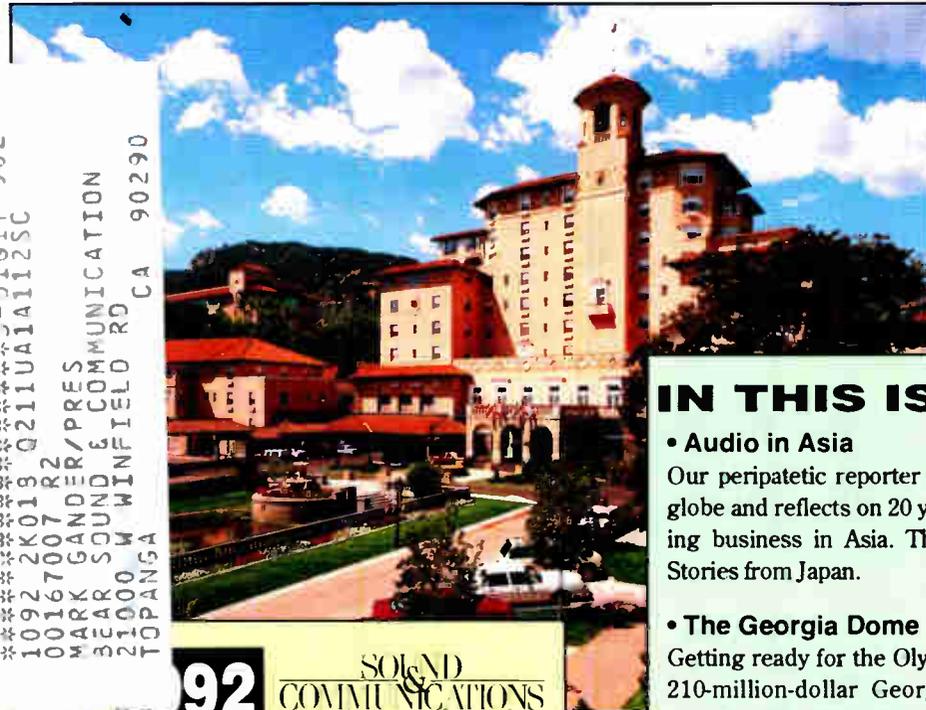


# SOUND COMMUNICATIONS

Volume 38 Number 12

December 29, 1992



## THE HOTEL MARKET

Contractors are increasingly asked to sign on as a-v techs, consultants, and rental facilities before they get the installation job. Surprising requirements include round-the-clock service and a dress code. And never forget: the customer is always right. We asked hotel managers for their best and worst stories in getting the sound and the visual necessities for their facilities. **36**

### IN THIS ISSUE

#### • Audio in Asia

Our peripatetic reporter roams the globe and reflects on 20 years of doing business in Asia. This month: Stories from Japan. **30**

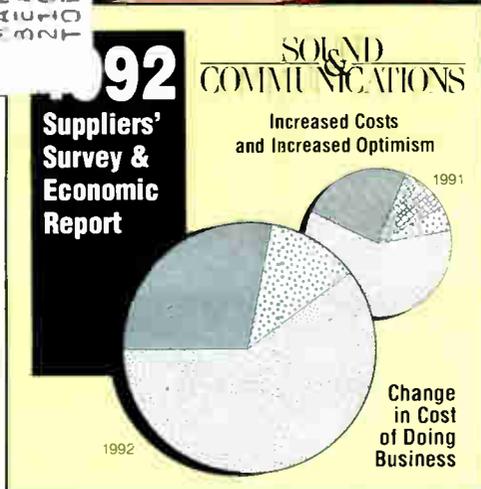
#### • The Georgia Dome

Getting ready for the Olympics, the 210-million-dollar Georgia Dome seats 71,000. The largest cable-supported dome in the world has a fabric roof system and other features that make for special acoustical considerations in the sound system. **64**

#### • Reps and the Economy

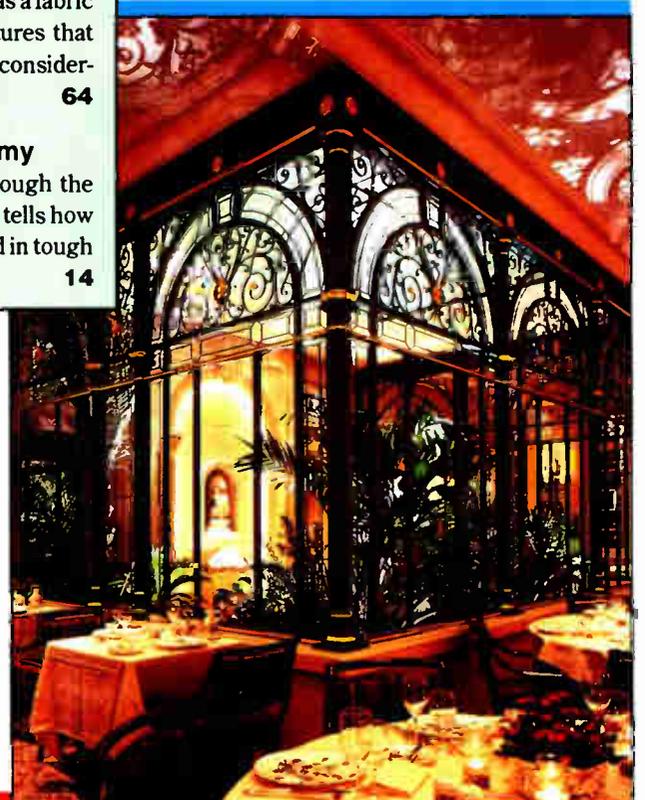
When the Economy gets tough the reps get going. A major rep tells how they can be your biggest aid in tough times. **14**

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## 1992 ECONOMIC REPORT

This fall, Sound & Communications sent detailed questionnaires to all the suppliers in the industry. A number of new queries found their way into the mix. We've tabulated the results and offer an analysis and comparison of our industry. We believe it provides some insight into the present state of the industry. **49**



# PERFORMANCE

## THE PEAVEY PERFORMANCE SERIES™



**T**he Performance Series™ 3680 Sound Reinforcement Console is the result of ongoing research by Peavey to meet the rigid requirements of today's sound engineers. Many technological advancements have been included with this new console, but we have also kept in mind the most needed and most often used features that are common to virtually every sound reinforcement application.

The totally modular concept, coupled with performance, function, features, and exceptional specifications, has offered to the sound engineer a console that is "tailor made"... and affordable!

### ULTRA LOW-NOISE DESIGN

The input stage is discrete and contains the lowest noise transistors that are currently available. The signal-to-noise spec of the Performance Series 3680 input stage has approached the theoretical limit at -133 dB while maintaining 60 dB of gain.

### DIFFERENTIAL SIGNAL ROUTING

All bus signals are differential to eliminate crosstalk and annoying ground conduction.

### GOLD PLATED INTERCONNECTS

Gold plated connection contacts are used throughout for lowest noise and maximum reliability. The highest degree of signal integrity is maintained with all signal interconnects to provide "low-noise" operation.

### IC SOCKETS

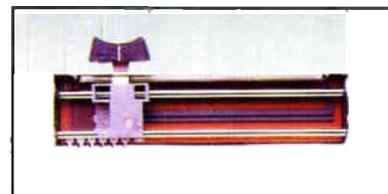
All ICs are individually socketed for ease of service as opposed to ICs that are soldered directly to the circuit board.

### INPUT CHANNEL FLEXIBILITY

Now available in 24 and 36 channel versions, channel options are unlimited for the future and for special applications requiring more than 36 channels.

### ELECTRONICALLY BALANCED INPUTS

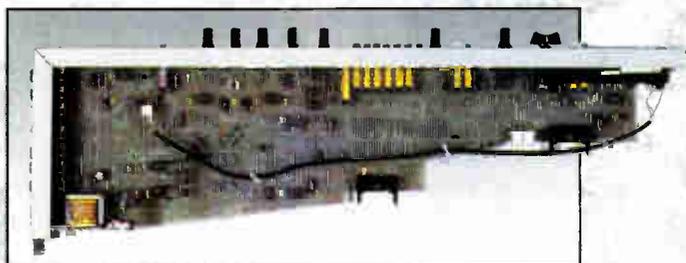
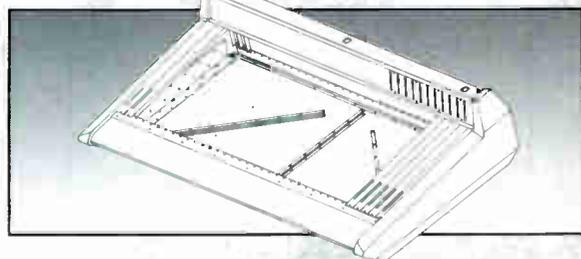
New electronically balanced input circuit offers 100 dB of common mode rejection, allowing the console to operate in most any environment without interference.



### PREMIUM FADERS

Rails are center ground and highly polished to match perfectly with nylon bushings for a silky smooth feel. The shaft is offset to prevent dust and debris from entering the fader mechanism.

# ENGINEERED... SOUND REINFORCEMENT CONSOLES



## MONOCOQUE CHASSIS CONSTRUCTION

A unique monocoque chassis construction has been selected for maximum rigidity and resistance to "flexing" of the chassis mainframe. This super-strong chassis design minimizes electronic problems due to the mechanical "bending" of the console chassis during transportation, set-up, and tear-down.



## EXTERNAL POWER SUPPLY

Rugged external power supply mounts in standard 19" rack and occupies only two vertical rack spaces.

## TOTALLY MODULAR CONCEPT

The Performance Series 3680 is a totally modular mixer from the standpoint of numbers of channels, and because channels may be removed separately. Each channel stands alone from the input to the 100mm fader. Removing the channel module also removes the entire array of input jacks and all patch points for that particular channel. From a service standpoint, the channel may be easily checked out on the bench or outboard from the main mixer housing since the input patch panel is part of the channel module.

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# The Transparency of Multimedia

We asked a new question on our economic survey questionnaire this year: Do you ever use the term "multimedia" in any way in marketing your products? A little over nine percent said they do. Considering that this is a term that has hardly even been defined, we considered that a surprising number. But maybe not.

If you accept my premise, and I hope you do, that "multimedia" is, at its heart, a transparency, a seamless joining of different electronic byways into one presentation that is controlled by a person, and optimally interacts with that person — then multimedia is nothing more than the way things have to be. Of course.

Sony and Denon both made interesting comments recently on the showing of some of their respective new high-tech products. Sony's CD-I player, just demonstrated, is specifically targeted toward business and commercial users, unlike Philips which has made a major push to the consumer market with its Imagination Machine.

Denon's DV-I player, shown to the consumer press, will, however, according to Robert Heiblim of Denon, be a business machine first. Sales have already been made to stores.

Both these products are interactive and use compression algorithms to get huge amounts of audio and video onto their respective disks. Denon would argue that DV-I comes closer to full motion video, a boon for any display product. And both these products are incompatible. And there's the rub.

As long as products don't talk to each other, there is no true "multimedia." The professional market is about to attack this problem with a vengeance, as several manufacturers have begun designing products with Lone Wolf open architecture computer control technology. Others are going with Crown IQ. Some



are going with both. The computer control contingent is getting serious.

Room acoustic design is entering the world of virtual reality with auralization on the way to create the multimedia experience before it even happens.

In this month when some of us will see each other at Infocomm and at NAMM (unfortunately scheduled for the same days), it's well to think of where electronic technology is headed. NAMM is the place, some of you might remember, where Warner New Media once demonstrated Tequila-containing blenders controlled via MIDI.

Control is the operative word. Control, transparency, and interactivity will be major tenets of the electronic systems of the future. The conventions coming up — CES, NAMM, Infocomm, NAB and NSCA — will all give us a view of the agenda of tomorrow.

Best regards,

Judith Morrison  
Editor in Chief

## SOUND & COMMUNICATIONS

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NSCA-TV News • AES-TV News

# Small Wonder

ASHLY was founded in 1972 with the stated goal of producing professional audio equipment that would set new standards for sonic excellence and reliability. The Company originally manufactured large mixing consoles with on-board signal processing for touring sound systems. Later, the consoles' built-in processing components were offered as separate rack-mounted units. The initial product line consisted of limiter/compressors, parametric equalizers, and a full selection of electronic crossovers. ASHLY added power amplifiers to its product offerings during the late 70's, and soon gained a solid reputation for the amps'

outstanding sonic performance and incredible reliability.

Building on this background of success and technological innovation, ASHLY has set out to expand its amplifier product line to encompass new markets. The new model SRA-120 professional stereo amplifier has been developed toward this goal, and offers superior sonic quality, rugged construction, and many useful features in a single rack space chassis. The compact SRA-120

is suitable for full-range applications, such as small control room monitor systems or as an ideal headphone distribution amp. With its excellent signal bandwidth, the SRA-120 is also well-suited for driving the high-end of a bi-amplification sound system setup.

The amplifier will deliver 60 watts per channel into 4 ohms stereo, 45 watts per channel into 8 ohms stereo, or 120 watts total into 8 ohms mono-bridged. Its design is based on "Class A" voltage amplifier stages with a complementary bipolar output section for low distortion and excellent overload behavior. Features include turn-on delay circuitry and instantaneous turn-off to eliminate any transients to the speaker. Each channel will also independently turn off its output if an overheated condition occurs.

This model also features rear panel switches to select between two choices of input sensitivity, stereo or mono operation, or normal or bridged mode. Rear panel input connections may be made via 1/4" balanced phone jacks or barrier strips with ground lift provision. Level attenuators for each channel are provided on the front panel, along with a stereo headphone jack. Status L.E.D.'s on each channel include signal present, clip alert, and "protect-mode" indication.

The SRA-120 is approximately 10" deep and weighs in at under 20 pounds, yet has performance characteristics and features typically found only in larger, more costly competitors. All Ashly amplifiers are covered under the company's exclusive Five Year Worry-Free Warranty program, offered at no extra cost to the user.

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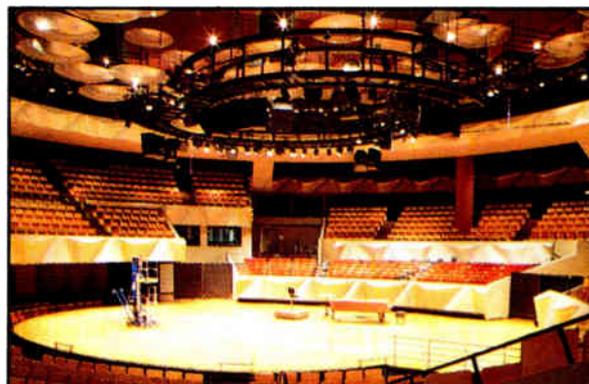
**ASHLY**

Circle 201 on Reader Response Card

# CONTENTS

Volume 38 Number 12

December 29, 1992



36

58

## FEATURES

### 20 NEW DEVELOPMENTS IN AURALIZATION AT THE A.S.A.

*By Mike Klasco*

Our technical editor provides a synopsis of his presentation at November's A.S.A. Auralization for sound system design was our resident expert's topic.

### 36 THE HOTEL MARKET

*By Beverly A. Knudsen*

Hotel directors provide a survey of horror stories and great successes culled from their work with sound contractors. What are the do's and don'ts?

### 49 1992 SUPPLIERS' SURVEY AND ECONOMIC REPORT

*By Judith Morrison*

We review the good, bad and ugly in our industry from the manufacturers' point of view. Was the past year any better than the year before? And can you be positive about the future?

### 64 THE GEORGIA DOME

*By Bill Morrison*

This recently completed dome stadium has an interesting innate acoustic character. Although very reverberant, the dome has good intelligibility.

## DEPARTMENTS

### 4 LETTER FROM THE EDITOR

### 9 NEWSLETTER

### 12 LETTERS TO THE EDITOR

### 6 *Sound & Communications*

### 14 GUEST COLUMN: PREDICTING THE UNPREDICTABLE

*By Wes Alderson*

### 30 FIRST PERSON: AUDIO IN ASIA, PART 1 — JAPAN

*By Mike Klasco*

### 58 INSTALLATION PROFILE: DENVER'S BOETTCHER CONCERT HALL

*By Ed Logsdon*

### 68 THEORY AND APPLICATION: SOUND QUALITY, PART 5

*By Steven J. Orfield*

### 80 NEWS FROM AROUND THE INDUSTRY

### 86 PRODUCTS

*By Steve Jacobs*

### 93 LITERATURE

### 94 PEOPLE

### 94 CALENDAR

### 96 AD INDEX

### 96 MARKETPLACE

### 98 PRODUCT CHECK: MALLS AND SHOPPING CENTERS

# UNIFIED ELECTRONICS

## Eliminate The Trade-Offs

Solve the sound contractor's usual trade-off between cost-effectiveness and flexibility, with the new Unified Electronics product line from University Sound. The core of the system is the 2000 Series, mixer/amplifiers featuring transformer isolated inputs, individual input gain controls, selectable phantom power and innovative muting circuitry. The units come in three- and six-input configurations with 60 or 120 watt output power ratings. Each model can be used as an independent mixer/amplifier or integrated with Unified accessory modules, providing cost-effective expansion capabilities.

The accessory modules offer a variety of functions, including a remote volume control, an audio-controlled relay and a tone generator. They can also serve as independent components using an optional accessory chassis.

Further enhancing the Unified Electronics line is the soon to be released MX-8 eight channel mixer. The MX-8 offers the same expandability of the 2000 Series without the integrated power amplification.

Make trade-offs a thing of the past – check out the unmatched flexibility and cost-effectiveness of University Sound's new Unified Electronics line.

For additional information, contact your University representative or call us toll-free: 1-800-444-9516.

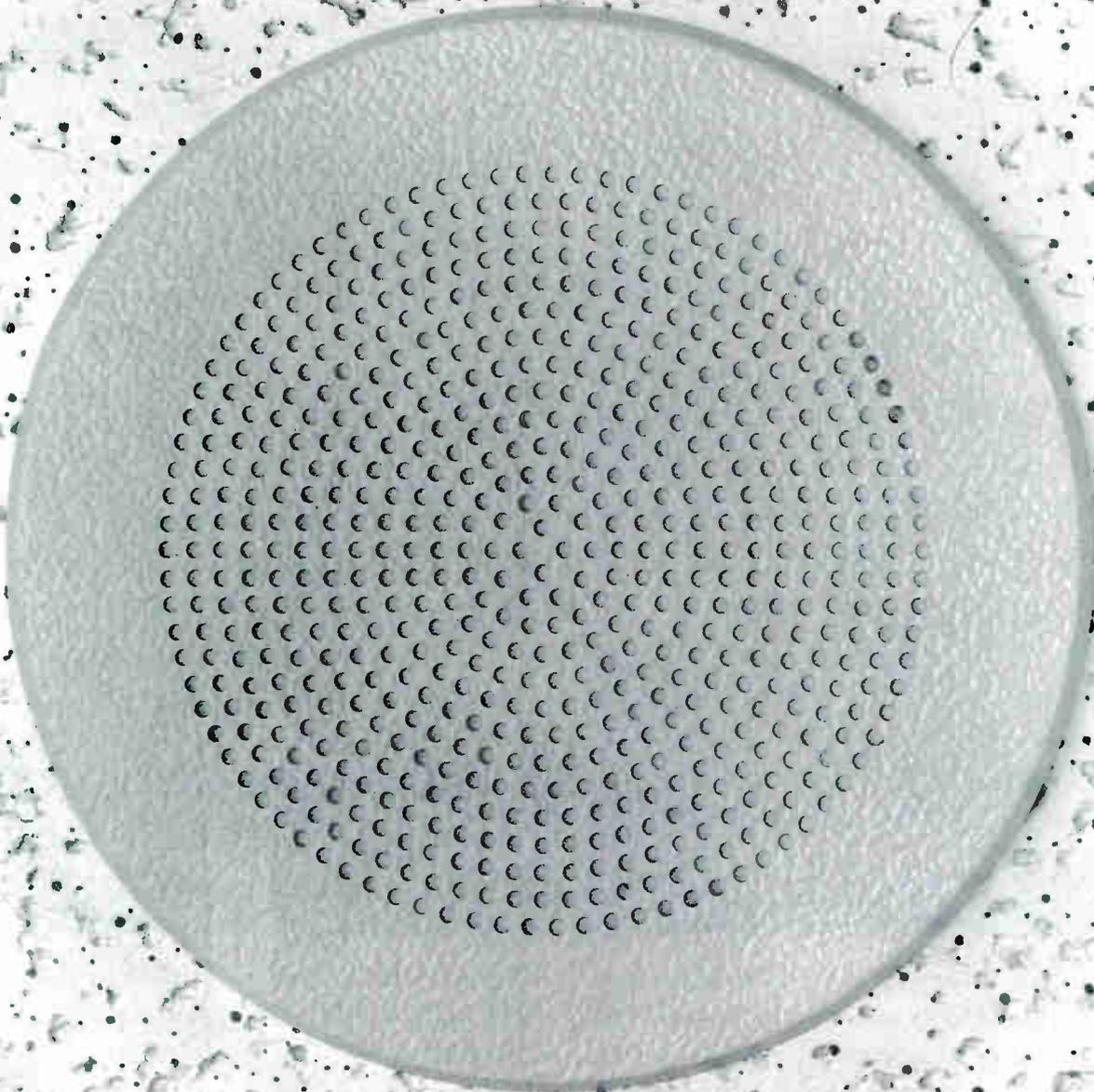


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# NEWSLETTER

## **AMPRO ACQUIRES GREYHAWK**

AmPro Corporation, the manufacturer of large screen displays for the industrial market, has entered into an agreement to acquire Greyhawk Systems, Inc., the California-based research and development company. AmPro's Greyhawk Division will introduce a new line of light valve projectors in early 1993. These products project video and computer data and graphics images at more than five times the brightness of conventional CRT projectors.

## **SEIDEN JOINS NUMARK AS SALES MANAGER**

Barry Seiden has joined Numark Industries as National Sales Manager. He comes to Numark from the Denon Professional Audio Division, where he was national sales manager. He has held the same position at Gemini Sound Products. Seiden had been sales manager of Numark Electronics before its purchase last summer by Jack O'Donnell (who had been with Stanton Electronics). O'Donnell, president of Numark Industries, is presumably establishing a group of managers familiar with the Numark brand and the DJ and club market. Barry Seiden has moved to Rhode Island (headquarters of Numark Industries), and will attend various shows at which Numark is exhibiting including CES and NAMM. Numark also exhibited at the International DJ Expo and LDI.

