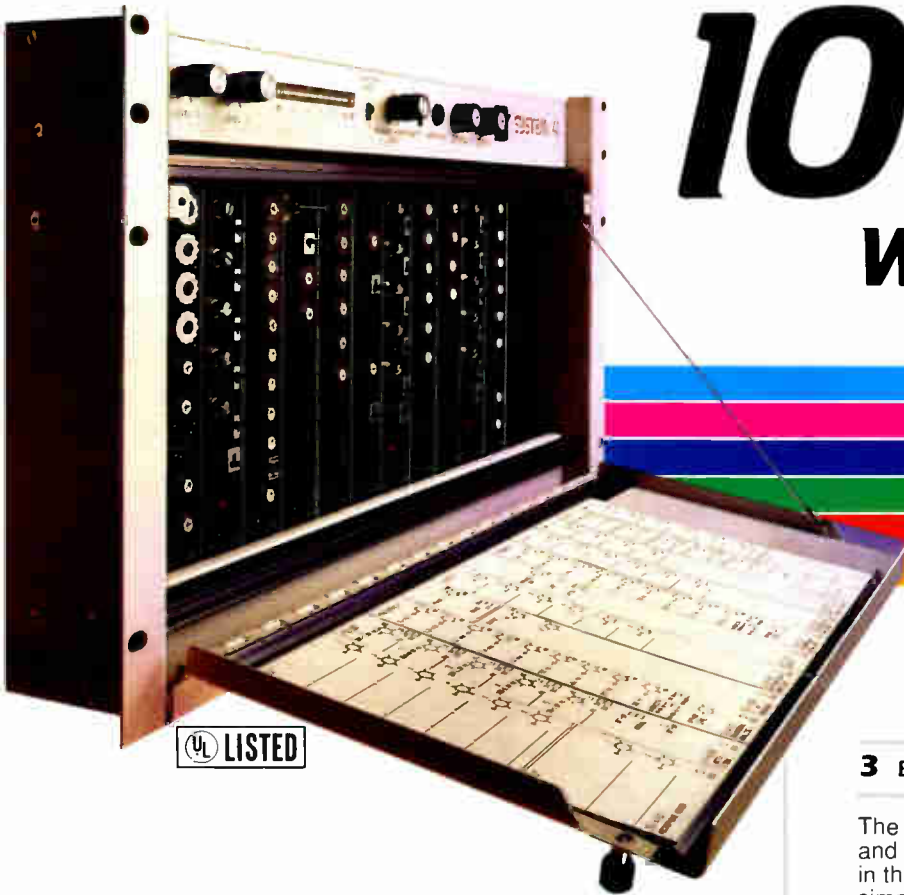
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From simple to complex designs, System 41's modular construction eliminates the tedious spec writing in configuring a system with a variety of stand-alone units. With over 30 modules to choose from, System 41 is limited only by your imagination. We took our time in designing System 41, so you don't have to.

3 EASY TO INSTALL

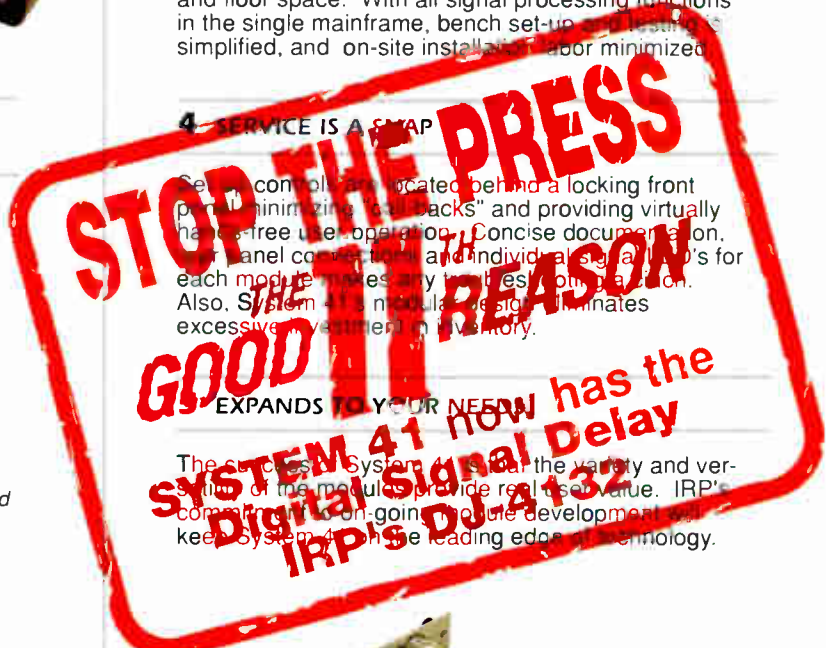
The compact System 41 mainframe reduces rack and floor space. With all signal processing functions in the single mainframe, bench set-up and testing are simplified, and on-site installation labor minimized.

4 SERVICE IS A SNAP

Service control panel located behind a locking front panel minimizing "cable backs" and providing virtually hands-free use operation. Concise documentation, front panel control panel and individual signal paths for each module makes any trouble shooting a breeze. Also, System 41's modular design eliminates excessive investment in inventory.

EXPANDS TO YOUR NEEDS has the SYSTEM 41 now has the digital signal delay IRP's DDA-132

The success of System 41 is due to the variety and versatility of the modules provide real user value. IRP's commitment to on-going module development will keep System 41 at the leading edge of technology.



A Variety of Modules
Incorporate Voice-Matic®, Level-Matic® and TEQ® modules, as well as line mixers, notch filters and crossovers into your System 41 for maximum flexibility.

why 41 to you!



*Match System 41 to your Installation.
System 41's modular approach gives you
total control to solve difficult design and
installation problems.*

6 USER FRIENDLY CONTROLS

Select only the System 41 modules that meet your individual signal processing needs. Many modules include remote switching and level control for simplified operation. All inputs and outputs are balanced. The rear panel connections simplify interfacing with additional equipment.

7 THREE YEAR WARRANTY

We want you to specify and install System 41 with confidence. Not only is System 41 great signal processing, but a quality manufactured product. Your reputation and ours depends on it.

8 DEDICATED CUSTOMER SERVICE

We know that once you reach a "comfort level" with System 41, it will be your system of choice. That's why IRP sales and technical staff are just a free call away: **1-800-255-6993**. Or FAX us your system requirements. You'll get a prompt reply on how to put System 41 to work for you!

9 PATENTED TECHNOLOGY

System 41 incorporates state-of-the-art technology that has become industry standards. Available as modules are the Voice-Matic® Automatic Microphone Mixer; Level-Matic® Automatic Level Controller, TEQ® Transversal Equalizer and the Audio Signal Delay.

10 IRP . . . A PROVEN LEADER

Leading sound contractors and acoustical consultants have specified IRP products for their innovative design, quality performance and reliability. System 41 inherits that tradition of excellence.

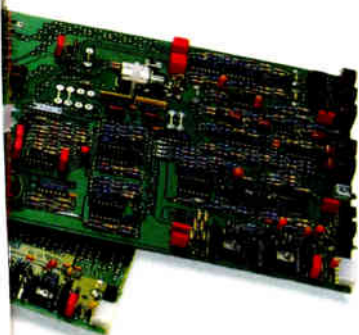


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Control Series. Compact high performance loudspeaker systems designed to meet a broad range of fixed and mobile applications.



loudspeaker systems, from the ultra-compact Control 1™ and Control 5™ to the powerful Control 12SR™, are designed to work perfectly with a wide variety of mounting hardware.

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