## **OTARI FORMS NEW DIVISION**

Otari Corp. has announced the formation of a new corporate division. The manufacturing facilities of the King Instrument division of Otari and Otari Console Products Group (formerly Sound Workshop) have been merged into the Otari Manufacturing Corp. All manufacturing operations in the U.S. will now fall under this new organization, which will be the worldwide source for Otari-brand audio mixing consoles, automation systems and audio cassette loaders. Named to the top positions in OMC are S. Higashino, president; T. Yanagisawa, senior vice president; Chris Honett general manager, New York Operations; and K. Taniguchi vice president and general manager Massachusetts Operations.

## **SAMSON WIRELESS INCREASES BATTERY LIFE**

Samson has announced that its Concert Series II wireless systems achieve a battery life of 17 hours or more in its transmitters. The systems incorporate the "latest" dbx IC and includes other technical improvements, according to the company. Doug Bryant, vice president of engineering, said, "By designing the new IC which incorporates the entire audio front end and the dbx circuit we have reduced the system's current draw to less than half of that of former systems." The Samson Concert Series II is a true diversity wireless microphone system.

## **AES SUBCOMMITTEE ON COMPUTER CONTROL**

The Audio Engineering Society formed the Subcommittee SC-10 on Sound System Control at the 93rd AES Convention. SC-10 replaces the former AES Working Groups. According to Bob Moses, chairman of disseminating the subcommittee's information, "Our new status as an AES subcommittee gives us a boost in our efforts to define a network for the professional audio industry. We now have a stronger presence in the AES, and hopefully more clout to get the ball rolling." The mission of SC-10 is to define open hardware interface and protocol standards for a professional audio network. The subcommittee has designated four new working groups: Working Group SC-10-1 on Data Communications (Michael Karagosian, chairman), Working Group SC-10-2 on Application Protocols (Jeff Berryman, chairman), Working Group SC-10-3 on Information (Bob Moses, chairman) and Working Group SC-10-4 on PA-422 (Ed Young, chairman). The subcommittee invites anyone wishing to join a working group to contact Bob Moses at 206-355-6000, fax: 206-347-7757.

## **CANON AND PICTURETEL CORPORATION AGREEMENT**

The Canon Still Video Systems Division has announced that PictureTel Corporation will use the RE-650 Video Visualizer in its videoconferencing systems. The Canon RE-650 Video Visualizer connects directly to the PictureTel videoconferencing system and is controlled through the key pad. The visualizer can display images of three-dimensional objects and documents on the monitor. Images can be displayed either on the full screen or inset with a picture.

# NEWSLETTER

## **TALBOT FORMS MARKETING GROUP**

Dave Talbot has formed the Talbot Marketing Group, a professional audio rep firm in Pleasant Valley, New York. Talbot has held positions with AKG Acoustics, BSS Audio and Turbosound. The new firm represents products in markets including MI, pro audio, engineered sound, sound contracting, broadcast, film and video production.

## **VIDEOCONFERENCING PRIMER FROM HITACHI**

Hitachi has announced the availability of a videoconferencing primer that explains recent trends in videoconferencing, the technology behind those advances and an emerging class of videoconferencing systems. The company says the videoconferencing market was \$60 million worldwide in 1990 and will be over \$2 billion by 1996. The primer can be requested by calling 1-800-HITACHI.

## **SEMICONDUCTOR MANUFACTURERS SUPPORT COMMON DIGITAL AUDIO FORMATS**

Several Digital Signal Processor manufacturers have announced an agreement to cooperate in standardizing multimedia DSP functions such as compressed digital audio. At the first meeting of the DSP Special Interest Group, representatives from Analog Devices, AT&T, Cirrus Logic, Intel, National Semiconductor, Motorola, and Texas Instruments decided to adopt the recommendation of the Interactive Multimedia Association for cross-platform compatibility at the application programmer's interface as a starting point for a broad number of potential agreements among DSP manufacturers. Other DSP SIG supporting members attending the meeting included Apple Computer, AudioFile, Asymetrix, Signal Processing Technology, Kinetic Systems, Intermetrics, Syncro Development, and Atlanta Signal Processors. The DSP Special Interest Group was established at a July meeting of the IMA Compatibility Project Steering Committee. The IMA is a trade association with more than 280 corporate members. The DSP agreement follows announcements earlier this year proposing a standardized set of digital audio interchange formats, the selection of a digital audio compression algorithm, and the availability of Intel's proprietary RTV 2.0 digital video compression algorithm through the IMA.

## **CROWN IQ SCHOOL SCHEDULED**

Crown has announced that the next session of its IQ School will be held February 23 through 26, 1993. The IQ School is open to all audio professionals. Crown personnel will lead classes focusing on the use and practical application of current IQ System 2000 computer control products for both IBM and Macintosh systems. The fourth day is reserved for certification testing.

## **JBL CONSUMER DEBUTS SYNTHESIS TWO**

JBL Consumer Products, Inc. has designed Synthesis Two, the second product in the new Synthesis line. Synthesis One was introduced last winter as a THX-licensed home media system. As with Synthesis One, the second system can be purchased as a complete turnkey home media system for visual as well as music reproduction. An electronically activated relay within the speaker system allows it to change between cinema and music modes via a button on the system controller remote. Each complement of drivers is electronically equalized. Synthesis Two is approximately half the price of Synthesis One: \$25,000 for the entire cinematic/music system down to \$13,000 for the cinema loudspeaker components only.

## **EIA/CEG OFFICERS ELECTED**

The Consumer Electronics Group of the Electronic Industries Association has named its officers for 1993. Newly appointed to the board for 1993 are: Darrell E. Issa, Directed Electronics; Gerald McCarthy, Zenith Sales; Stan St. John, AT&T; Michael Williamson, Sharp Electronics. Jerry Kalov of Dynascan is Chairman of the CEG Board of Directors and Joseph Clayton of Thomson Consumer Electronics is Vice-Chairman. New additions to the Executive Committee are Robert Heiblim of Denon and Robert Shaw of International Jensen. Clint Gibler of AT&T is chairman of the Assistive Devices Division, and Paul Fontaine of Digital Equipment is division vice chairman.

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## LETTERS TO THE EDITOR

# ASA, Schematics and Swimming

### MODELING SOFTWARE

To the Technical Editor:

I would appreciate a draft or final version of the talk which you presented at the recent ASA conference in which you compared various computer models for room acoustics.

We are interested in the immediate procurement of certain modeling software packages that you overviewed. Toward that end, could you provide a list of contact names/addresses/phone numbers of the various companies?

Thank you for your assistance, and for the valuable service that your survey is providing to the acoustics community.

**Rebecca Mercuri**  
University of Pennsylvania  
Philadelphia, Pennsylvania

*Dear Ms. Mercuri,*

*In this issue of Sound & Communications there is a summary of my talk at the Acoustical Society of America meeting on the various sound system design software programs and new developments in auralization. Each of these software programs represents years of effort, and the thought that I could possibly provide a fair overview on a half dozen programs in a twenty minute talk is very optimistic. You might want to contact the magazine for back issues of Sound & Communications for comprehensive reviews of each of these programs. We also intend to review the new releases of all of these programs during 1993. For information on the phone contacts for the various companies, you could use the Sound & Communications Blue Book.*

*Here are some of the contacts:*

*AconstaCADD: Altec Lansing, phone Rick Julien, 405-324-5311.*

*Modeler: Bose Corp., Tom Vimmerman, phone 508-879-7330.*

*EASE: Renkus-Heinz, Inc., phone Carl Dorwaldt, 714-250-0160.*

*CADP2: JBL Professional, phone Jeff Long, 818-893-8411.*

*Umblulus: North Star Sound, phone Tom McCarthy, 612-871-6016.*

*Hypersignal-Acoustic: Signalogic, phone Linda Wacht, 214-343-0069.*

### SCHEMATICS FOUND

Thanks to you and your printing of a letter entitled "Bankrupt Belfry," I have found a dealer who had the schematics for the Tape-Athon model 2000 belfry sound system. [July 1992, pg. 19.]

As I stated in the letter, the company went bankrupt and I had been unable to locate anyone with the schematics. Lo and behold, Midstates Sound & Communications of nearby Oneonta, New York happened to see this a few days ago and contacted me. Oneonta is less than 60 miles from Schoharie, so you never know where something of this sort will show up.

**Edward Scribner**  
Schoharie, New York

### MAKING WAVES

Before the door is closed on swimming speakers [Volume 38 Number 7, The Answerman], I'd like to offer this final bit of information on underwater speakers. Our company also manufactures speakers for swimming pools and for such diverse applications as attracting and repelling fish, as well as towing at great depths by a surface ship, acoustically simulating a submarine.

Ours is the only electrodynamic (loudspeaker-type) sonar transducer: Some units boast neodymium magnet drivers, weighing over 1,000 pounds. Of course, a smaller version is used in swimming pools.

**Bernard S. Willard**  
Director of Engineering  
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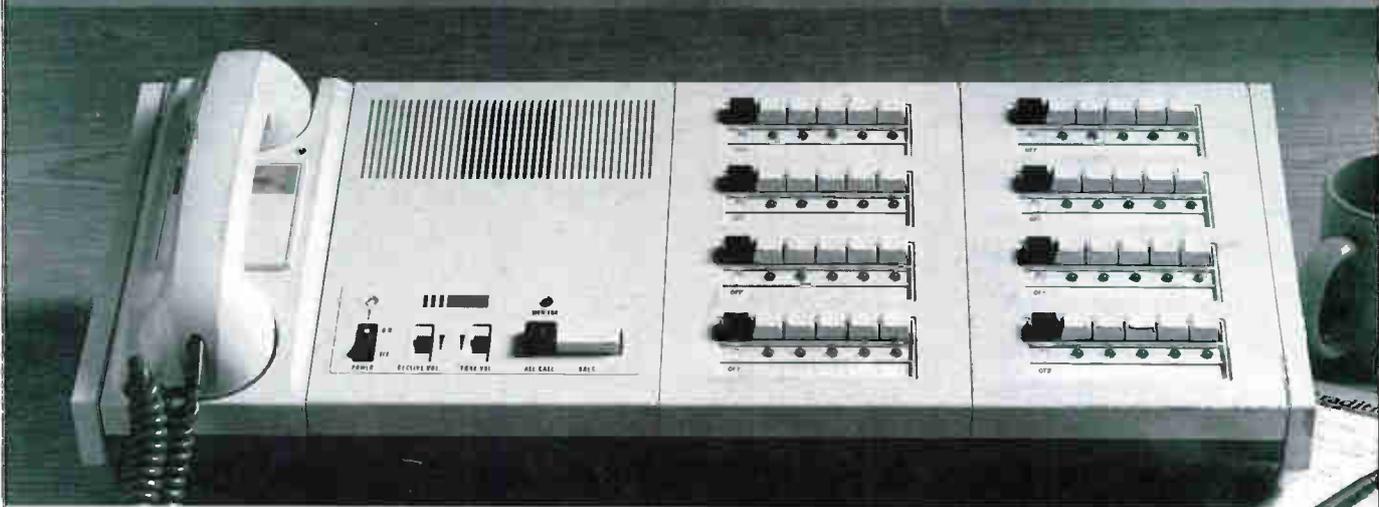
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# MANUFACTURERS' REPS PREDICT THE UNPREDICTABLE

By Wes Alderson

**What effect will changing local economic factors have on any manufacturer's national market? Where can you expect to see increases? Decreases? Who can you turn to for answers to these complex problems?**

Manufacturers in our Sound, Signal and Audio Visual Industry frequently predict and rate sales performance in regions and territories based on indexes such as BPI. Yet many manufacturers assume that these indexes are stable, static numbers. In reality, such "numbers" are in a constant state of flux and may have very little to do with how successful a manufacturer's sales force has been at obtaining market share in any given area.

A manufacturer's regional sales and market shares depend not only on the national economy but also on local "mini economies." Frequently these mini-economies depend on unobserved factors. Sometimes they are not even quantitatively measurable. But they affect your business!

## FLAWED BUSINESS INDEXES

Some fairly popular indexes are based only on an area's population, or perhaps on population plus unemployment rate

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*Wes Alderson is President of WesTech Marketing, the California Manufacturers' Rep Organization.*



plus per capita income. Other indexes factor in construction rates plus deeper economic factors and may come a little closer to approximating the business health of an area. At best however, these indexes do just that — they *approximate* the business health of an area. Why is this important to all of us?

## PERCEIVED REALITY

As an industry, we are not basing our decisions on reality. Instead we unavoidably are basing our decisions on "perceived reality." In other words, each of us bases his or her decisions on their interpretation of the "real picture." Therefore the accuracy of our decisions and the success of our activities depend largely on the accuracy of our interpretation of what is going on "out there." If we base that interpretation on flawed indexes, then we are vulnerable to flawed decisions. This is not profound; it is common sense!

As a consequence, it is extremely important for us to make our *perceived reality* as accurate as possible. It is also

important to recognize the fact that the indexes are all flawed to some extent. So we should take them with a grain of salt rather than staking our business lives on them.

## REGIONAL IDIOSYNCRACIES

Some of the factors that have a heavy impact on a region or a state's use of sound, signal, and audio-visual equipment include local codes, financial churn, construction rate, the concentration of business entities, the nature or type of that business, large government programs and grants, local money supply, and even micro-economic regional balance of trade.

## CODE & APPROVALS

It is well known that local codes, city approvals, and their government enforcement encourage the use of products produced by some manufacturers, and in some cases make it illegal for some products to be used in certain areas. For example, consider the effect which California Earthquake codes may have on

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the installation hardware required for heavy central cluster loudspeakers in public buildings. Or think of the dramatic effect that the ADA (American Disabilities Act) has had on the use of hearing assistance devices in some states — but not all states. Do any indexes or readily available governmental statistics address such issues for you?

### **USE YOUR REP'S KNOWLEDGE**

Generally a manufacturer can count on the intimate knowledge possessed by his local independent sales representative. The local representative's entire business career depends on this ability to perceive the effect of local conditions. His territory may only be 11 percent of your market . . . but it is 100 percent of *his* market. So ask him about local conditions and ask him about the effect codes will have on new products you plan to introduce. Use his knowledge for your own benefit.

### **CONSTRUCTION RATES**

Obviously, the need for sound, signal, and audio visual equipment in any area will depend largely on how much building is going on. If the area in question suffers from a regional recession, with low rates of occupancy in commercial office and residential buildings, new construction is discouraged. Therefore, this will reduce the regional appetite for equipment. The southwestern states have suffered from this condition for several years.

### **REGIONAL MICRO-ECONOMIES**

The health of a national economy depends in part on how effectively it can produce goods and services from its natural resources and labor, and how competitively it can sell these goods and services in domestic and foreign markets. In that way a national economy is (or should be) just like a very large business. In another sense, a national economy is only the sum of the millions of businesses and consumers

which it contains — a wheels-within-wheels concept.

The health of a national economy also depends on economic abstracts such as money supply. If there is an adequate money supply and relatively low-cost capital, then business is encouraged to expand and process more resources into goods and services. The rate (or churn), the speed with which it does this, and the rate at which the currency cycles also have a significant effect on the nation's economy.

Why are these factors important for your perception of how well you can do in various regions? Regions, States, and Trading Areas mimic the antics of a national economy. One area may lack business entities that produce goods and services, and as a result it may not develop or utilize its resources, may not produce and sell goods competitively and profitably, and may therefore not provide employment to its population. The results will include low construction rates, low spending rates, and therefore low potential for the equipment produced by our industry.

### **IS THE AREA ASLEEP OR AWAKE?**

There are some areas of the nation where all of the factors exist which we would normally look to to gauge how well a product will sell. Yet that product may still not sell well in the area. This can depend not only on the known and measurable factors such as money supply, construction, and per capita income, but also on immeasurable issues such as the aggressiveness of the local area and even fads!

To borrow an example from another industry: When Citizen Band Radio became a huge fad in the midwestern states, the trend never really caught on in California. California had the lowest rate of sales of CB Radios per capita versus any state in the union. Many manufacturers felt their own rep was "responsible." What was the real reason? Probably the CB Radio did not fit the lifestyle or attitudes of California residents. Can you

think of parallels in our own industry?

In some areas, all of the factors required for a booming mini-economy may be present. But there may be a lack of aggressive businessmen to take advantage of the opportunities. Low-cost capital availability does very little good if aggressive individuals do not seize the opportunity to use it to take advantage of the local resources to produce goods and services. I am thinking of a relatively major metropolitan area in California. Manufacturers keep asking the question, "Why is there only one successful major contractor in the area?" Possibly the answer is simply that the area is relatively sleepy. If that is reality, should we deny it or accept it? If we want to make crucially important predictions of our sales volume, it is probably better to accept such realities.

### **THE CALIFORNIA ECONOMY**

The state of California is a good example of a "mini-economy" that changes due to a combination of controllable and uncontrollable factors. Much of the nation has viewed California as a "heaven of business opportunity." This is because Sunny California was a desirable place to live, there was a huge annual population influx, there were myriad independent businesses, the state government tried to make California a good place to locate a business, and a large share of Federal Defense contracts went to huge defense manufacturers in California.

### **KILLING THE GOOSE THAT LAID THE GOLDEN EGG**

During the past 20 years, California's government gradually increased business taxes due to misguided "tax the rich" and "punish business" attitudes. This caused many businesses to relocate to areas with more favorable attitudes. Then of course, the same people who wanted to tax business began to complain about joblessness. This hurt the state!

The huge population influx forced real estate values to the sky for both commercial and residential properties.

People were unable to buy homes. People produced traffic, smog, and congestion, which they then became tired of. Now recent trends indicate that there is a net annual population *decrease* for the state.

Due to the "New World Order," the USA is sharply cutting back defense expenditures. Since an inordinate percentage of defense funds went to California, these cutbacks are cutting into the business of the major employers such as Hughes, Lockheed, and Douglas. This has produced wholesale layoffs, with the result that California's unemployment figures (which were considered immune to recession for decades) now rank among the worst figures in the nation.

Will California be able to overcome some of these negative elements, or will it become another "rust belt"?

Which of these factors were controllable and which were uncontrollable? Were any of them predictable?

### PLANNING FOR REGIONAL CHANGES

If you are a manufacturer trying to base your business plan on expected demand figures and sales from various regions of the nation, how can you anticipate these figures with any degree of comfort? Where can you bank on sales increases? Where should you anticipate unavoidable sales decreases? There is a profound difference between sales trends and market share. Especially long term. We must keep in mind that the areas referred to by politicians today as The Rust Belt were the boom areas only 50 years ago.

Would the suppliers of sound and audio visual equipment to Michigan 30

years ago have predicted that the intrusion of foreign cars would reduce the economy and construction in that state to the level of today? Again, to examine the "New World Order," what effect would huge grain sales to the former Soviet nations have on the economies of the Midwestern states? Would this produce a significant construction rate increase and therefore more appetite for sound, signal and audio visual equipment?

### CAN YOU PREDICT THE UNPREDICTABLE?

Is your sales force responsible for such increases and decreases? Do these market changes depend mainly on large scale economic trends which are beyond control? Common sense dictates the answer. Some of these things are both uncontrollable and unpredictable.

## SOUNDSPHERE SPEAKERS KEEP NEWSDAY PRESSES ROLLING...

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

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

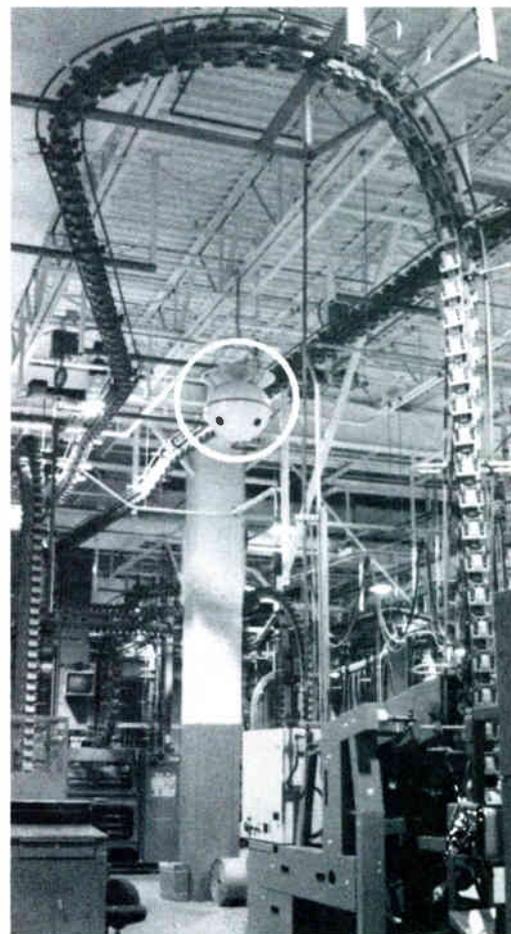
Patrick O'Hanlon, Production Maintenance Electrical General Foreman at the site states, "The area in question is a high density noise area and communication is difficult. When Bernie Lory of Craftsman Sound talked about Soundsphere speakers in airport terminals, I knew it was the system for us. The even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

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

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How can you predict the unpredictable?

Probably, it is best not to try. The best course of action may well be to know as much as you can about as many things as possible — especially new technology, economics, and the major trends in both the national and world economies. Try to anticipate the effect that these trends will have on our industry.

Frequently the analysis of directions

taken by business is an inexact science — economics. Business trends are governed as much by Chaos theory as they are by any postulated laws of “Cause & Effect.” Sometimes the best approach is one of intentional naivete — to rely on feeling one’s way along. If manufacturers and representatives do this and do the very best they can to increase market share, then things generally will turn out okay.

Remember that all of these major trends are modulated by local events, just as RF is modulated by Audio! The question posed in the beginning of this article was, “Where can you turn for answers to these complex questions?” The answer is: *Rely on your local representative* to keep you updated on local events, including the regional economy and codes. Take his opinions seriously. Encourage your representatives to report such things to you whenever impact is anticipated. To repeat: Remember, his area may only be 11 percent of your sales — but it is 100 percent of his!

### BEING POSITIVE ABOUT THE ECONOMY

As businessmen in the sound and audio-visual industry, we must face the fact that many of the above facts are negative. However, they are not all negative: not *every* aspect of our economy is gloomy. Therefore, the secret of success is to *create your own reality*. This means that we must look for creative ways to locate and develop those ideas that will lead to more business, even while others around us are failing.

For the manufacturer, the best way of finding those ideas, those “threads of opportunity lost in the chaos of recession,” is to locate a really good, creative representative. The rep will know his territory better because he *must* succeed there. The synergy created by that rep calling on accounts for his other product lines will enable him to carry your innovative products into projects that you would have never known about. I know of several reps that are finishing their biggest years ever, right in the face of this recession!

Similarly, contractors may do well to listen to the ideas brought to them by creative reps. The best reps will realize that the best way for them to succeed and sell more product, is to work with their contractors/dealers to develop mutually beneficial, new, profitable business.

1993 will be an interesting year for all of us. ■



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# New Developments In Auralization

*A Report from the 124th Meeting of the Acoustical Society Of America in New Orleans*

BY MIKE KLASCO

**T**he Acoustical Society of America (ASA) met in November in New Orleans for its annual get-together. The ASA, not to be confused with the AES, may not be too familiar to some readers of *Sound & Communications*. Membership consists predominantly of people working in acoustic science from industry, universities, and government.

Sessions at the 124th Meeting included a number of categories that sound contractors would be interested in, such as Architectural Acoustics, Musical Acoustics, Speech Communication, as well as topics quite foreign to us like Acoustical Oceanography, Animal Bioacoustics, and Education in Acoustics (ha!).

A new category was established for this show that will definitely be of interest to sound system designers. This was the session named "Architectural Acoustics and Psychological and Physiological Acoustics: Virtual Environments — Computer Modeling in Room Acoustics." Essentially the topics related to developments in auralization for sound system design. Auralization is the ability to derive the impulse response of a space

(even if the room only exists within your computer) and combine this room signature with music and listen to how the room will sound.

I was invited to the ASA meeting to present an overview of commercially available computer models for sound system design and room acoustics, and the auralization options that will be

**Room models, which initially were only floor plans, now had walls, ceilings, and surface finishes.**

available in the near future. Since auralization has not been discussed for some time in these pages, I will provide a synopsis of my presentation here. Thanks to Jeffrey Long of JBL, Ken Jacob of Bose, Carl Dorwaldt and Dr. Ahnert from EASE/Renkus Heinz, Dr. Akira Mochimaru of Altec, and Dr. Peter D'Antonio of RPG for their help.

## OVERVIEW OF SOUND SYSTEM SOFTWARE

The first personal computer modeling software for sound system design began to appear about 10 years ago. These early programs primarily were intended

as aids for optimizing the aiming of loudspeakers. Very little attention was given to the acoustical characteristics of the room, except for plugging-in the midband reverb time. As the speed and power of personal computers grew, the sound system engineering programs became more ambitious and began to address acoustical characteristics. Room models, which initially were only floor plans, now had walls, ceilings, and surface finishes. Ray tracing and image modeling capabilities were included, and simulations of STI intelligibility measures using the room model are now offered by a number of programs.

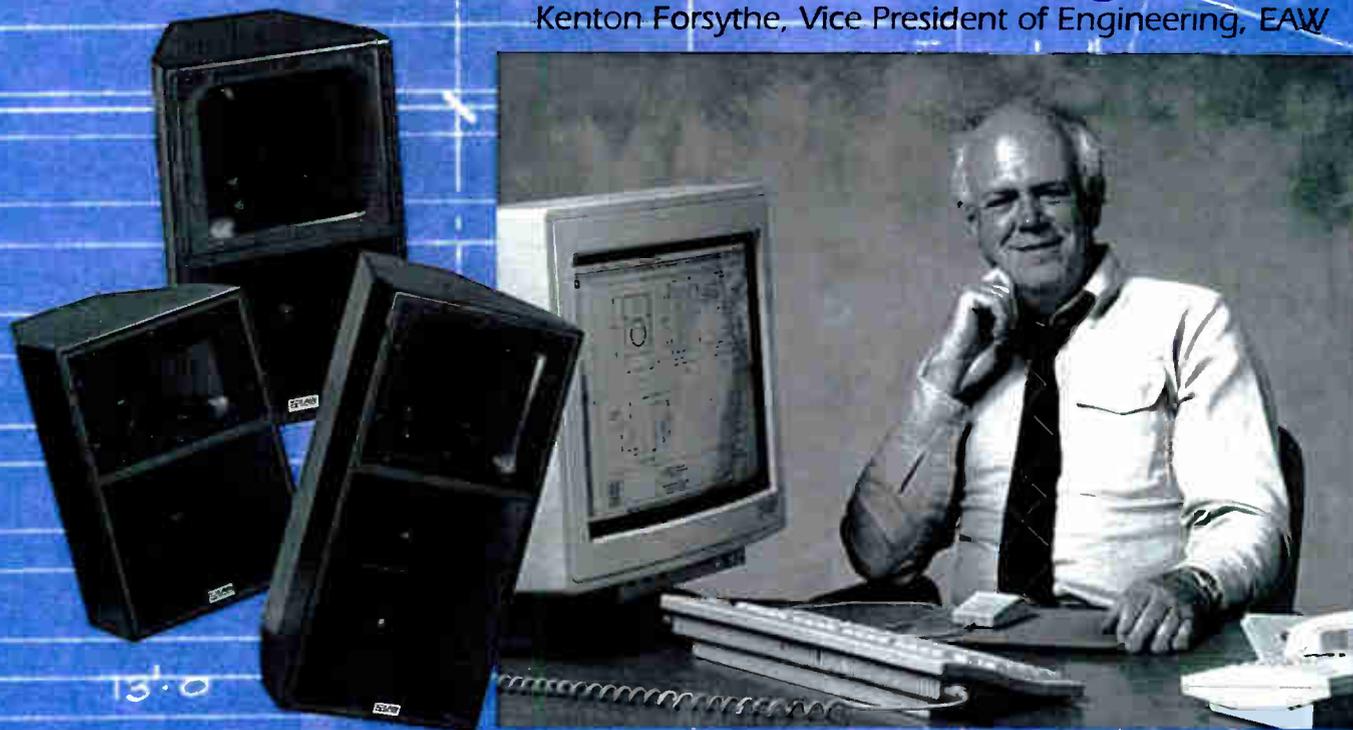
The use of image modeling/ray tracing can derive an approximation of the impulse response of the room. This impulse can be exported and convoluted with external signal processing programs and computer based DSP hardware to allow auralizing. While echograms showing the arrival times of the reflections can be meaningful to an acoustician, this data has little value in convincing a facility manager of the effectiveness of your sound system layout or acoustical treatment. And, of course, your primary concern is not how good a room measures, but how it sounds. Auralization offers the

---

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

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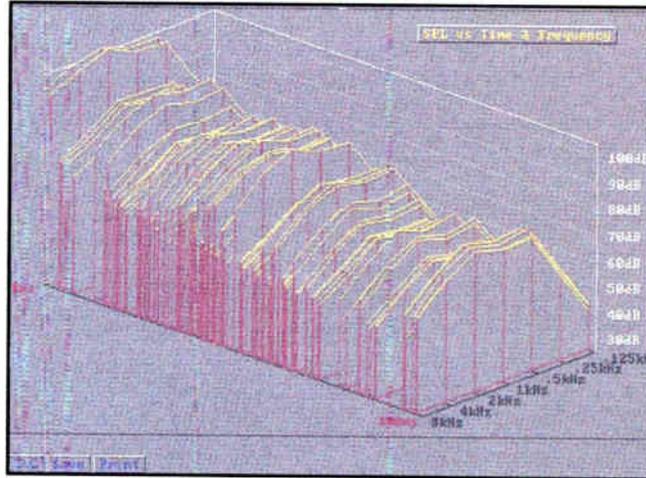
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promise of an audible prediction of how the room will sound.

**WHO'S DOING WHAT IN SOUND SYSTEM DESIGN PROGRAMS AND AURALIZATION**

*Hypersignal-Acoustic Version 3.4 from Signalogic.* Hypersignal-Acoustic has often been used as the software/hardware interface for sound system programs to provide auralization. Hypersignal can process a dry stereo audio signal (such as music recorded in a pseudo-anechoic environment) with the derived impulse response of a room — such as from EASE, AcoustaCADD, or CADP2). The result is a simulation of what the room will sound like at a specified seating location; very handy if the room, or the modified room, only exists within the sound system design program. The



*This is the EASE/EARS 3D spectral decay waterfall.*

Hypersignal software supports a lot of hardware including almost all Ariel products and the Techron TEF 20 HI.

Hypersignal is much more than auralization, and since this program was reviewed over a year ago in Sound & Communications many functions have been enhanced. These include improvements in real-time data acquisition, hard disc recording and playback (you can use your hard disc as the playback source for auralization), waveform editing and more. For

auralization, the maximum convolution sizes have been increased to permit a greater extent of the reverberant decay tail to be processed. We should have a comprehensive review of Hypersignal-Acoustic 3.4 ready by this spring.

*Renkus-Heinz EASE 2.0 and EARS.* EARS, Electronically Auralized Room Simulation, is a software program intended to be used with Version 2.0 of EASE. EARS is an application-specific Binaural Auralization program that eliminates the need for exporting the

# Industry Standard.



AMPLIFIER MODEL	8 OHM*	4 OHM*
MODEL 1200	100 Watts	150 Watts
MODEL 1400	200 Watts	300 Watts
MODEL 1700	325 Watts	500 Watts

\*20 Hz to 20 kHz, 0.1% THD



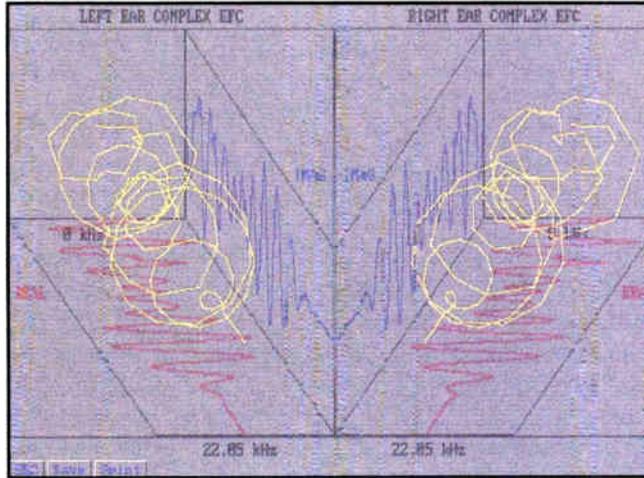
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room's impulse response to Hyper-signal-Acoustic.

Version 2.0 of EASE is nearing completion, while EARS is still in the final development stages. Version 1.0 of EASE was reviewed a little over a year ago. I found EASE 1.0 a very powerful program that was capable of modeling complex rooms and providing comprehensive and useful information to the sound system designer. The complete speaker file library contains many speaker manufacturers, and the "no

strings attached" licensing policy is a breath of fresh air, but the awkward program interface and the confusing data entry procedures for entering room coordinates were serious weaknesses. I have worked with EASE JR. and found this "cut-down" second generation version of the program much easier to work with. Version 2.0 of EASE will operate in a Window-like manner with pull-down menus, and overall operation is intended to be more intuitive and user friendly. The room modeling coordinate

method that I disliked has been replaced with a new approach that is promised to significantly reduce the time it takes to model even complicated rooms. Many other improvements, from better graphics to additional printer drivers are also in the works.

**I found EASE 1.0 a very powerful program that was capable of modeling complex rooms.**

Dr. Ahnert's present plans are to complete Version 2.0 of EASE and then move on to completion of EARS. The new release of EASE was previewed at the San Francisco AES (at the Renkus-Heinz suite) and Dr. Ahnert gave a paper on EARS.

# Future Standard.



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Beta testing of Version 2.0 of EASE has already begun with sales of the program to begin in early '93. EASE 2.0 and EARS will be demonstrated at NAMM in January, with stereo headsets provided so the auralization can be heard. EARS is scheduled to be formally introduced as a finished program by March.

*Altec Lansing's AcoustaCADD.* Auralization will be an optional func-

tion for AcoustaCADD 2.0. Like AcoustaCADD's competitors, the cost of the auralization option has not yet been determined. Altec's Dr. Mochimaru has been refining the auralization capabilities of AcoustaCADD and has given a paper on taking into account Binaural Auralization considering the direction of the listener's face, along with other considerations such as the loudspeaker's

off-axis transient response. Altec has also been working with Dr. D'Antonio on the effect of the diffusion scattering response of reflecting surfaces characterized as a transient response.

AcoustaCADD 2.0 will include a template program that I have had the oppor-

## Auralization will be optional for AcoustaCADD 2.0.

tunity to play with for awhile. This presently includes a number of churches and other facilities, but without the dimensions. The user need only "plug-in" his job's dimensions into the template and . . . instant model! This template idea is a Godsend and I would expect to see this ingenious idea "adopted" sooner or later by AcoustaCADD's competitors.

*JBL's CADP2.* JBL's Jeff Long told me that they have been busy putting the

## Simple or elaborate systems can be constructed and saved in the exact configuration to a data file.

finishing touches on release 1.1 of CADP2, with the release happening as you read this. CADP2 is a Windows format program. Release 1.1 has cleaned up essentially all of the initial release bugs, along with numerous program enhancements. For example, the user can now save and recall arrays. With this feature, simple or elaborate systems can be constructed and saved in the exact configuration to a data file. You can then duplicate this array for remote locations or for use in other jobs. Furthermore, an array can be defined as a speaker device, *i.e.* a composite speaker. This has a distinct advantage when utilized with multiway speaker products (such as JBL's own Architectural Series or other one-box systems).

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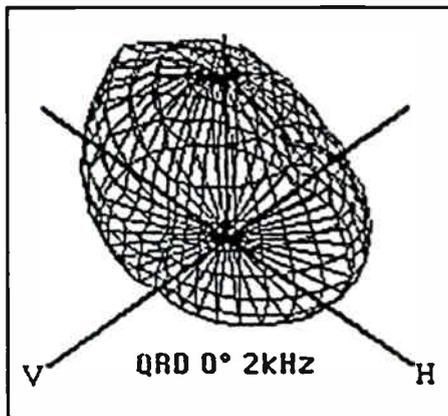
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Instead of the product being measured and stored as a single entity, the components of a multiway, when saved as an array, can now be manipulated separately for adjustments to their drive levels and frequency bands election. Yet the array can be positioned, aimed, and controlled as a single unit.

For auralization, CADP2 1.1 will provide room impulse response file export to Hyperception. This takes the form of an ASCII text file of the information contained in the echogram. This can be used with third party programs such as Hypersignal. Once in Hypersignal, the user can perform the auralization process, assuming that a suitable DSP board (like the Ariel DSP-16) is available.

*Bose.* At the 91st AES Convention, Morten Jorgensen, Christopher Ickler and Kenneth Jacob presented a paper on a prototype audible simulation system.



*The polar response for a QRD Diffusor for 0 degree incidence at 2 kHz.*

While the paper discussed the promise of audible simulation in effectively communicating acoustical results, the authors astutely pointed out that none of the existing auralization systems had been verified as accurate. There is no scientific evidence showing that listeners' responses over these simulation systems were comparable to their responses in the actual room. They concluded that:

"A major distinction must be made between a plausible audible simulation and a realistic one, since in the former

case only similarity is needed while in the latter quantitative proof of realism is required. For an [audible simulation] system to be an effective design tool, therefore, it must be proven scientific.

**The authors astutely pointed out that none of the existing auralization systems had been verified as accurate.**

cally to yield [responses from subjects] which match those obtained from real rooms."

In the intervening year, Bose has concentrated its effort in three areas: binaural impulse response synthesis algorithm

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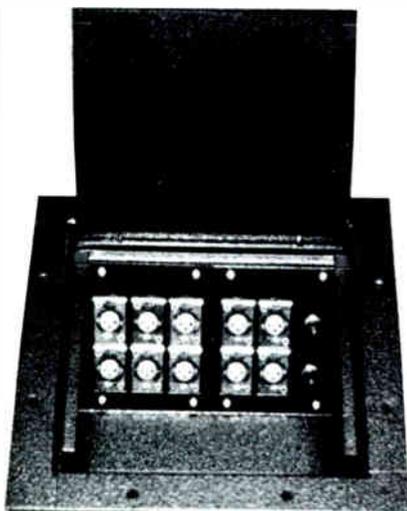
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efficiency, synthesis algorithm diagnostics, and simulation system authentication. The present thinking at Bose is that specialized processors (a DSP board, for example) will be required to achieve the responsiveness that designers will demand. Unlike the other software and hardware discussed in this report, Bose has based its sound system engineering software on the Mac platform. Unfortunately, not all the Mac computers have a slot for a plug-

**The present thinking at Bose is that specialized processors (a DSP board, for example) will be required to achieve the responsiveness that designers will demand.**

in board, although the Mac's external SCSI port could be used for an outboard DSP processor.

In their diagnostics work, Bose has made binaural impulse response measurements and binaural recordings in different auditoriums. Synthetic binaural impulse responses have also been computed using Bose's Modeler software and their prototype auralization system. The goal of this research is to find any obvious and correctable errors in the binaural impulse response synthesis algorithm. Listeners were unable to tell whether A or B was synthetic, indicating that the simulations were at least as convincing as binaural recordings.

A full scale authentication experiment is planned to test the ability of their auralization system to simulate the speech intelligibility of sound systems in large rooms. The experiment will use a variety of sound system types and rooms and will compare the speech intelligibility scores obtained

from the simulator to those obtained in the real rooms.

As to Bose's plans to commercialize this work, that will depend on the outcome of the research outlined here.

*Dr. D'Antonio DISC Project.* About two years ago it became apparent to me that the lack of standards for speaker directional characteristic files, room modeling coordinate files, and surface materials (both absorption and diffusion) was a serious impediment to the progress of sound system design programs. Through the AES I initiated a meeting to begin to try to coordinate these efforts. From this meeting the AES Subcommittee On Acoustics was formed, with myself as chairman and David Klepper as vice chairman. One of the working groups created to develop standards was Characterization of Acoustical Materials with Dr. Peter D'Antonio as Chairman. Dr. D'Antonio's main effort has been to develop a way to characterize diffusion with his DISC Project (DIrectional Scattering Coefficient). It may seem hard to believe, but there is no standard for measuring or specifying the characteristics of a diffuser, whether it is one of Dr. D'Antonio's RPG devices or just a row of wood slats on a theater

**Dr. D'Antonio's main effort has been to develop a way to characterize diffusion with his DISC Project.**

wall. Let's say you actually end up with one of the new auralization programs, design your room, auralize, and find that you have a serious slap-back flutter echo from the rear wall. Additionally, your project is a church and the congregation participates in singing in the services, but the congregation is not strong-lunged, so you do not want to absorb their vocal efforts.

Currently, there is no way for you to tell the sound system design/

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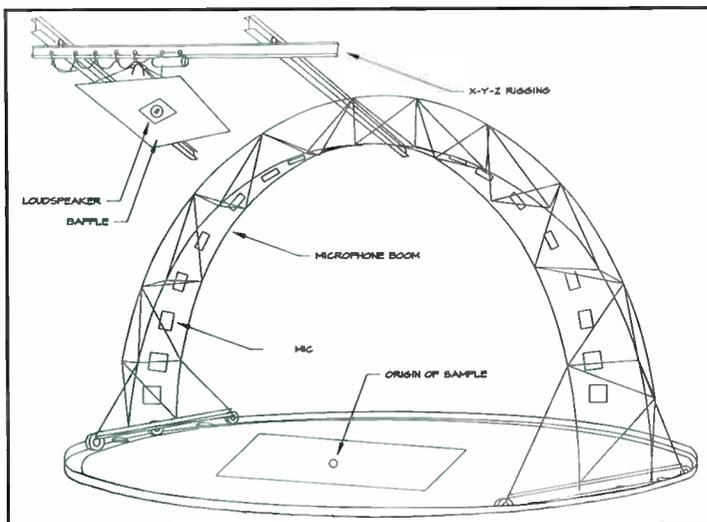
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*The measurement apparatus for determining the Directional Scattering Coefficient of all architectural materials in RPG's DISC PROJECT.*

auralization program that you would like to install some sort of diffusing element on the back wall. And the reason for this is the lack of standards for characterizing diffusion, that is, the random-incidence absorption coefficients; nor is there a database of directional scattering coefficients for the commonly used architectural materials — which gets us back to the purpose of Dr. D'Antonio's DISC Project. The goal is to determine the necessary directional scattering coefficients, as well as computational algorithms which utilize these data in image model/ray tracing programs. Dr. D'Antonio gave a paper at the ASA, and we will invite him to report on his progress in the pages of *Sound & Communications*.

### HARDWARE FOR AURALIZATION

**Outboard Processors.** AcoustaCADD and others have demonstrated auralization techniques using the Lake FDP 1 Digital Audio Convolution Processor from Australia. This is a very high power processor that allows the room's impulse response to be superimposed on the dry music in real-time. Cost of the Lake FDP 1 has recently dropped in price to about \$10,000, as the souped-up FDP 1+ has just been introduced, but both are still too expensive for sound contractors.

**Plug-in Data Acquisition DSP Boards.**

Conventional data acquisition DSP boards contain a/d (analog to digital converters), some memory, DSP (digital signal processor), and d/a (digital to analog converters). Unlike the pricey Lake processor, they cannot play back and superimpose the room's signature (impulse response) in real-time. Instead, the dry program material must be saved to hard disc, post-processed in the DSP board, and saved as a new file. Renkus-Heinz estimates that 20 seconds of music will take about 15 minutes of processing time.

The Ariel DSP-16+ is a popular choice, as it is not too expensive (about \$3,000, depending on the software bundled with it), and can double as your acoustic analyzer for speaker and sound system testing when used with the Bell Labs SYSid software, also available from Ariel. Dr. Jont Allen of Bell Labs and Dr. Sunil Puria of Ariel/MIT Research Labs gave an interesting paper on the concepts and functions of SYSid at the ASA.

An alternative is the TEF 20 HI acoustic analyzer, which (like the Ariel board) is supported by Hypersignal Acoustic.

**Multimedia Boards.** In my discussions with the developers of EASE and AcoustaCADD, I find they are considering some sort of inexpensive hardware alternative for implementing auralization, at least as a starting point until the user decides to upgrade to a "CD" quality data acquisition board.

One possibility is to use multimedia "sound boards." Quite a number of "sound boards" such as Sound Blaster and the Covox Speech Thing are commonly available and cheap (less than \$200 wholesale). But most of these inexpensive boards use 8-bit encoders and decoders, which limits the signal to noise ratio to about 48 dB, not quite adequate for auralization. If the sound quality of the hardware is inferior, then the fine nuances of the processed sound during auralization will be lost, such as the ability to discern the difference between a direct radiator and a horn speaker.

Recently a couple of 16 bit multimedia sound boards have hit the market, such as Multisound by Turtle Beach Systems, but these wholesale for about \$600. Another alternative is the Ad Lib board which boasts a 12 bit dynamic range (72 dB), and costs about \$300 retail. We will keep you posted on these developments.

### EXHIBITS

Aside from many technical papers at the ASA convention, there were exhibits and workshops. Compared to the NSCA or AES conventions, the exhibit area was tiny, with only a dozen or so displays, but many very powerful acoustic analysis simulation and test systems were demonstrated. Of course B&K was demonstrating its excellent acoustic analysis gear including the 2100 series portable analyzers, which is a high resolution real-time analyzer. Hewlett-Packard showed a handheld portable FFT analyzer. Quest demonstrated its octave band analyzers, Larson Davis showed a range of sound level meters and their portable FFT analyzer which interfaces with personal computers. ACO Pacific exhibited their calibrated mics, a less expensive alternative to B&K. A few acoustic analysis computer workstations were exhibited, such as those from Computation Systems, Entropic Research, Kay Elemetrics and National Instruments. Finally, Overly presented their line of noise barrier doors and windows. ■

# AUDIO IN ASIA, PART ONE: STORIES FROM JAPAN

By Mike Klasco

**This is not a documentary on the sound contracting business in Asia, but a collection and observations from my travels to Asia over the last ten years.**

My firm, Menlo Scientific, consults for various audio manufacturers in Japan, Taiwan, Korea, China and the Philippines. My tale begins in Japan.

Sound contracting in Japan generally follows the character of the rest of their industries—BigTime. Instead of Church and State being separate (in this case Manufacturers and Installers), the big audio companies both manufacture and contract for design and installation. Panasonic (National in Japan) Ramsa is a sound contractor over there. Yamaha has a separate division for facility design and installation. These super-sound-contractors even have their own research groups. For example, what started out as Fuji Sound's design software is now the core of Mark IV Audio's AcoustaCADD. While Fuji does not manufacture loudspeaker drivers (last I checked they were mostly E-V products), they do build their own mixing boards.

For a few years I consulted for Yamaha in Japan to help develop their YST sound reinforcement speaker line. When traveling to Korea you pass over Japan about an hour before you land in Seoul (Korea). I always thought I should work closer to home than Korea and that Ja-



*A rainy day in Tokyo's electronic discount district.*

pan would be a good place to start. Well, I miscalculated. Yamaha is in Hamamatsu, about 200 miles southwest of Tokyo. A trip to Yamaha would start off with a few hours spent getting to the San Francisco airport and getting on the plane. The flight takes about 10 or 11 hours to Tokyo. Getting your baggage and going through customs takes another hour or two. The trip from the airport to the Shinkansen (bullet train, although the exact translation is "new line train") is another two hours. Once you are on the bullet train you have another two hours to Hamamatsu. All in all, it's about 20 hours door to door. Of course the ensuing jet lag does not help all of this either!

Hamamatsu is a city of 500,000. It is an industrial city, home of Yamaha, Honda, Roland, Kawai, Suzuki and half dozen other big manufacturing companies. With the exception of about 100 Americans from Honda's Ohio factory, there are only a few hundred foreigners in Hamamatsu. If Yamaha had another foreign consultant in their factory com-

pound of about 7,000 workers, I never saw him.

The most unusual experience at Yamaha was the piano crossing. Two adjacent facilities are used for Yamaha's automated production of pianos. After the piano is almost completely finished, it is moved by robots on tracks to the second facility. To get to the other area the piano must cross a street and a railroad style crossing has been set up. As the piano is carted across the street by the robot, the robot synthesizes a tune to the passersby.

During one of Yamaha's preliminary field tests in Japan we were to take a few prototype speakers to a community center in a fishing village. I sort of expected a field hut, but the facility was a first class live performance theater, what you might expect at an Ivy League university. The sound equipment was comparable to a Broadway playhouse and the installation was done by Yamaha's sound contracting arm. I inquired how could this fishing village afford such a concert hall? It was explained to me that the hall was

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

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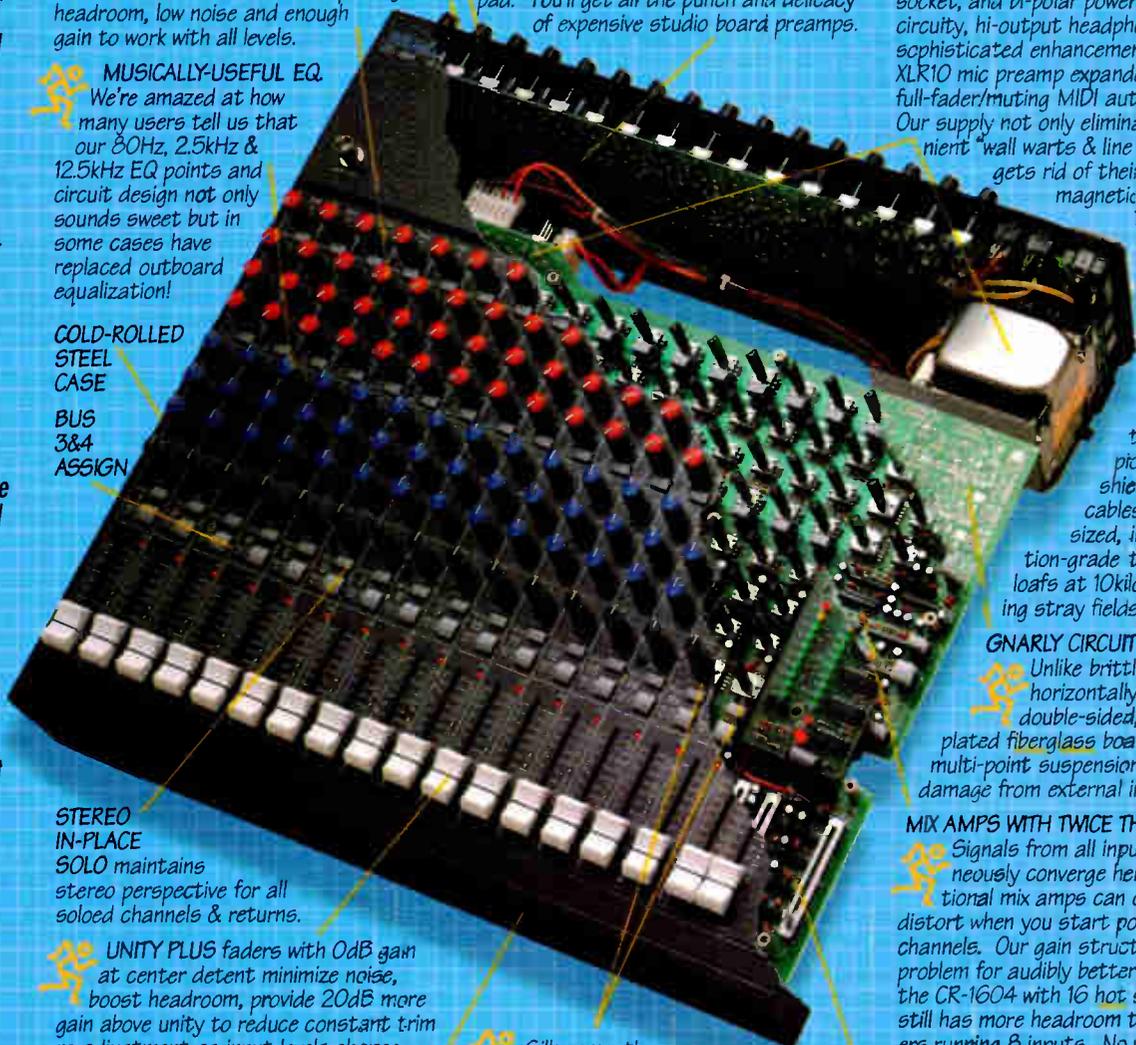
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a "gift" from Yamaha to this village. I had worked for Yamaha long enough to know that such gifts were not earned lightly. I asked what favor did the village do that this token of appreciation was granted. The response was that the village loaned Yamaha the use of their lake for boat racing each year. Apparently, boat racing is a big betting sport in Japan. All the racing boats are identical (all these

### THE SOUND EQUIPMENT WAS COMPARABLE TO A BROADWAY PLAYHOUSE AND THE INSTALLATION WAS DONE BY YAMAHA'S SOUND CONTRACTING ARM.

boats are made by Yamaha, of course). The only difference is the "jockeys," which are all Japanese teenage girls. They are all celebrities, and are paid enormous salaries. Schools for training to become race boat drivers are popular in Japan, with only a few graduates being able to actually find work. These schools promising fame and glory remind me of the recording studio schools in the U.S. In exchange for the use of the lake and being allowed to run the boat races, Yamaha provided the hall for the village. Of course, since the hall was nearby, Yamaha would occasionally try out prototype sound equipment in the hall.

Aside from the surprise story of how the village got the hall, the acoustics of the hall were not what I expected. A few years ago a famous Japanese acoustician (Ando) wrote a book on concert hall design. A number of unusual criteria were expressed, including the suggestion that the reverberation time should be constant with frequency. This hall near Yamaha was one of those halls that were designed with these criteria in mind. I will just say that while the diffu-

sion was good and there were no flutter echoes, the space was a bit too live for my taste.

Engineers and marketing people at Yamaha who were originally from Tokyo often looked down at Hamamatsu as it was not a big city, just a factory town. One jokingly asked me if I knew what the direct translation of Hamamatsu into English was. The punch line was "Cincinnati." Japan is real expensive. The two hour train ride from Tokyo to Hamamatsu is about \$80; a similar ride on the San Francisco Bay area's BART is \$4. While a decent hotel room in a small city like Hamamatsu is not too bad at about \$80, and about \$400 monthly for a modest studio apartment, food is expensive. Dinner can be \$35 for a light meal. Coffee will be \$5 extra and do not expect a free refill! Tokyo is far more expensive, with dinner easily exceeding \$100 and a dumpy hotel costing over \$200 per night. As I write this, I am in Japan visiting the Audio Fair in Tokyo. My hotel room at the Sunshine Prince (adjacent to the convention center) is literally the width of the bed. One of my fellow travelers remarked that he actually liked the bathroom module as it reminded him of his trip on a cruise ship (micro-bathroom modules are also used there). How small was the bathroom? Let's just say that if you were drunk you would not have the space to fall off the toilet!

Everything in Japan is more expensive than the U.S., even Japanese goods. VCRs, audio equipment, etc., are typically sold for close to list price, with the identical items selling for higher resale prices in Japan than in the U.S. As a rule, Japanese manufacturers price their goods to match the price of imported U.S. and European goods in Japan. Only in certain parts of Tokyo can you find discount stores; outside of Tokyo they just do not exist. Even at the audio stores in Tokyo's Akihabara section, I did not see any real bargains. But I did see a few items not yet available, as I write, in the U.S. like DCC digital audio tape recorders, high definition televi-

sions, and high brightness flat screen color auto TVs for sale.

The truly unique gizmo I saw at the Audio Fair was Sony's NT micro-digital-audio tape format. The tape cassette is literally the size of a postage stamp, and the entire machine is about the size of a very compact micro-cassette recorder. The Stereo unit has almost CD quality sound with about one hour recording time that is crammed into the NT machine, along with a video-style rotating head drum. I just cannot imagine how they will get this into production.

Japan is the birthplace of Karaoke, and bars with karaoke systems are everywhere. While laserdisc-karaoke (sort of music minus one + MTV) is starting to get popular in the U.S., the less ambitious karaoke systems in Japan are CD+G. This is the CD based system that originally was to have both music and still pictures encoded into the disc and a graphic output for the video still frame. What became the standard is the words to the music encoded along with the music, which are sent to a video monitor or superimposed on other video material. Recently, JVC has introduced CDs for karaoke with video data compression so the video portion can be active.

While you can find many discos in Tokyo, outside of the very big cities they are not so popular. In Hamamatsu there really was only one club for a city of 500,000. Yet in the U.S. you can see a number of Japanese companies offering what appear to be mixers seemingly developed for the Japanese domestic market, but these designs are a little weird. These products are multimedia mixers specifically designed for the Japanese wedding business. Japanese weddings are highly orchestrated, sometimes even with the bride coming down from a trap door in the ceiling with a puff of smoke and all sorts of other effects (I wonder if a similar — but opposite — process is available for divorce proceedings?).

Japan's lack of natural resources has an influence on construction and

materials used in their pro audio products. An extreme price premium is put on glass epoxy circuit boards and the lower grade phenolic boards are used in almost everything but the most expensive power amplifiers, digital processors and high-end mixing boards. In the past I have encountered other unusual influences on construction technique.

Twenty years ago at GLI (a disco equipment company I owned) I battled with the Japanese factory we used over board layout practices. I wanted a single board without any internal wiring; they wanted a dozen little boards with miles of spaghetti. Eventually it was explained to me that the circuit boards for the mixers were assembled by a "cottage industry" in a small town. Each family sat around a table at home and stuffed a particular board. At the end of the week they took these boards to a small factory

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and stuck all the subassemblies together. This approach, "keiretsu," was popular even with many of the large Japanese companies until the 1970s, with small companies bringing most production in-house by the 1980s.

Japanese companies still rely on many small subcontractors, although these days with the tight economy and pressures of the money exchange rate the smaller suppliers are hurting. A number of the keiretsu outfits were more than suppliers of subassemblies, but built entire short run products, such as high-end audiophile or pro models. If you look for it, at trade shows you can see these keiretsu outfits that once concentrated on building for the Japanese giants trying to set up distribution under their brand name in the U.S.

Marantz Japan, originally called Standard Radio in the late 1960s, is an interesting (but not typical) example. Standard Radio was going under and was bought by the Tushinsky brothers. These fellows also owned Superscope (the originally importer of Sony tape recorders) as well as Marantz. Standard Radio was renamed Marantz Japan and became the first Japanese company to be owned by a U.S. company. Over the years ownership of Marantz changed hands a few times and now it is a factory in Tokyo filled with Dutchmen, as Philips has ended up in control of it!

Marantz is a large OEM source of quality products that include many of the CD recorders on the market (regardless of the name on the front panel), a number of "pro" cassette decks, not to mention the two Marantz companies that oddly co-exist in the U.S. (Marantz-Philips and Marantz-Dynascan).

Vestax is another high quality OEM supplier with aspirations of developing a brand name. Vestax has built for both Japanese and U.S. companies; one example is Stanton's disco mixers. Of course, the keiretsu/OEM phenomena is not limited to Japan, and Phonic of Taiwan is in a similar situation to Vestax, but we can talk about that next month when Audio In Asia goes to Taiwan. ■

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# 'Checking In' to Hotels

## *Advice On How to Have a 'Long, Pleasant Stay' in the Business*

BY BEVERLY A. KNUDSEN

**J**ust as they have tales of perfect guests and dreadful guests, hotel directors have stories of both great successes and horrible disasters in working with sound contractors.

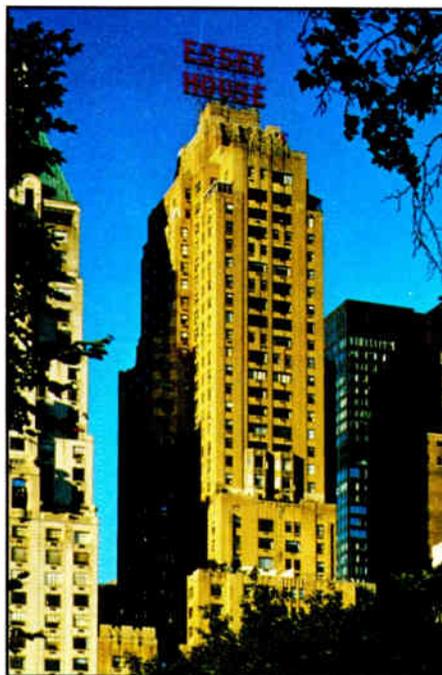
There was the contractor who delivered half the equipment for an installation early, and looked like a hero . . . until the rest of the shipment didn't arrive. Unable to reach the contractor by phone, the hotel audio-visual manager went in person to investigate, and found a padlock and a sheriff's notice on the shop's door. And while a business going "belly up" in the middle of a job is rare, there are a multitude of problems that can arise. Consider: a hotel can spend large amounts of time and money planning and promoting an event, but it can all be wasted if there's a problem with the a/v service. So, we decided to talk to hotel managers and sound contractors who have developed successful business relationships, and to ask both for some key "do's and don'ts" to follow.

### **WHOSE HOTEL IS IT, ANYWAY?**

"Installers should acknowledge that

---

*Beverly A. Knudsen is a freelance writer in the New York City area.*



*The Essex House/Hotel Nikko New York.*

we know best what our needs are," says Jerry Jensen, Audio/Visual Sales Manager at The Broadmoor in Colorado Springs. In the past three years, Jensen has initiated major upgrades and new system installations at the hotel, including a multi-function room installation [see *Sound & Communications*, Volume 37 No. 12].

Jensen is happy with the contractor he ultimately selected — Electronic Systems International — but found others who bid on various jobs too inflexible. "Many contractors wanted to do *their* system, *their* way. We wanted to design the system ourselves, then have the installer come back with input. Some contractors wanted to sell us on a particular brand; in general, many had too many preconceived ideas about the direction we should take."

In contrast, Electronics Systems International demonstrated multiple systems for Jensen, not insisting on certain brands. Ultimately, the Shure Automatic Microphone System, White equalizers, QSC Audio amplifiers, and speakers from Electro-Voice, Atlas/Soundolier, Ramsa and Apogee were used.

In the multi-function room, reports Jensen, some contractors wanted to use a patch-based system. "I didn't want that, cause I knew the connector would eventually fail," says Jensen. Electronics Systems International went for a digital combiner in its approach.

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— are not overly preoccupied with appearance and decorum. This is definitely *not* the case at hotels, however. Management is very concerned that contractors fit in with the hotel's image.

"Our customers expect the audio-visual personnel to act like members of the hotel staff: cordial and congenial. It is very important that when contractors come onto the hotel grounds, they conform to the standards of the hotel in terms of security and safety rules, and also in term of dress." The speaker is Johnny So, Managing Director of Loew's Ventana Canyon Resort in Tucson. He finds this is especially critical if a contractor uses part-time staff or subcontractors; more attention is often needed to check that they are as reliable and presentable as the rest of the a/v team.

Brian Flaherty, Assistant General Manager of The Four Seasons in Philadelphia, agrees. "The a/v staff is not literally on the hotel's paycheck, but I want them to fit in with the 'Four Seasons Family.'" This is an issue on a daily basis, says Flaherty, for — depending on the volume of business expected at the hotel — there are two full-time and a range of part-time a/v technicians on site.

"A contractor should have a dress code for his staff," says Mil Samardzija, New York General Manager at Projection Video. "We have blue jackets with gray slacks, plus tie. Delivery people also have a uniform that uses blue and gray. This way, hotel security recognizes them, and there are no questions or delays." It all boils down to professionalism, says Samardzija, who adds, "A contractor can't be wearing a 'Twisted Sister' T-shirt and blue jeans if he wants hotel business!"

### THREE WAYS TO GO

In trying to reach hotel a/v directors for this story, I would often be transferred by the hotel switchboard and then hear "Joe Smith, ABC Video."

This is typical of one of three systems commonly used in hotels today. Under this system, many of the larger hotels use an outside vendor — such as Projection (called Projection Video in New

York), Ancha Audio/Video Corp., and Photo & Sound — that provides equipment, service and staff. In this case, the contractor acts as the hotel's in-house audio-visual director and he and his staff are a constant on-site presence. The vendor is usually selected by the director of convention services or the executive committee of the hotel. These contractors often specialize in hotel work; Ancha, for example, is now in 635 hotels nationwide.

The Marriott Hotel chain has taken that approach a step further. It owns its own national network of a/v contractors, called Marriott Visual Presentation (MVP). These contractors are full employees of the hotel chain.

The third method is more traditional, and is now most likely to be used by older or smaller hotels. In this case, a hotel uses an outside contractor — such as King Cole or Ace Audio/Visual in New York City, for example — for "drop off" or episodic service. The hotel a/v manager will contact the contractor on a per order basis.

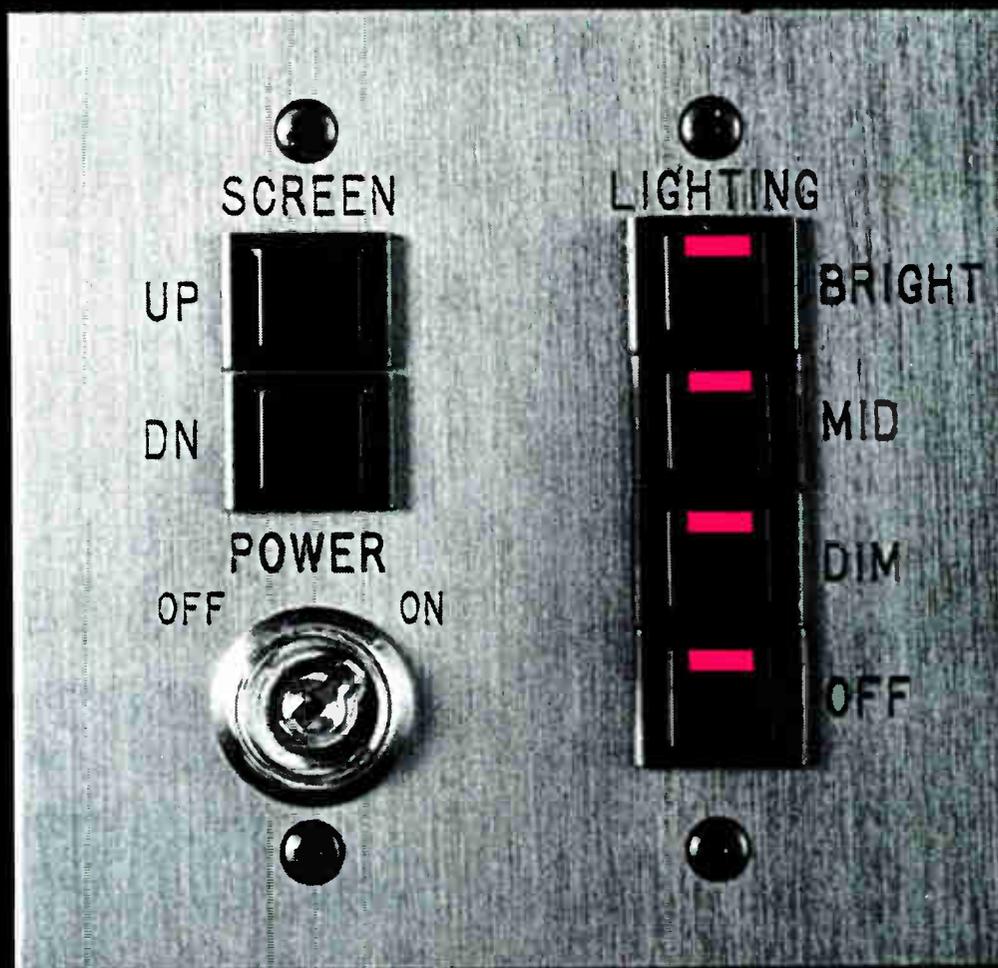
Contractors I spoke to say the hotel business has indeed changed in recent years. It is now a fairly involved, competitive industry. It is also an increasingly sophisticated market, where contractors are sometimes asked to help hotels stage events that rival Broadway shows in complexity.

### STAYING ON THE LEADING-EDGE

The Loew's Ventana Canyon Resort has a large volume of convention business; Johnny So estimates that about 100 conferences are held there each month. "These conferences can require something as simple as hooking up a projector, or as complicated as setting up multimedia rooms with rear-screen projection TV, sound and lights. At times several days of work are required to accommodate a single conference. There are constant challenges, and the contractor has to be able to respond quickly, using the best equipment."

Brian Flaherty comments that "like so

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**Many hotel guests have special requests regarding the type of equipment they want for their events, and contractors are often expected to accommodate these demands.**

used, with well-trained technicians to manage the equipment effectively." Many hotel guests have special requests



PHOTO BY BOB McINTYRE, BROADMOOR HOTEL.

*The Broadmoor Hotel in Colorado Springs.*

regarding the type of equipment they want for their events, and contractors are often expected to accommodate these demands.

Ancha San Francisco Audio/Visual Director, Larry Casserly, claims the in-house type of contractor operation offers advantages for the hotel in keeping equipment current. "An outside installer comes in, puts in a system, and then it wears out in 2-4 years. The problems then escalate until they need to be

called in to repair it. When we first come into a hotel, one of the stipulations of our contract is that we analyze the hotel and design a system to meet its needs. We then install brand new equipment, which we maintain and upgrade on an ongoing basis. With our service, the hotel gets constant attention; not periodic service based on problems that have surfaced."

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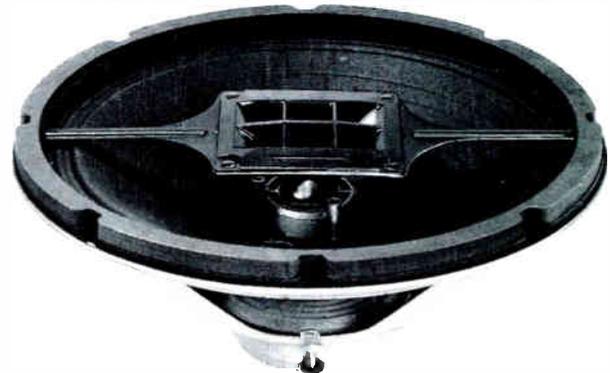
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*Four Seasons Hotel in Philadelphia.*

system required or client demands that present challenges, but the actual structure of the hotel.

Tom McIntyre, of WP Consultants, Ltd., is a technical consultant to The Essex House/Hotel Nikko New York. The 60-year old hotel had been closed for two years for renovation, and McIntyre's job involved coordinating the work of the construction management firm, the design consultants,

the architect, and contractor.

"A new system is being installed in the hotel's public spaces: the lobby, two ballrooms, seven meeting rooms, two boardrooms, and several hospitality suites. Everything had to be computer controlled," says McIntyre.

The job was difficult, due to the age of the hotel. "When a hotel is older, new system installations are always a problem," concedes McIntyre. "Paths had to

be found for cables and wiring through concrete fills; and domes, Corinthian columns, and gold leaf appliques have to be protected and taken into account in the work." McIntyre worked with the design consultants, Imera Fiorentino Associates, and the Tishman construction management firm in selecting a contractor. Altel Sound Systems in

**If there wasn't a total commitment to follow-through, we didn't want them."**

Pleasantville, New York was the final choice. The contractor is using IRP, Ivie Technologies and Atlas/Soundolier equipment in the installation, as well as Panasonic projection TVs, Kodak projectors, and a variety of other equipment.

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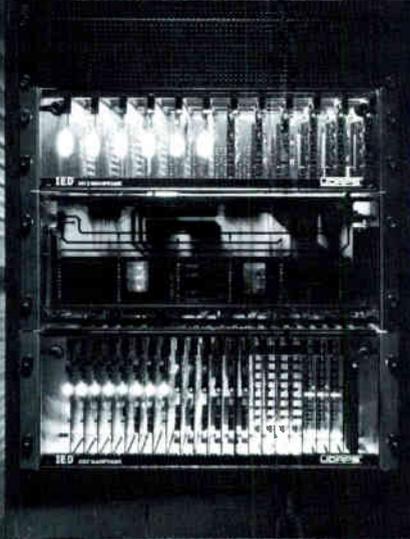
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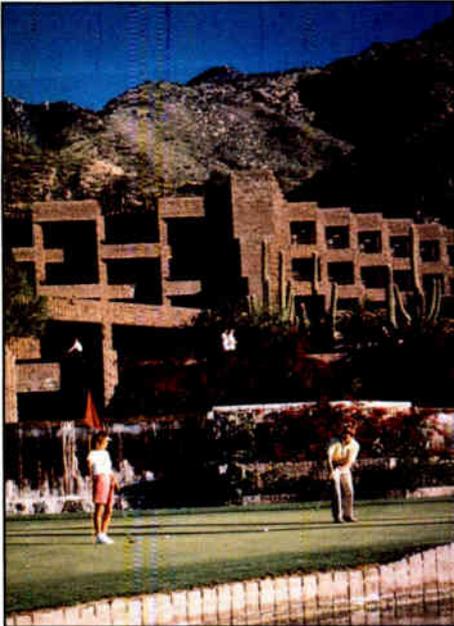


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*Loews Ventana Canyon Resort in Tucson, Arizona at the 18th hole.*

### 24-HOUR SERVICE REQUIRED

All the hotels I contacted agreed that a contractor's service contract was a critical factor in their selection process.

"The ability to get hold of someone 24 hours a day, whether it's on weekends or at night . . . that's what we wanted," explains Jerry Jensen. "Some contractors were flexible about the equipment they'd use in the installations, but hedged when it came to service. If there wasn't a total commitment to follow-through, we didn't want them," he concludes.

While most hotel meetings are held during daylight hours, occasionally there are some corporate events on

### A little research before signing the contract can uncover problems.

evenings and weekends. "We have an a/v technician on-site in that case," says Flaherty. "Basically, there are times when a technician has to be available the same hours as the rest of hotel personnel: 24 hours a day."

Mil Samardzija cautions hotels against falling into "numbers mania" and simply going for the contractor that offers the highest commission. "In that case, that often means there's no support after 4 p.m.; watch for the service hours offered!" Projection Video guarantees that

its technicians will be present an hour before a meeting starts, and they will stay on-site until a half-hour after the start of the last event that *doesn't* require a/v service. That way, if someone unexpectedly wants to screen a videotape, for example, his request can be met.

### CONTRACTORS HAVE THEIR SAY

Experience is a good — but rough — teacher, and hotel managers can avoid some painful learning experiences if they listen to some advice from successful sound contractors.

"Before hiring a contractor," warns Mil Samardzija, "look at the history of the company. Is it primarily an outfit that's done staging? That may present difficulties; you could end up with 'rock and roll' types. Also, if you have a large hotel, has the contractor only worked in smaller hotels? Their requirements might be much less demanding than yours." A lot of companies "look good on paper," but a little research before signing the contract can uncover potential problems.

Look at the contractor's warehousing capacity. "We keep our hotels well stocked, even overstocked," says Larry Casserly. In the San Francisco market, Ancha has a specialty warehouse in the area that supplements each hotel's

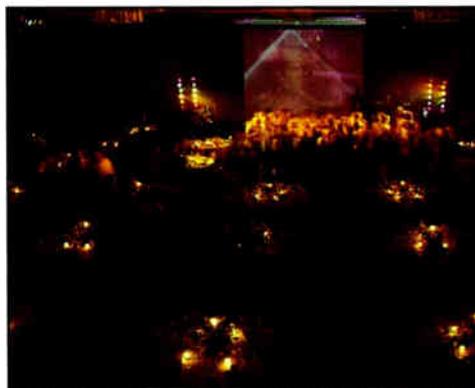
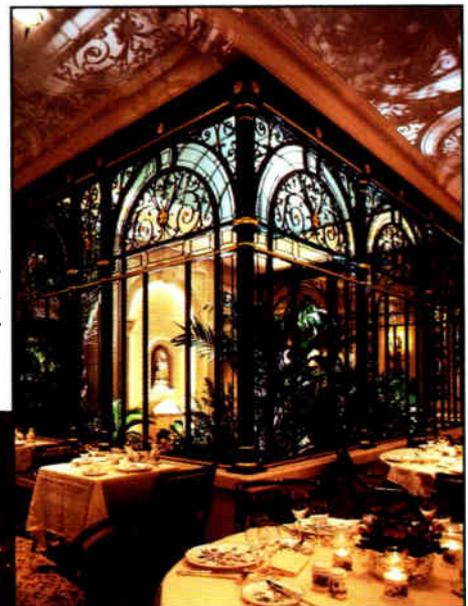
stock. Any hotel a/v director who's had to ask "How long will it take to get it here?" knows the importance of easy access to equipment.

And, finally, don't automatically go for the lowest bid. Happily, this opinion

### "When I check out other hotels' sound systems, I can hear that they compromised."

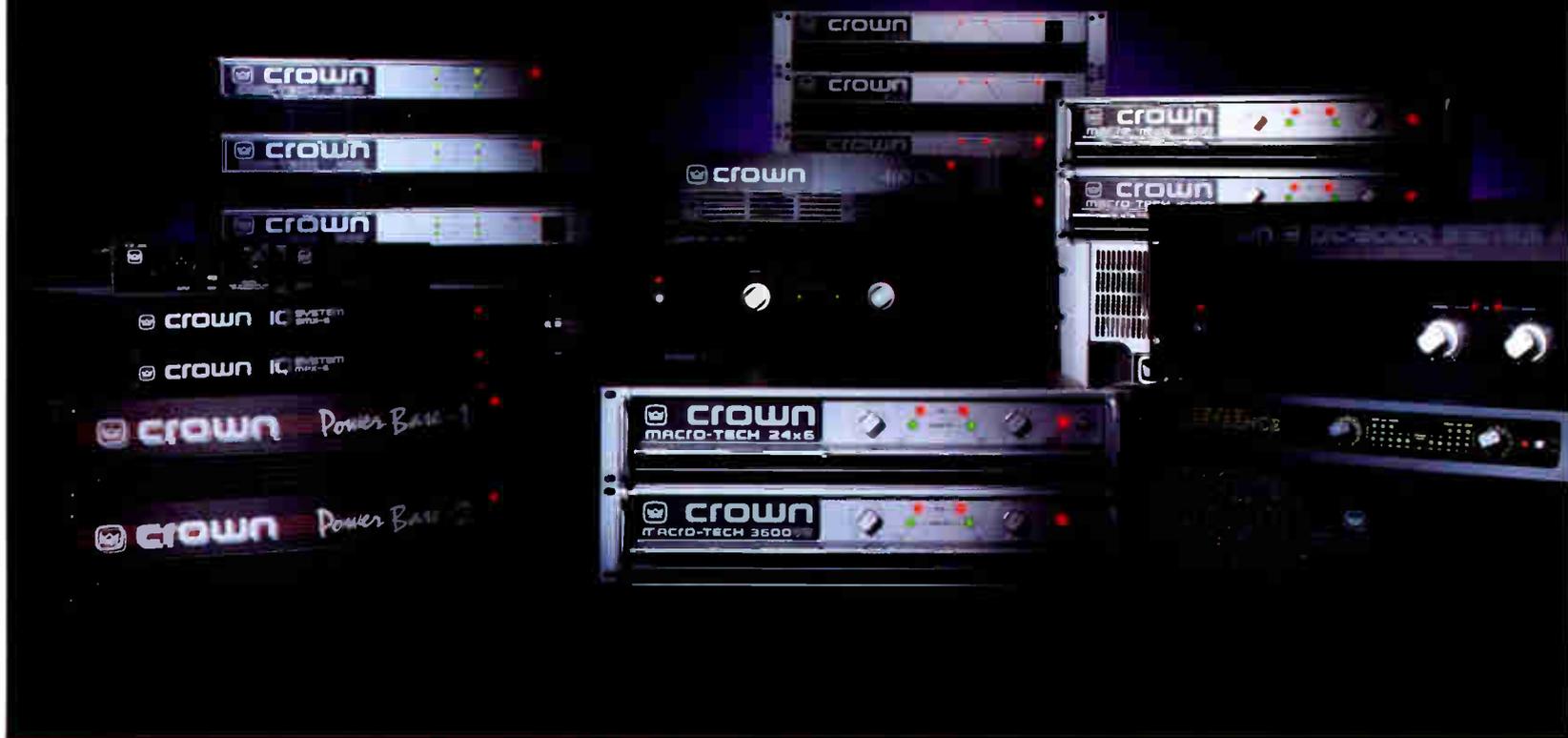
is shared by some successful hotel a/v directors as well as by contractors. "When I check out other hotels' sound systems, I can hear that they compromised," comments Jerry Jensen. "It's not just the lowest cost we go for. We use quality equipment, and won't cut corners and opt for a lower-priced public address type system. We were willing to pay the price for a system that was not just intelligible for speech, but was effective for a/v presentations as well." Amen to that. ■

*Cafe Botanica at the Essex House in New York has a background music system with remote program selection and local volume control.*



*The Grand Ballroom at the Loews Ventana Canyon Resort.*

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\*In case you were reading too fast, we wanted to remind you that this ad is about UHF, not VHF wireless. †As long as you are reading our ad this closely, we thought we'd tell you who they are: Yukinaga Koike, Doug Bryant, Takao Horiuchi, Susumu Tamura. †dbx is a registered trademark of Carllon Industries.

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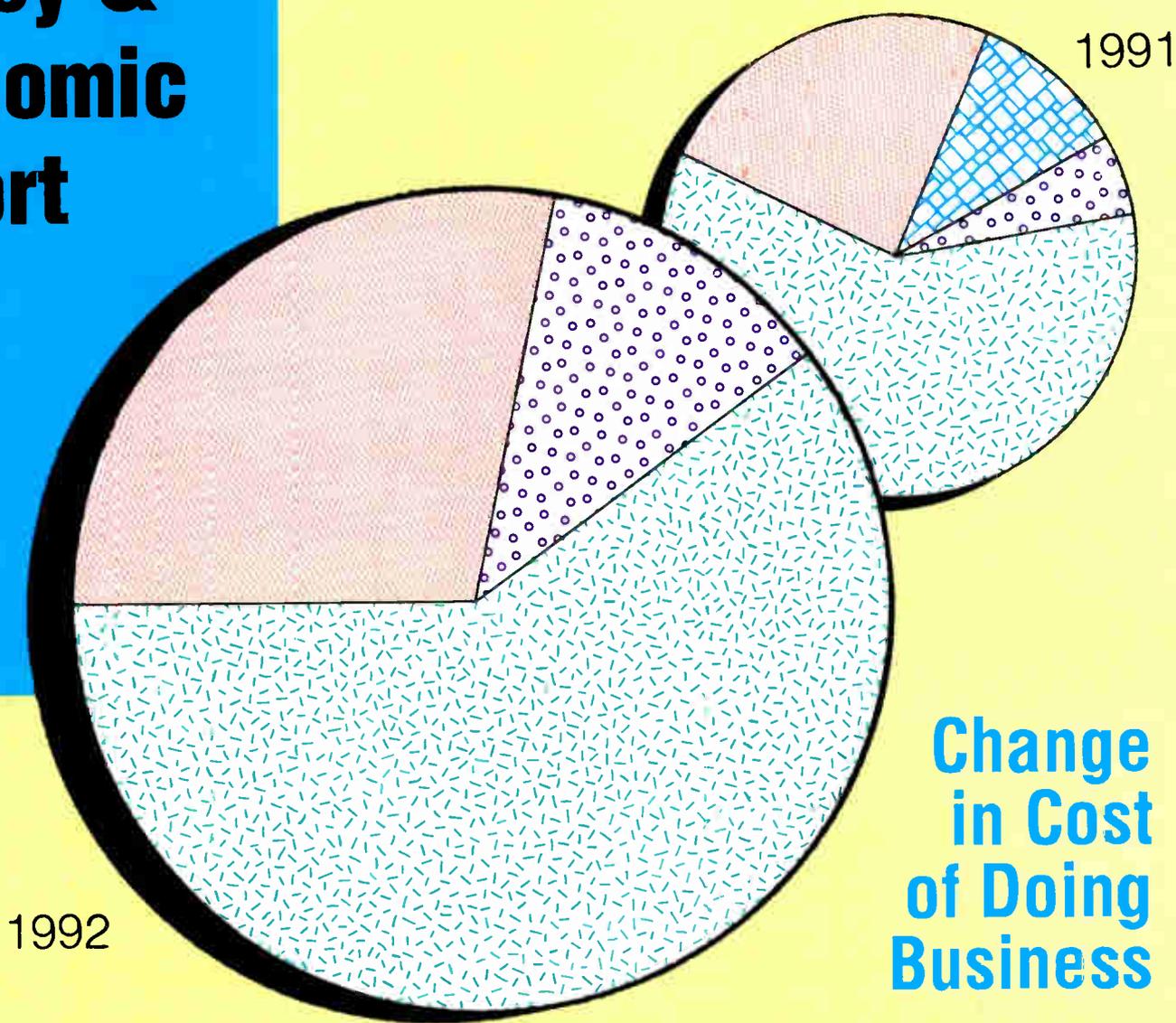
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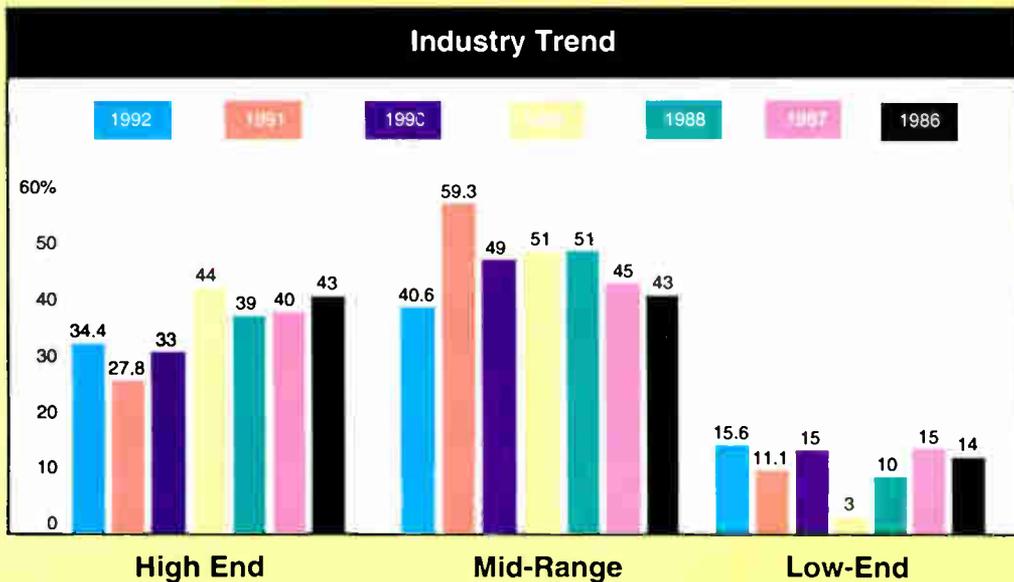
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1992

1991





Change in Operating Margin	
Higher	28.1
Lower	50.0
Same	18.8

Change in Average Cost Per Sale	
Higher	50.0
Lower	21.9
Same	18.8

# The Seventh Annual Sound & Communications Suppliers' Survey & Economic Report

**By Judith Morrison**

Here's the bad news: A full 50 percent of suppliers to the sound and communications business are operating on a lower margin this year than they were last year. And 50 percent are incurring higher costs per sale.

The seventh annual Sound & Communications Suppliers' Survey and Economic Report finds things not quite rosy in the offices of suppliers across the land. But the outcome isn't all bad.

Once again we polled the suppliers listed in our annual Sound & Communications Blue Book for answers to questions that affect the industry. The eight page questionnaire was mailed this fall and asked questions about 1992 business. Some of the answers, with comparisons to other years, can be found in charts on these pages.

As for that cost per sale: This was a new question that we added this year. Fifty percent of our respondents said the cost was up. But over a fifth said their cost was down. And nearly a fifth said that the cost was the same. (The rest of the people chose not to answer this question.) Larger companies were more likely to say that costs were up; smaller companies were more apt to say that costs

were the same. We also added a write-in question asking exactly what the average cost of a sale is. The answers were rather surprising and all over the place, ranging from "8 percent" to "40 percent" and everything in between. Our favorite answer to this question was, "Too much," a comment we suspect many would agree with.

As for the change in operating margin: Again 50 percent reported that their margins were lower. But 28 percent reported it higher. And 18.8 percent reported it the same. Larger companies were far more likely to report margins both up and down. Smaller companies were more likely to have remained the same. Again, we attached a write-in question to this topic. What exactly is an ideal operating margin? The answers ranged from 12 percent to 60 percent, with most answering between 40 and 60 percent. One respondent answered: "Ideally, 100 percent; but seriously, 33 percent."

We also asked a more general question, "How has the cost of doing business changed in the past year?" Although 65.6 percent said "higher" or "much higher," that number was down from last year's response, when 79.7

How Pleased Are You with Your Reps Performance? —	1990	1991	1992
Very Pleased	13.2%	13.2%	11.5%
Pleased	49.1	57.9	53.8
Not Pleased	35.8	28.9	30.8

Do You Use Independent Reps? —	1990	1991	1992
Yes	74.6%	70.4%	81.3%
No	25.4	29.6	18.8

percent answered "higher" or "much higher." This year 34.4 percent said their costs had remained the same, a far better augur than last year's 14.8 percent. But no one this year reported lower costs, versus 5.6 percent last year. Larger companies were more likely to report their costs as having remained the same.

How is the credit picture? Slightly more respondents have refused credit to more customers this year than they did last year. Over 37 percent are in this position. And only 3.1 percent report refusing credit to fewer customers. But 53.1 percent report the situation as the same as last year (versus 59.3 percent saying the "same" last year). That means that credit refusals have consistently increased at least over the past two years. Larger companies were more likely to have increased credit refusal. Smaller companies were more likely to report things as the same as last year.

More respondents see the trend moving towards the middle range of price points (40.6 percent). Over a third see the trend moving towards the high end. Only 16 per-

cent said the trend was toward the low end. We asked that these answers be based on the orders filled in 1992. Last year's survey had less of a spread, with nearly 60 percent predicting the midrange, and only 11 percent the low end.

What do suppliers see as the most important criteria used by their customers in selecting products? Once again, "reliability" came in for the lion share of the vote (nearly 60 percent voted this as most important). Technological innovation and availability brought in another 25 percent each. Price was seen as most important by only 9.4 percent of the respondents. But last year, 24.1 percent thought this was "most important." "Price" was the only criterion that showed a drastic change. The others remained fairly stable, with the exception of "predisposition of specifier." The specifier was seen as less important this year than last. (The responses come in over 100 percent, because respondents tended to check off more than one "most important.")

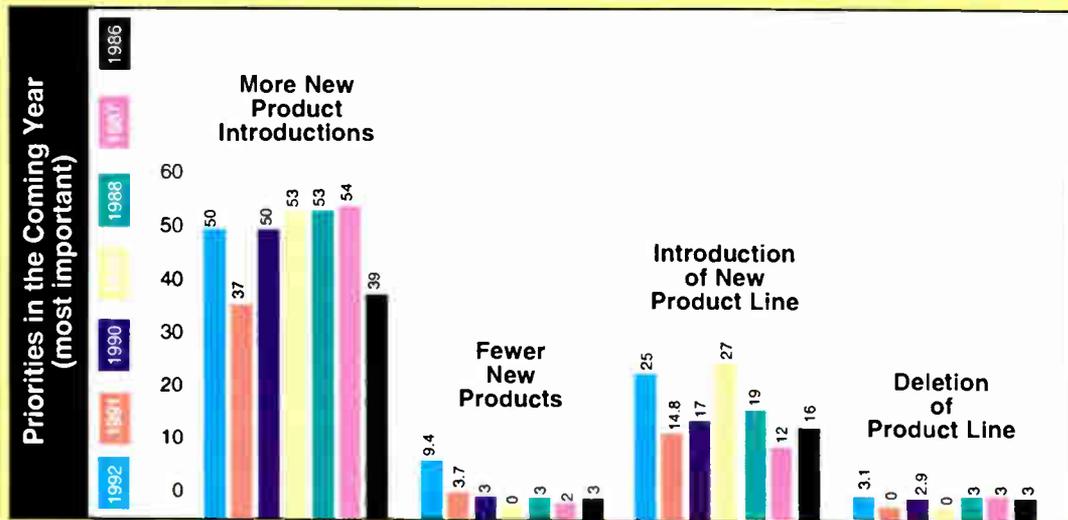
Larger companies were far more likely to consider re-

Trade Shows Exhibited At in Year	1991	1992
None	7.4%	—
1-5	66.7	71.9
6-10	16.7	15.6
Over 10	9.3	12.5

Expectations Unit Sales —	1989	1990	1991	1992
Increase in unit sales	93.3%	81.7%	79.6%	87.5%
Decrease	4.4	2.8	0	3.1
Same	0	14.1	16.7	9.4

Plans for Number of Trade Shows Exhibited At	1991	1992
More	24.1%	28.1%
Fewer	7.4	12.5
Maintaining Current Level	64.8	56.3
No Answer	3.7	3.1

Trade Shows Attended in Year —	1990	1991	1992
None	1.4%	3.7%	—
1-5	69.0	70.4	68.8
6-10	21.1	18.5	12.5
Over 10	7.0	7.4	18.8



Changes Planned in Distribution Pattern	1992	1991	1990
Yes	28.1%	27.8%	29.6%
No	65.6	72.2	69.

Change in Time Between Invoice and Receipt of Payment	1992	1991	1990
More	34.4%	59.3%	47.9%
Less	12.5	5.6	1.4
Same	50.0	33.3	43.7

Most Important in Making Buying Decisions	1992	1991	1990
Consultant	15.6%	22.2%	25.4%
Contractor/Management	18.8	20.4	21.1
Contractor/Installer	12.5	31.5	22.5
Contractor/Engineer	18.8	16.7	23.9
Architect	6.3	3.7	5.6
End User	3.1	44.4	25.4

liability "most important." Smaller companies were more likely to consider price most important, along with "technological innovation." Only 12.5 percent thought that the relationship between the contractor and manufacturer was "most important." But that was somewhat offset by the 34.4 percent who placed this criterion in the second most important spot. Large companies were more likely to consider the relationship important.

How does all this translate into hopes for the future? We asked each company what the expectation for sales was for 1993. A whopping 87.6 percent expected things to be either "very positive" or "positive" for their company in 1993 (68.8 percent positive, 18.8 percent very positive). And no one felt either "negative" or "very negative." This response was fairly consistent with last year's response, but the breakdown is a little different. Last year nearly 30 percent were "very positive" and 50 percent were "positive," with two percent negative. (No one ever checks off

the "very negative" box.) This year larger companies were more apt to be "very positive." Smaller companies were more apt to be just "positive."

When it comes to the industry as a whole, things are different. Here 3.1 percent opted for "negative." And only 60 percent voted for either very positive or positive (53.1 percent positive; 6.3 percent very positive). These numbers, however, are actually up from last year. There are expectations among our suppliers that good times are coming.

As for marketing plans, three-quarters of our respondents plan to be more aggressive next year than they were last year. (Only 65 percent reported a plan for increased aggression last year.) Reasons for being more aggressive included: "Focus on new products aimed at capturing more market share of sound contractors"; "New products are tailored to ADA mandated applications"; "Want to increase our market share"; "The market does have some

stimulus at this time”; “You must be aggressive in all areas to survive in a down economy.” And, as one respondent put it succinctly: “Survival.”

Look for more new product introductions in the coming year. Fifty percent of our respondents reported “new product introductions” as the most important priority for the coming year. But over nine percent said that *fewer* new products were a priority; 25 percent said that “introduction of a new product *line*” was most important. And over three percent said that deletion of a product line was important. Product introductions seem to be returning to the way they were before 1991 when this classification consistently got around 50 percent of the votes. But our results see a marked increase in the attention to “fewer

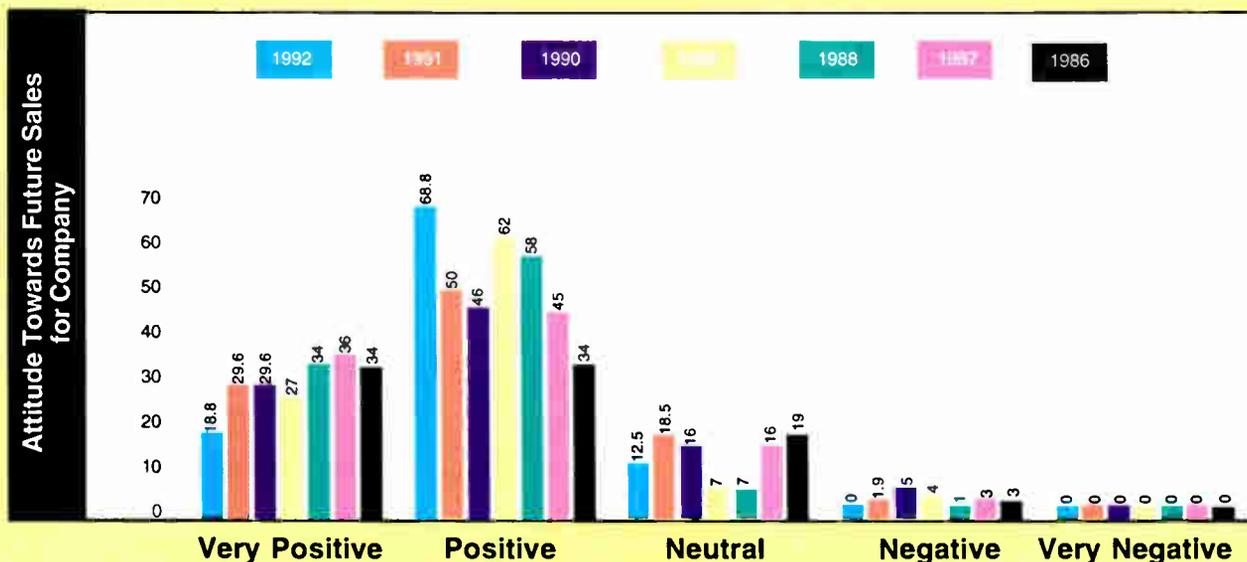
new products” and to “introduction of a new product line.” There may be some growth in the market going on in that companies are focusing on new marketing strategies or new technologies.

New product *categories* are expected by over 65 percent of the companies, with larger companies more likely to plan to introduce new categories (as opposed to new product).

Expectations for increased unit sales were up this year — to 87.5 percent from 79.6 percent in 1991 (but still a far cry from 1989 when over 93 percent of manufacturers expected an increase in unit sales. But decreased expectations were up also, although only 3.1 percent expected a decrease. Nine percent expected things to re-

Expanding Sources for Company Business (in descending order)
Worship Houses
Schools
Boardrooms
Factories and Office Buildings
Concert Halls
Residential
Hospitals

Softening Sources for Company Business (in descending order)
Concert Halls
Residential
Factories & Offices
Worship Centers
Hospitals
Boardrooms
Schools



## Suppliers' Advice to Contractors

- "Know your damn products! Don't make the manufacturer tell the customer we can't do the application."
- "Concentrate on quality."
- "Focus on fewer lines; stay cash rich."
- "Get more negotiated sales."
- "Watch costs, budget more closely. Stress value in renovation market. Don't drop price just to win bid."
- "Align yourself with strong manufacturers offering solid products, programs, technical support and clout."
- "Prepare to market and support new technology for ADA application."
- "Diversification."
- "Stay abreast of what the market is requiring."
- "Learn more about the factories you represent or sell for."
- "Sell up to quality and look for additional value-added items on each sale."
- "Sell features and benefits."
- "Don't be reactive."
- "Don't sit and wait for the customer to call you."
- "Stress technical education of sales people and installers."
- "Plan for intergration of data products with audio-video products."
- "Diversity into new markets."
- "Go find business instead of waiting for it to come to you."
- "Hang in."
- "Loosen up on your definition of yourself. A 'sound system' installation involves more than speakers and wire. It includes non-electronic acoustics."
- "Hire a good salesmen and keep him/her."

main the same.

Religion is apparently good for business. Nearly 70 percent of manufacturers see “worship houses” as a source for expanding business (although 19 percent thought this was softening). Nearly 60 percent thought the school

market is expanding (16 percent think it’s contracting). Close to half of our respondents see growth in “board rooms”; and 37 percent see expansion in residential work. But residential work also was seen as a softening market by 28 percent of our respondents, with the same num-

Refused Credit to More Or Fewer Customers?		
	1992	1991
More	37.5	35.2
Fewer	3.1	5.6
Same	53.1	59.3

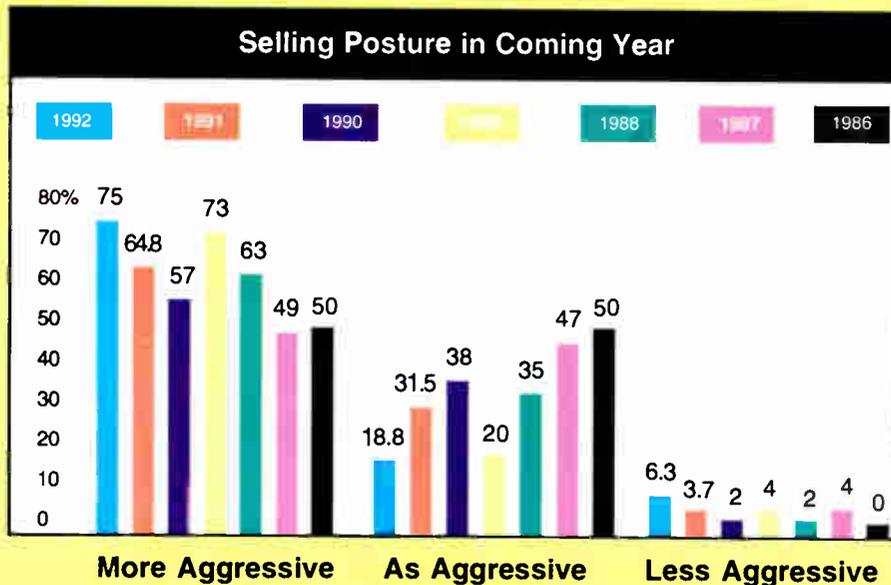
Attitude toward industry as a whole — 1990 1991 1992			
Very Positive	8.5%	5.6%	6.3%
Positive	43.7	48.1	53.1
Neutral	38.0	40.7	37.5
Negative	9.9	5.6	3.1
Very Negative	0	0	0

“Most Important” Criteria Customers Use in Selecting Products (in Percent)*		
	1992	1991
Reliability	59.4	55.6
Technological Innovation	25.0	27.8
Availability	25.0	16.7
Serviceability	15.6	16.7
Relationship Between Contractor & Manufacturer	12.5	13.0
Price	9.4	24.1
Predisposition of Specifier	9.4	14.8

\*Over 100% Due to Multiple Answers

### Contractors Doing an Unusually Good Job

- Ancha Electronics, Rolling Meadows, Illinois
- Sound Com, Berea, Ohio
- Alpha Securities, Arizona
- Pran, Houston, Texas
- Perspective Measurements, Del Mar, California
- Vanguard Communications Buena Park, California
- Pro-Line Audio, Minneapolis, Minnesota



ber saying that factories and concert halls are softening. If manufacturers are looking for more business, they aren't necessarily looking for it at trade shows. While 28 percent reported that they plan to increase the number of trade shows they exhibit at, 12.5 percent plan fewer exhibitions (up from 7.4 percent last year). And 56.3 percent plan to maintain the current level. Our respondents may just be tired. Nearly three quarters of them exhibit at between one and five shows a year. And 28.1 percent exhibit at over five trade shows. No one exhibits nowhere.

And no one attends no shows. Nearly 19 percent attend over 10 shows a year (up from 7.4 percent last year). In general, exhibits at trade shows were up, even though plans for increase are not as clear.

We asked manufacturers to give advice to contractors. As usual, the advice was anonymous and strong. Among the comments: "Stay cash rich." "Stress value in the renovation market." "Align yourself with strong manufacturers." And, a comment to take to the bank, "Know your damn products."

#### New Markets and Applications

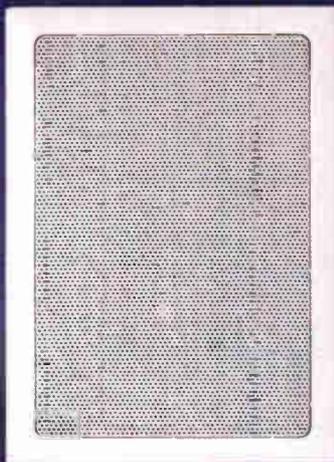
- Multimedia
- MI market
- Corporate
- I/R Control
- D/A converters
- Home theater
- Medium to small facilities
- Residential
- A/V dealers
- Rental companies
- More emphasis on audio visual interdependence.
- New products aimed at the high end of engineered sound.
- Home/project studio recordist
- Movie theaters
- Health care
- Digital video
- Security—prisons
- Pocket page
- Lower cost products
- Hospitals
- Sound reinforcement
- Concert sound
- Translation/interpretation
- Infrared
- International market
- Surround sound
- Datacom
- Background music
- Commercial sound
- Data Storage
- Upscale home video market
- Car audio
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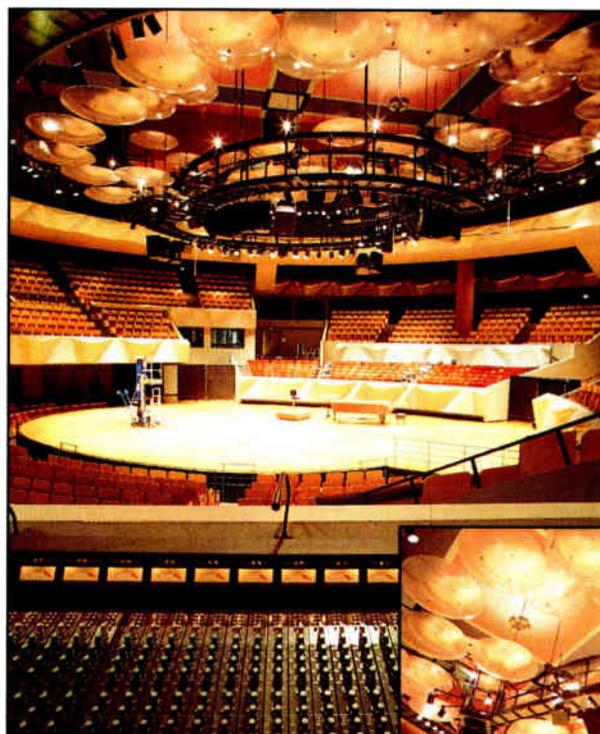
# BOETTCHER HALL: THE END OF AN ACOUSTICAL IDENTITY CRISIS

By Ed Logsdon

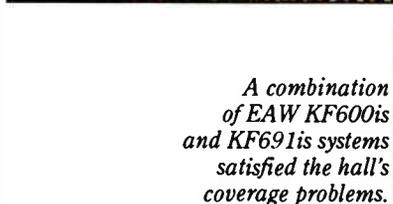
**Boettcher Concert Hall, one of five performance spaces in the Denver Performing Arts Complex, was originally designed exclusively for unamplified symphonic music. When the city fathers decided to use it as a multipurpose facility, the transition to pops concerts and other contemporary programs proved more difficult than expected: The new repertoire often demanded more than the existing sound system could deliver.**

Designed as the home for the Colorado Symphony, the 2,634-seat Boettcher Concert Hall was initially furnished with a custom-fabricated central cluster using a combination of 4-inch and 8-inch speakers. That system was intended only to allow the conductor to speak to the audience and to “lift” soloists over the

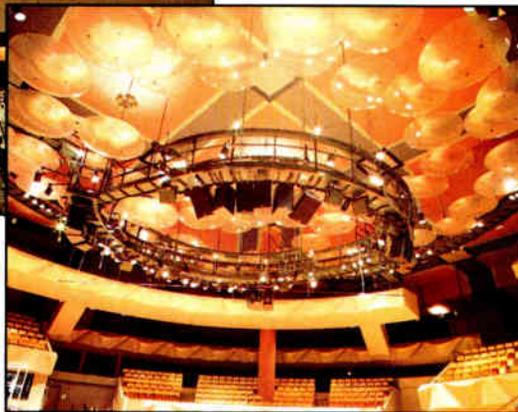
*Ed Logsdon is Senior Sound System Consultant with David L. Adams Associates, Inc.*



*Mix position at the Yamaha PM1800A at Denver's Boettcher Concert Hall.*



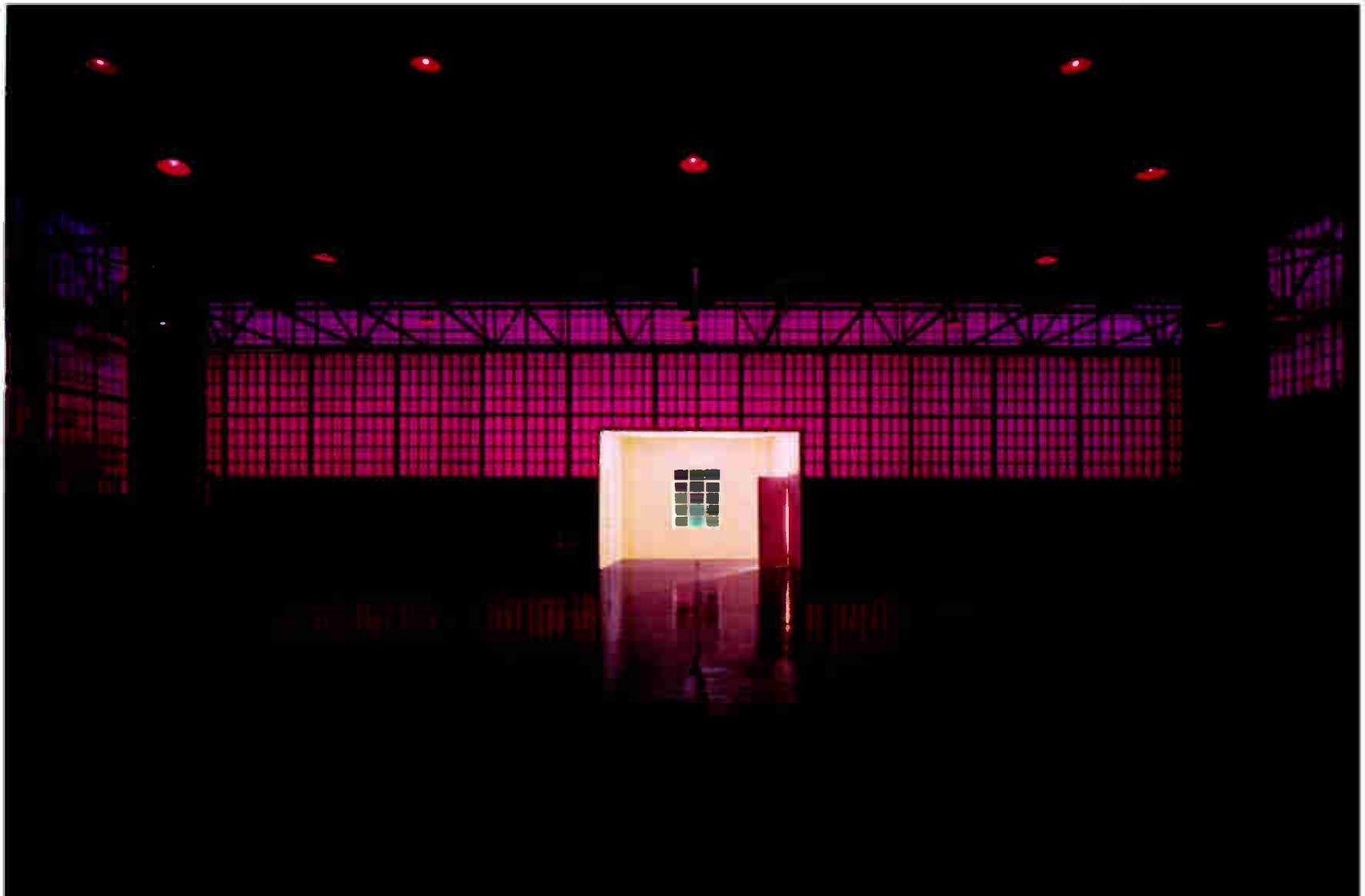
*A combination of EAW KF600is and KF691is systems satisfied the hall's coverage problems.*



orchestra. Soon after the hall's opening in 1978, the City and County of Denver, which own the Performing Arts Complex, responded to economic pressures by opening the hall to pops concerts and other events incorporating electronic instruments. Four large speaker clusters were installed to handle the wider range of musical demands.

After 12 years of service, that system

had become a part of the hall's sonic problems. The clusters were two-way systems with large constant directivity horns and double 15-inch bass bins — a sophisticated solution for 1978. But the design did have some weak points. Sound from the fan array horns was spilling onto the stage, causing feedback. Some of the seats were only 20 feet below the nearest cluster, and in those locations,



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

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



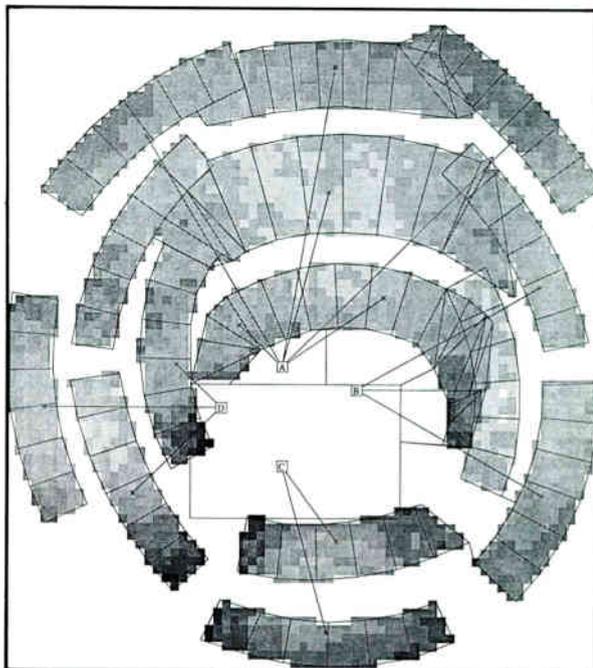
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World Radio History

the highs could take your head off. Overall, the system had plenty of boom and sizz, but the midrange was not very pleasant. The passage of time had only made matters worse — many of the high frequency compression driver diaphragms had cracked and electronic components had failed.



*Boettcher Concert Hall floor plan in a Bose Modeler plot showing the "cabinet clusters."*

When David L. Adams Associates, Inc. was brought in to improve the Boettcher Concert Hall, I was assigned the task of designing a new sound system. My first step was to enter the hall's shape and dimensions into Bose Modeler software. A central cluster approach was tried and rejected because of the hall's curved ceiling reflectors. To cover all the seats, we would have had to install two central clusters, one above the dishes and one below. That was too expensive, so we decided simply to replace the existing clusters using more advanced speaker systems.

A combination of EAW KF600is and the new KF691i systems satisfied the coverage problems in computer simulations. I often find small horn-loaded systems like the 600 Series very effective in applications like this.

At Boettcher Concert Hall, the front-facing main array has six EAW 600 Series systems, with three systems hung

on either side of the stage and two systems used for the stage-rear parquet seating area. To obtain the required coverage angles, we used combinations of KF691is and KF600is in all four arrays. "Ring" speakers used to fill in the upper seats were retained from the old system.

With speaker systems decided on, the next step was to replace the hall's outmoded electronics. The EAW 600 Series Virtual Array systems are biamplified with Crown Com-Tech amplifiers driving the HF and MF subsystems through internal passive crossovers, and Crown Macro-Techs handling the low frequencies. Crown's IQ-2000 computer system provides monitoring and control functions. During installation and testing of the system, we calibrated the drive levels to the individual speaker systems using IQ-2000. But the sound engineers can also raise or lower each individual amplifier if they feel the need to. In addition, they can easily turn clusters on and off, depending on the seating arrangement for a particular concert. This avoids exciting the room more than necessary. Audio-Digital delays are used to synchronize the output from the clusters with sound arriving from the center stage. White equalizers compensate for room effects.

The stage and the house mix position have also been updated to handle the Boettcher's eclectic musical mix more efficiently. A.R.T. equalizers, UREI compressor/limiters and Alesis QuadraVerbs give the hall's sound mixers the creative control needed to accommodate both modern



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We use this illustration to shed some light on a superior design and introduce the new Tannoy CPA5 (ICT)<sup>TM</sup> loudspeaker - a small contractor-specific loudspeaker from our new Contractor Series. Designed and engineered with contractor requirements in mind, our new CPA5 offers controlled directivity and throw characteristics, uncommonly superior vocal articulation and strong vocal midrange presence from a loudspeaker promising failure-free operation from its HF unit. How? "Inductive Coupling Technology" (ICT)<sup>TM</sup> makes it so.

Simply stated, the CPA5's five inch ICT transducer has no high frequency voice coil or HF windings. Instead, a one inch Duralumin HF passive radiator sits in the same gap with, and is inductively energized by, the electro magnetic high frequency energy, generated as a by-product of the LF unit. The ICT transducer's crossover free architecture ensures linear, smooth, symmetrical off-axis dispersion out to 22kHz and true point-source, phase coherent sound.

The CPA5's ICT design offers exceptional performance with outstanding dynamic range and 90dB 1W 1M sensitivity. AT LAST you can have a dynamic, full bandwidth background music system which even at the lowest of volumes, remains highly intelligible with shimmering presence. And yes - they also sound great loud.

The CPA5's 100 Watt power handling and 110 dB output, provides clean, non-fatiguing sound at exceedingly high volumes - free from mid-range compression, and with remarkable bass response for such a small enclosure (8 1/2" high X 6" wide X 5" deep).

Its modern, rugged, molded polypropylene cabinet (available in two colors) and shielded components are "environmentally friendly" and impervious to most weather conditions. Equipped with 70 Volt transformer fittings for multi unit installations, the CPA5 mounts both vertically or horizontally, offers two grill faces, and an adjustable, rotating badge.

While its affordable CUB-5 hardware meets all safety standards, the CPA5 also retrofits most existing mounting hardware available today.

We think you will find the Tannoy CPA5's exceptional performance a uniquely flexible, cost-effective and reliable alternative to what you've been settling for in foreground/background music systems. We have the required projection and presence you've been looking for, at all volumes, and you'll never blow our HF unit. We may not glow in the dark.... WE DON'T HAVE TO. If you value exceptional high performance and trouble free, safe sound, step up to the TANNoy CPA5 (ICT)<sup>TM</sup>.

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# THE SPEAKERS

Boettcher Concert Hall is the first installation in the United States to employ the new KF691is, which combine the efficiency and arrayability of the KF600i with wider 90-degree horizontal dispersion (KF600is are engineered for 60-degree x 40-degree coverage). Both EAW systems are three-way

## The KF691i is a product of EAW's custom design work for EuroDisney's Wild West Arena.

designs with horn-loaded 10-inch cone midrange subsystems that really bring the presence out. Kenton Forsythe, Vice President of Engineering for EAW, was a pleasure to work with. His systems are quite compact, yet they have the required specifications. While modeling various cluster configurations, I asked him about a 90-degree x 40-degree version of the KF600i. He promptly suggested the KF691i.

The KF691i is a product of EAW's custom design work for EuroDisney's Wild West Arena. "The design goal for that installation was to project a stereo image over wide areas," Kenton Forsythe recalls. "We needed a system that offered the compactness, efficiency and output capabilities of a KF600i, but which had wide enough coverage to function as a standalone system. The basic geometry of the mid-bass and high-frequency horn flares is similar to the KF600i, but the horns have been allowed to 'grow' to cover 90 degrees rather than 60

degrees as in the KF600i. Some people actually prefer the tonal quality of the 90-degree configuration." The KF691i is equally suitable for individual use and as part of arrays like those used in Boettcher Concert Hall. The enclosures match the KF600is in height and depth, but are wider to accommodate the 90-degree mid-bass and high-frequency horns. Internal passive filters are used to optimize response linearity in both the KF600i and KF691i, and these have been adapted so that both systems can be bi- or tri-amplified using the same MX-800-6 Closely Coupled Electronic Processor.

"The KF600 Series of Virtual Array systems has expanded to meet user demands," EAW President Ken Berger told me recently. "600 Series systems are now available in full passive, biamped or triamplified configurations, with

## These have been adapted so that both systems can be bi- or tri-amplified.

portable Road or Permanent installation hardware, and with either one-inch high-frequency drivers for extended bandwidth or two-inch drivers for maximum output. The KF600i and KF650i are 60-degree horizontal coverage systems, while the KF691i is a 90-degree horizontal design. We now offer KF600 systems to meet virtually any application."

—Ed Logsdon

music and classical masterworks. The new Yamaha PM1800A console can deliver four mixes, and its mix-minus capability adds to the flexibility of the system. Stage wiring has been updated with custom-modified Wireworks splitter boxes. It used to be a ten-minute walk just to plug in a mic on stage. With multiple-input boxes stage right and stage left, setups are much more efficient.

James Thompson, manager of the Boettcher Concert Hall, is pleased with the new sound system. "So far, we've used the system for a Colorado Symphony Pops concert of Latin pop with Vicki Carr and her band, for a light opera production of Gilbert & Sullivan's H.M.S. Pinafore, and to bring out Yo-Yo Ma's cello in performance with the full symphony. The quality of the EAW speakers is far superior to what we had. You could

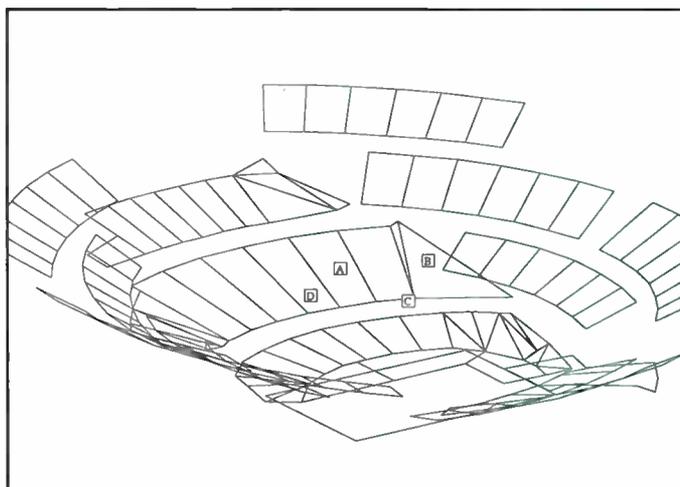
barely tell the system was in use during the Yo-Yo Ma concert.”

“We’re very happy with the Crown IQ-2000 system as well,” Thompson says. “Our engineers can manipulate and control the system from the computer located at the mix console. This demands a certain level of expertise on the part of the sound engineer, but we’re bringing them up to speed, and we now have a couple of people who can handle the system quite well. We have two IQ2000 systems in the Performing Arts Complex, and we’ll add more as we get funding.”

Boettcher Concert Hall’s renovation is not complete: David L. Adams Associates has also designed a custom orchestra shell and new architectural features that provide for variable acoustics, but these have yet to be installed.

Audiences and critics have already

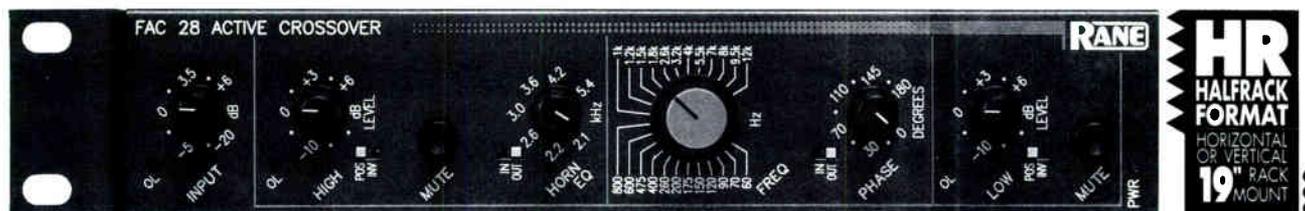
*Bose Modeler print out of the isometric view.*



responded positively to the new sound system, however. A music critic for the Denver Post called me up and said, “I don’t know what you did, but it sounds good.” I was equally happy to find that results of actual measurements in the hall match what we predicted on the Modeler: Coverage is very smooth and even, although the hall is definitely a

non-symmetrical space. So I think we can call this system a success. With its acoustical identity crisis under control at last, the Boettcher Concert Hall is well on its way to resuming its intended position at the summit of Denver’s musical life. Critics and audiences agree that the hall has reached a new high point in an occasionally rocky history. ■

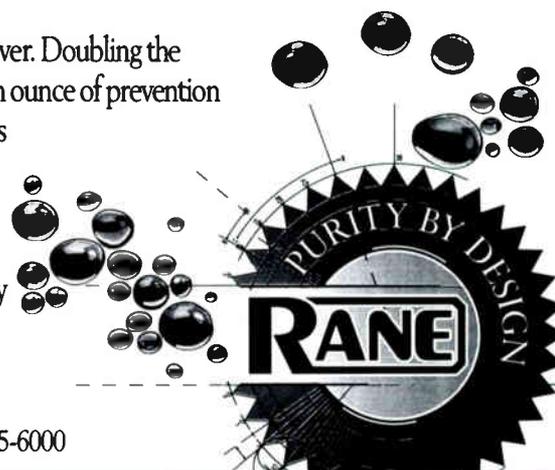
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# The Georgia Dome

## *The Acoustics and Sound System of Atlanta's New Dome*

BY BILL MORRISON

**T**he Georgia Dome, completed in August 1992 at a cost of 210 million dollars, is the largest cable-supported dome in the world. Designed by Heery International, the dome seats 71,500. The dome is home to the Atlanta Falcon Football Team; however, other uses for the Georgia Dome will include conventions, basketball, concerts, sports venues for the 1996 Olympics, and other sporting and civic events.

The acoustics of the dome are interesting in that the Teflon coated fiberglass fabric roof system is acoustically reflective at high frequencies; however, low frequencies transmit through the fabric. This provides more manageable reverberation times in the low frequency region than would be possible in a stadium with a hard domed construction. To help control high frequency reverberation and to provide thermal insulation, a fabric liner is suspended below the structural dome fabric. Geometrically, the fabric dome is acoustically beneficial in that the roof system em-



*Exterior of Georgia Dome.*

ployed in the Georgia Dome is shaped more like a flattened dome instead of a pure dome. This prevents strong focusing effects and contributes to more uniform acoustical conditions throughout the dome. Acoustic treatments in the dome include sound absorption panels attached on the back wall above the upper seating levels.

Reverberation times were measured in the dome throughout the lower, club level, and upper level seats utilizing a B&K 2123 analyzer. Software supplied with the B&K 2123 was used to average the spectral decay characteristics of multiple pink noise bursts. (Reverb times

for each  $1/3$ -octave band, at a typical club level seating location, are shown in Figure 1. Figure 2 shows an example of the rather uniform decay characteristics (SPL vs. time) of a single  $1/3$ -octave frequency band.)

In the Georgia Dome, the maximum reverb time is 9 seconds in the 200 Hz band. In the high frequency bands, the reverberation times are much lower as the high frequency absorption in the air and high frequency absorption by the dome's fabric liner compensate for the high frequency reflective characteristic of the dome's structural fabric.

The sound system design chosen for

---

*Bill Morrison is the principal acoustician with Acoustical Physics Labs in Doraville, Georgia and specializes in the design, analysis and acoustical simulation of sound reinforcement systems. He holds a Masters Degree in Physics from Georgia Tech and is a member of the ASA (Acoustical Society of America).*

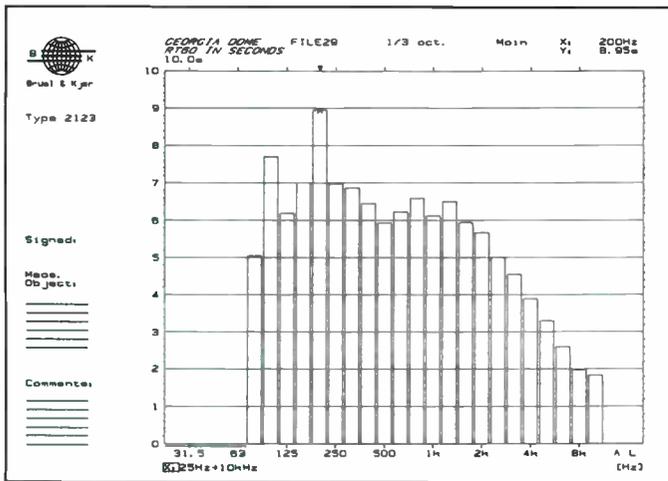


Figure 1. Reverberation Times for 1/3-Octave Bands.

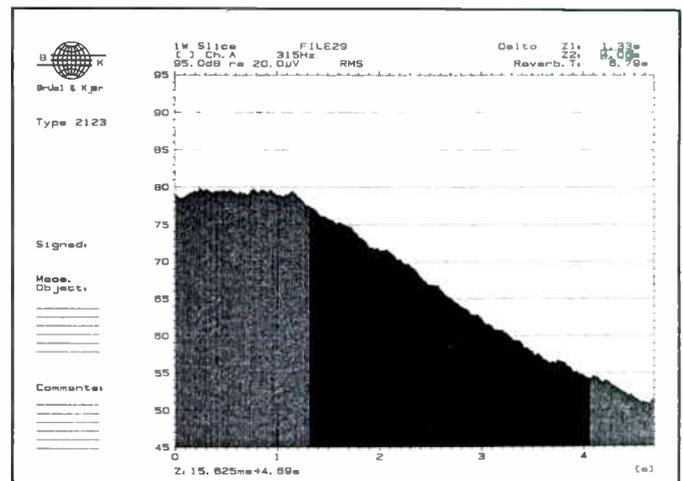


Figure 2. Reverberation Decay Curve.

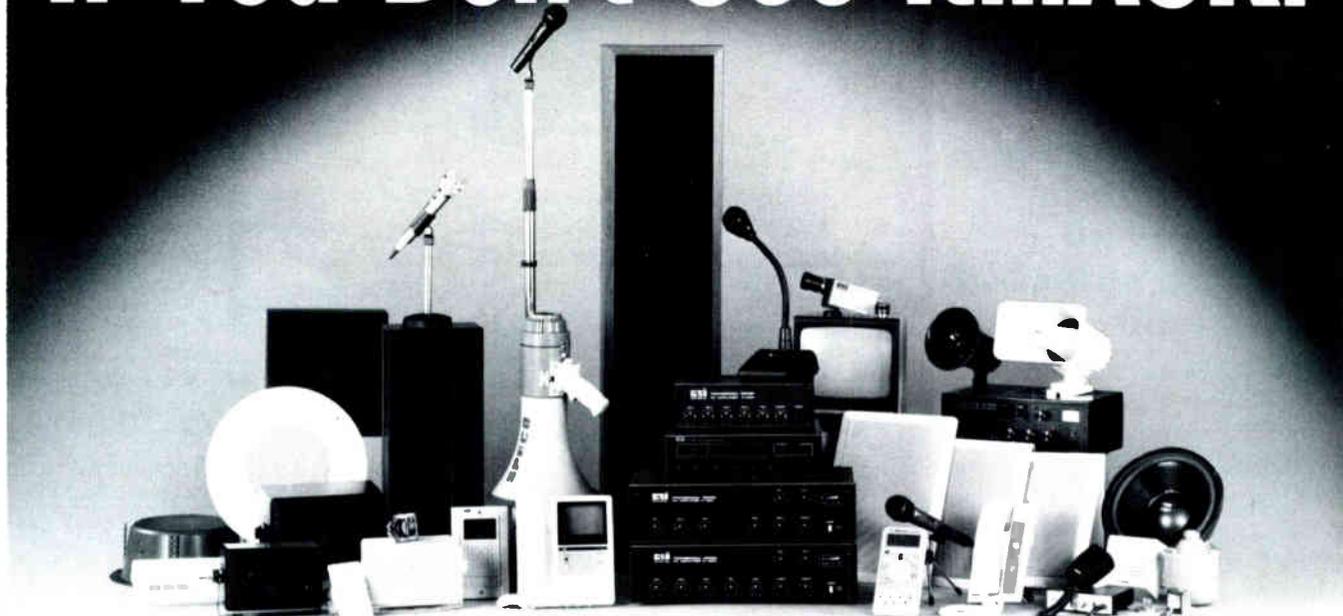
the Georgia Dome, as is common in highly reverberant environments, is a distributed speaker system. The distributed speaker system design, despite some problems, does allow the loudspeaker-to-listener distance to be minimized as compared with a central cluster loudspeaker design. Thus, in this highly reverberant environment, the ratio of the direct sound level from the loudspeaker to the reverberant level is

sufficiently high to insure good intelligibility.

The distributed loudspeaker system in the Georgia Dome consists of 22 clusters distributed on a large oval ceiling (about 130 feet) the lower audience seating areas. The loudspeaker-to-listener distances, for seating positions in the lower, mid, and upper levels, range from 100 feet to 140 feet.

Within each of the 22 distributed clusters are three loudspeaker systems. Each loudspeaker system in the cluster is comprised of a direct radiator LF cabinet with two 15-inch drivers, a midrange horn/driver, and a high frequency horn/driver — all arranged horizontally. The low frequency cabinet is the JBL 4648 with two 2226 15-inch drivers in a vented cabinet. The midrange is a Community M4 (4-inch throat) with the Community

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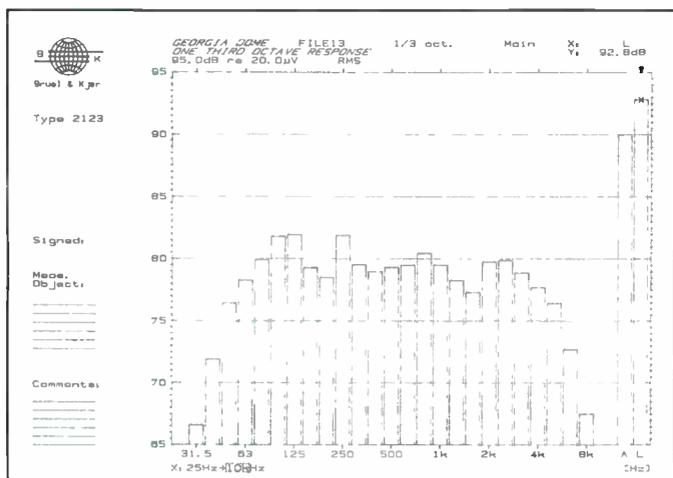


Figure 3. 1/3-Octave Frequency Response.

PC-1564M 60 x 40 horn. The high frequency driver is the Electro-Voice DH1A-16 (2-inch throat) with the Electro-Voice HP6040 60 x 40 horn.

The loudspeaker systems in each cluster are mounted in a vertical array with the lower loudspeaker system aimed downward to cover the lower seating area, the middle loudspeaker system aimed to the middle seating level (club level) and the top loudspeaker system aimed to the upper seating areas. Additional high frequency horns are distributed on the catwalk system to provide coverage to the field area.

Each low frequency cabinet, each midrange driver, and each high frequency driver in each loudspeaker system is powered by a dedicated channel

### Amplifier configurations for various stadium conditions and modes are selected by the audio operator.

of a Crown IQ computer-controlled amplifier. The midrange and high frequency drivers are powered by Crown Com-Tech 400 amplifiers (195 watts/channel). Low frequency cabinets are powered by Crown Com-Tech 1600 amplifiers (800 watts/channel). This allows the output of each driver in each system, through the IQS system, to be configured for a wide variety of audience seating patterns. Amplifier configurations for various stadium conditions and modes are selected by the audio

operator through a touch-screen AMX control system.

Each loudspeaker system has its own dedicated Yamaha DDL-3 digital crossover. The DDL-3 provides digital based delay adjustments for each bandpass filter section. Thus, through proper adjustment, coincident time arrival from each driver in the loudspeaker system can be achieved. A peak limiter, a 1/3-octave equalizer, and a parametric equalizer are the only signal processing



Cluster Loudspeaker System.

equipment in line with the entire distributed loudspeaker cluster system. A DDA "Q" Series (24 frame with 16 Q-mutes) mixing console provides the Georgia Dome's loudspeaker systems with source material from a variety of wireless microphones, CD players, cart machines, etc.

The underbalcony seating areas are covered by JBL 2142 12" coaxial speakers. Yamaha DDL-3 digital delays allow under balcony seating areas to be adjusted for coincident time arrivals from

the under balcony speakers and main cluster speakers. Additional 8" ceiling type speakers are distributed through public concourses, rest rooms, private boxes, press boxes, meeting rooms, etc. to allow a program selection of delayed stadium sound, TV sources, paging, or local sources.

A priority emergency paging system is designed to break into all stadium and peripheral sound systems with voice instructions. An emergency power source insures that the sound system will operate during power outages.

How well does the system work? The system operates as expected. Speech is intelligible. Measurements of Speech Intelligibility utilizing the TEF STI (Speech Transmission Index) software with the TEF System 12 indicate good intelligibility for all seating areas.

Music reinforcement sounds reasonably good. (Overall frequency response of the stadium system at a typical seating area is shown in Figure 3.) As of this date, there are some areas of system performance which can be improved by additional adjustments of the system, additional operator training and involvement, and additional acoustical treatments; however, the system sounds good and is a good start toward meeting all the sound reinforcement needs of the Georgia Dome. ■

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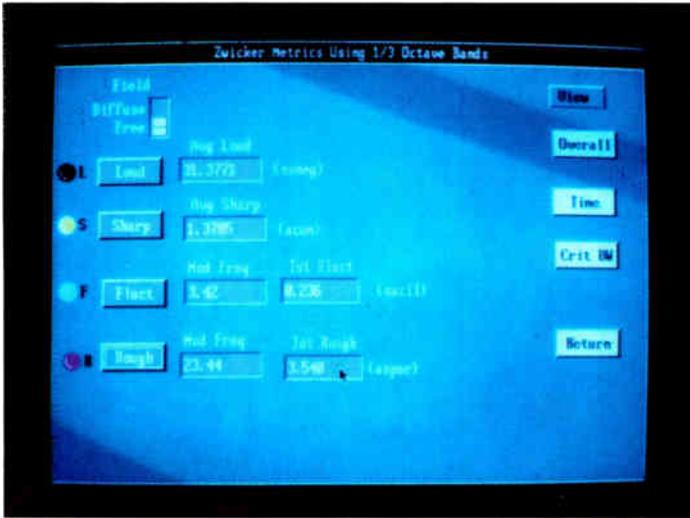


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may be below the threshold of annoyance or negative response. Thus, the experimenter must begin to accommodate the idea that a sound may be sharp but not objectionable.

It is also interesting that there are no commonly available scales with which to evaluate the threshold and limits of listener response to any specific product. This is due partially to the fact that product expectations suggest that one

product may be "appropriately" rough (e.g., lawn mower) or inappropriately rough (e.g., food processor). It is due also to the fact that background noise level will change absolute signal-to-noise ratios for the same product under alternative environments. (The demographics, within certain product markets, of hearing loss also have the same resulting changing S/N levels.)

Also, there is a wide variation in user

response to product sounds, based on the product performance under unrelated criteria. Finally, marketing efforts can change a buyer's response to product expectations and ratings (e.g., the ongoing sensitization of the population with regard to product noise).

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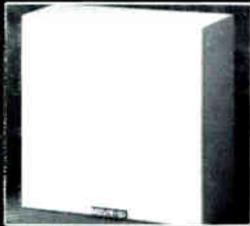
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ground in mind, it is instructive to begin to look at the most common individual metrics; these are Loudness, Sharpness, Roughness and Fluctuation Strength. These metrics underlie most of the analytical work currently being undertaken by sound quality engineering staffs and should provide a good introductory look at the application of computer analysis to the sound quality problem. Prior to consideration of these metrics, it is important to mention the concept of critical bands. Critical bands are roughly defined as the band limit of sound adjacent to a given sound which have some potential masking effect of the sound under consideration. Critical bands, in general, describe the bandwidth sensitivity of the ear at various frequencies. Some sound quality calculation, and some new acoustic analysis systems, calculate and measure directly in critical bands rather than octaves or fractional octaves (e.g.  $1/1$ ,  $1/3$ ,  $1/6$ ,  $1/12$  octave).

### LOUDNESS

Loudness is generally considered the oldest of the sound quality metrics in use, and it clearly precedes the development of "sound quality" as a formal field. Underlying the loudness metric is long term attempt within the acoustic community to equate psychophysical loudness with the A-Weighted decibel scale. Established in both the legal domain and in acoustic measurement, in general, is the development and use of the A-weighted decibel scale. Based on human hearing sensitivity thresholds in each of a number of frequency ranges (generally, 20 Hz—20 kHz), this scale is used to modify non-weighted (linear) physical acoustic measurements via de-emphasizing those frequencies which have a higher hearing threshold for the typical listener.

Experiments in threshold detection are generally performed via the presentation of only one frequency component (for example, a pure tone at 500 Hz). They do not take into account the perception of broadband sounds (for ex-

ample a sound covering the 500 Hz octave), nor do they take into account the effect of auditory masking of one sound by another. Thus, two sound samples with a nominally similar A-weighted decibel level may have very different low frequency distributions, and the one with more low frequency content may produce less perception of higher frequency sounds due to "forward" masking.

The dBA scale also does not take into account that findings that the ear's sensitivity to frequency discrimination has been characterized by the development of "critical" bands (*i.e.*, bands of varying bandwidth across the frequency spectrum) describing the average frequency discrimination of the auditory system. With regard to critical bands, specifically, below 500 Hz, the masked threshold is independent of frequency; above this point, the masked threshold increases by 10 dB per decade.

The loudness level of a sound is the sound pressure level of a 1000 Hz tone in a plane wave and presented frontally that is as loud as the sound; the unit of loudness is the "phon." Specific loudness is described in: "sones," with one sone being equivalent to a 1000 Hz 40 dB tone (40 phons). From this general description has been developed a set of equal loudness contours.

This loudness metric has been incorporated into the ISO standards via the use of a  $1/3$ -octave scale and calculation, and in its current embodiment, it does not deal with the time-varying nature of many sounds. Loudness is generally intended to describe the perceived intensity of a time invariant sound sample.

### SHARPNESS

Sharpness is a less obvious and more arbitrary descriptive metric. It is defined by the spectral content of narrow band sounds and the spectral envelope, in general. Sharpness is defined for narrow band noises as increasing with increasing frequency. At low frequencies, sharpness increases almost in proportion to the critical band rates. Bandwidth

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World Radio History

is nominally inversely proportional to sharpness. Sharpness is not very dependent upon level and has little dependence on bandwidth, when considering bandwidths smaller than critical bands.

The strongest parameters determining sharpness are spectral content and center band frequency of narrow band sounds. Narratively, sharpness describes the high frequency nature of the sound sample; the purer the tone and the higher the frequency, the sharper the sound will be rated. The unit of sharpness is the "Acum."

### SHARPNESS DEFINITION

A reference sound producing one Acum is a narrow band noise one critical band wide at a center frequency of 1 kHz having a level of 60 dB. The overall spectral envelope is the principal determinant of sharpness. Metrics used in sub-

jective testing which are intended to describe sharpness include Shrill, High Frequency, etc.

### ROUGHNESS

Roughness, like many metrics, can be considered independently of other metrics. Unlike fluctuation strength, roughness is perceived as a constant "rough" sound; while the listener can detect the quality of sound produced by variation, the modulation rate is too fast to actually hear the variation as alternative sound levels. Thus, roughness pertains to a sound perceived as rough but not varying. Roughness can occur in time variation or in frequency variation.

### ROUGHNESS DEFINITION

Roughness, a modulation-based metric, begins at about 10 Hz modulation

frequency and sees its maximum around 70 Hz modulation. In order to produce roughness, modulation must occur in the region between 15 and 300 Hz. The unit of roughness, the Asper, is referenced to a 1 kHz tone at a 100 percent modulation in amplitude and at a modulation frequency of 70 Hz. For amplitude modulation, the important parameters are the degree of modulation and the modulation frequency. For frequency modulation, the modulation frequency and the modulation index become the important issues. Typical narrative descriptors used with roughness include roughness and harshness.

### FLUCTUATION STRENGTH

The sensation of modulation is heard when modulated sounds exhibit a modulation rate of up to 20 Hz. Above this modulation rate, the temporal perfor-

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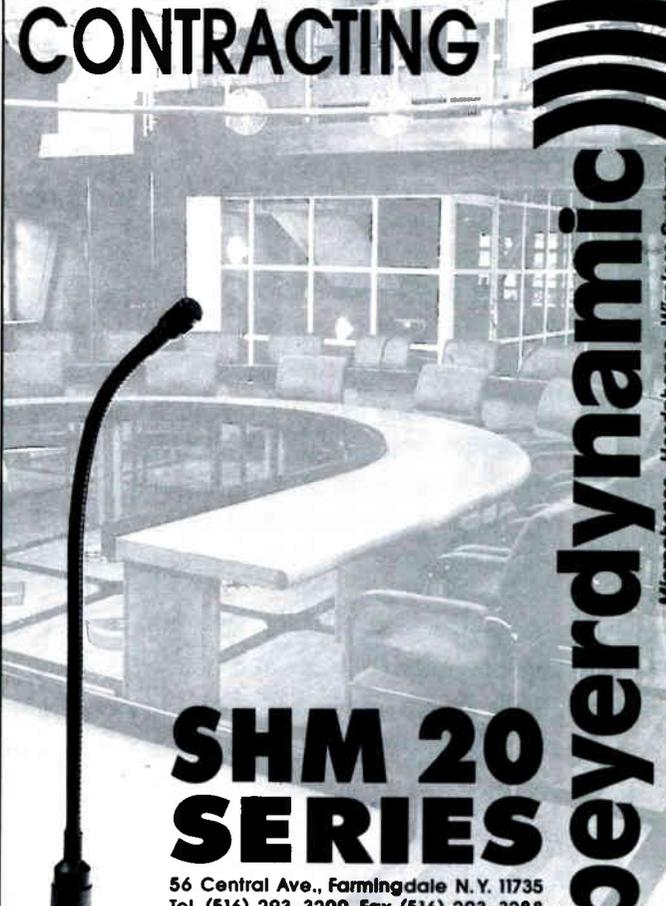
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# CONTRACTING



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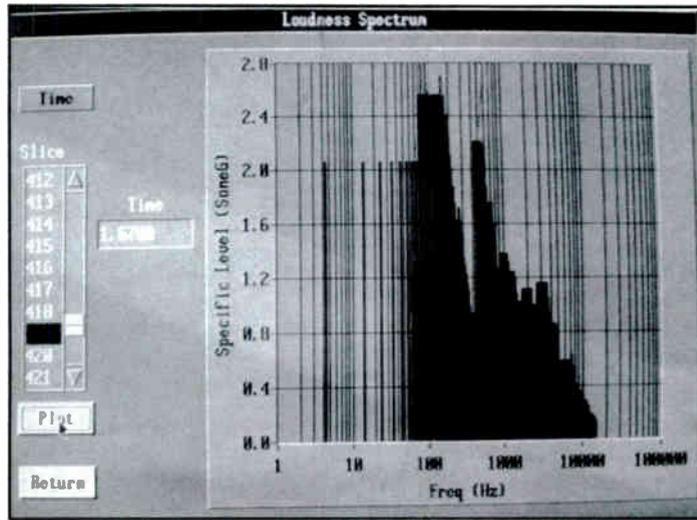
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mance of the listener begins to saturate, and roughness sensation begins. This metric is able to be considered in the absence of other metrics. Fluctuation strength increases with increasing sound pressure level.

### FLUCTUATION STRENGTH DEFINITION

Fluctuation Strength is useful as an absolute and as a relative value, and fluctuation can occur in level or in frequency. It is affected by sound pressure level, by modulation depth, by modulation factor and by center frequency.

A fixed reference selected is a 60 dB 1 kHz tone 100 percent amplitude modulated at 4 Hz. This is referenced to 1 Vacil. For a given sound, the maximum fluctuation strength is found at a modulation depth of at least 30 dB. Above



Loudness spectrum.

the maximum value, fluctuation strength remains constant.

### A CALCULATIONAL EMBODIMENT

Having discussed the four principle metrics being used in sound quality calculation, there is clear interest on the part of many manufacturers in beginning to evaluate the benefit of these and other metrics to their sound quality and noise control programs. The only metric

in common use at this time is loudness, as the use of the others has been substantially limited by the cost of software and testing systems needed for their use.

As part of the Organization of the Sound Quality Working Group, (See Sound & Communications, Sound Quality, Part 1, March 1992), Orfield Associates has just completed the development of a software package, Sound Quality Analysis I, which is the only inexpen-

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offer a dual-microphone clip where redundancy is desired) and windscreen add to the versatility of this remarkable sub-miniature condenser.

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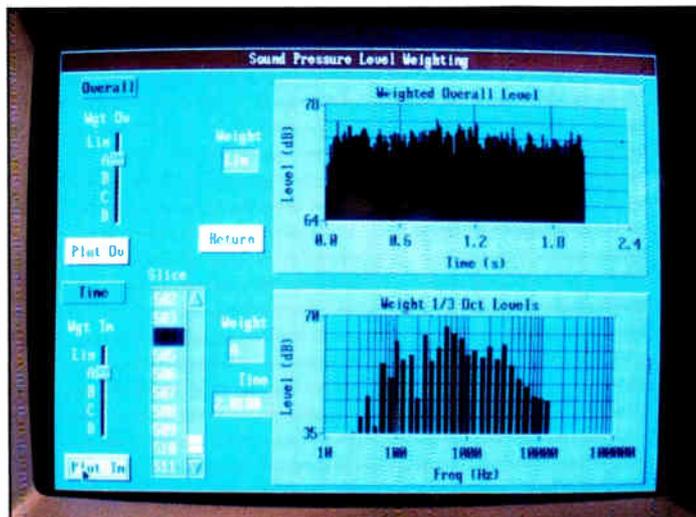
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sive package available at this time for use in sound quality calculation.

This SQA I package, shown in examples within this article, will accept either direct input of microphone signals and will accept ASCII analyzer files of both single spectrum and multi-spectra data. In its first revision, it will read data directly from certain B&K analyzers.

Thus, measurements taken previously can be calculated in order to begin to develop correlations between different products or product prototypes, and current work. This software package is now in the hands of a number of acoustical departments of major manufacturers. Via the use of binaural recording and digital editing, jury presentations, and sound quality calculation, the product manufacturer can now begin to inexpensively consider the breadth of the sound quality field. In addition, by joining the Sound Quality User Group,



Frequency weighting.

he can be directly in touch with his professional peers in other firms.

### SUMMARY

Via the consideration of sound quality calculation, the sound quality engineer or researcher can begin to develop a model for the analytical process of sound quality work. Via the use of listening juries and calculational metrics, the validity and predictive value of calculation can begin to become established, the specific metrics which are useful can be identified, and eventually, less listening jury work and more analytical

work will begin to reduce the time burden and the expense of using listening juries as the only method of sound quality research.

This revolution in analysis will finally allow many manufacturers to begin the long process of converting from noise control engineering to sound quality engineering. In our next sound quality article, we will discuss alternatives for statistical consideration of SQ data along with alternative jury testing instrument methods available to this field.



## SOUNDSPHERE SPEAKERS LOOK & SOUND CHOSEN BY CUB FOODS STORE CHAIN

While Soundsphere Loudspeakers have been utilized in Cub Foods stores in Eden Prairie, Cottage Grove, Bloomington and Plymouth, Minnesota, the most recent installation has been at the newest 120,000 sq. ft. store in Apple Valley. Twenty-five Soundsphere #110A speakers with transformers tapped at 75 watts were installed to gain quality music and voice page.

Craig Streich, the Store Manager, takes advantage of the music quality and added efficiency of clear voice page when reassigning workers to various tasks in the expansive store.

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



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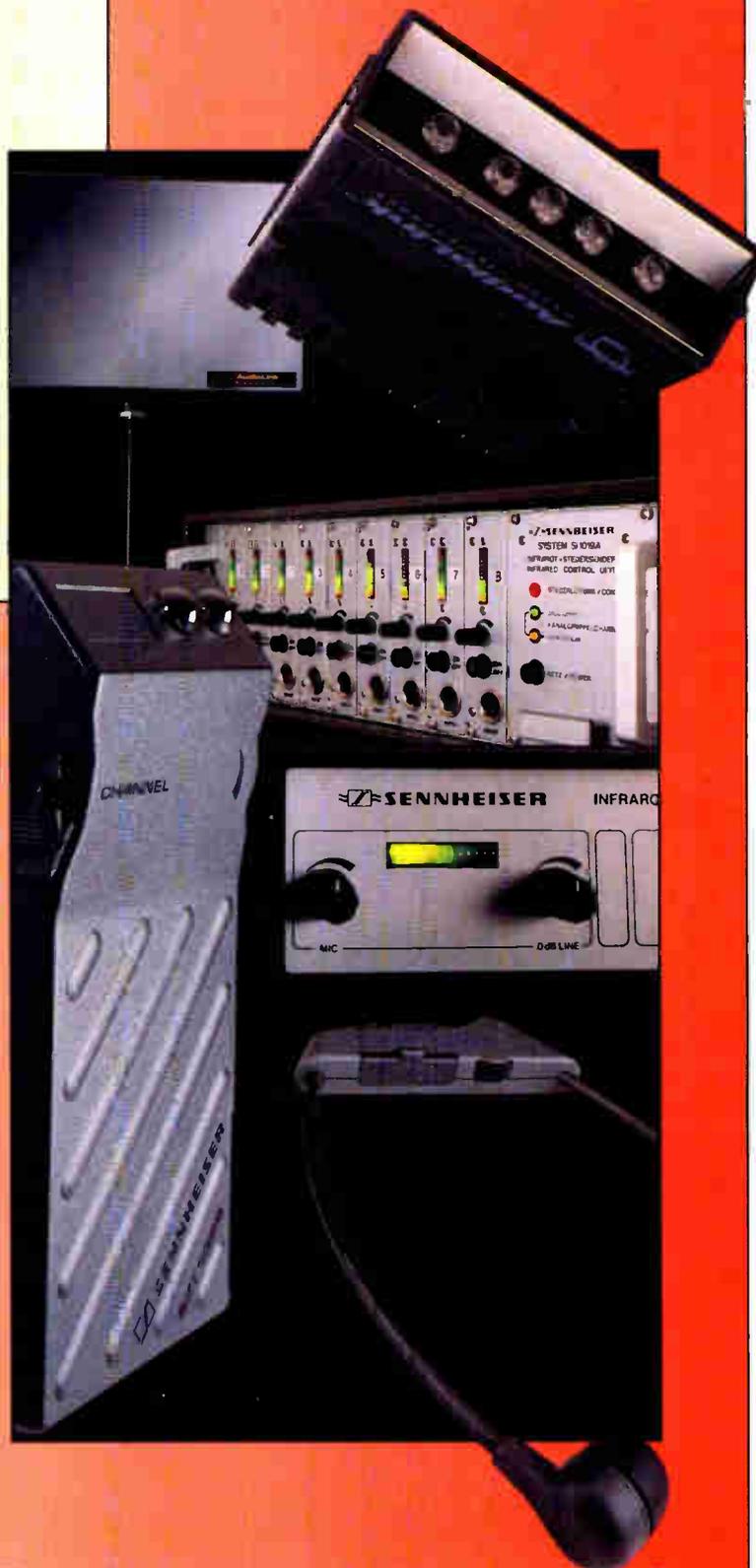
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# Sony Shows CD-I; Denon Demos DVI; CEBus Standard Released

### Sony Shows CD-I Viewer

Sony has shown a CD-I (for CD-Interactive) viewer for training, presentation and other applications for corporate, government, and medical customers. Sony has said its strategy is to provide these customers with a selection of products — CD-I as well as the DataDiscman and Multimedia CD-ROM Player — to “address a range of applications and budgetary requirements. The model IVO-V11 will be marketed early in 1993 as part of Sony’s line of “personal information and multimedia products” by the company’s Business and Professional Group. The model includes on-board color image display and digital audio. It is portable and is expected to sell for approximately \$1,900. Sony has no plans to introduce software for the product, which also has Photo CD capabilities.

### DVI System From Denon

Denon has been demonstrating the Digital Video Interactive System for interactive A/V media with the Denon DVI Player. Based on the “DAVIS” standard, DVI uses CD-ROM technology to interactively display high quality still images, full-motion video and graphics, and to play CD stereo sound. The Denon DVI Player uses a Denon CD-ROM drive, and 80286 computer, and an Intel DVI processing board. Output to a high resolution monitor is from 2 Mbytes of Video RAM. An FD/HD controller card can be added to the player to enable use of floppy drives and/or hard drives. The system software is the New World Extensions Operating Environment developed jointly by Denon and Digital Video Arts. The software is a Graphical User interface shell for an MS-DOS system.

Denon has established a super-computer-equipped Multimedia Studio for compressing video and/or graphics using the MPEG standards for video data compression. Developers send their video/



graphic material to Denon on videotape; Denon produces a CD-ROM disc of the material and the developer uses the disc and MS-DOS to develop the final application. Denon then uses the disc and the application software for production of the final DVI disc. Denon claims that video materials require about one-fifth the processing time for DVI as for CD-I.

### CEBus Standard Released

The Electronic Industries Association’s Consumer Electronics Group has announced the release of the completed CEBus Home Automation Standard. EIA/CEG was the developer of the standard. Judd Hofmann, vice president of Panasonic Technologies, Inc. and chairman of the EIA/CEG CEBus Committee, said, “CEBus products that use one of four distinct signal distribution methods — power line, coaxial cable, twisted pair, or infrared — can now be designed. The EIA/CEG CEBus Committee is continuing its efforts to add the capability to distribute signals through radio frequencies to the standard.” Hofmann added, “Throughout the standard’s development, the CEBus Committee never lost sight of its original charter — to ensure that virtually any product can be inexpensively adapted to CEBus operation, that CEBus can be easily integrated into existing homes, and that CEBus is easily extensible.” According to

George Hanover, EIA/CEG staff vice president, engineering, “The EIA is developing a plan to support a variety of related applications and programs, including a database of CEBus commands for product developers, and a product certification program.”

### Video Replay Gets MII

Video Replay in Chicago has purchased a complement of studio and field videotape decks in the MII format from the Panasonic Broadcast & Television Systems Company. Ron Norinsky, president of Video Replay, said that his equipment rental customers tend to be MII users looking to supplement their own gear. In addition, on the post production side, Video Replay is demonstrating to new users that for interformat on-line editing and duplication “the quality and performance of MII is equal or better than Betacam . . . We’re trying to work with those who have a communica-

tions need and are not locked into a format.”

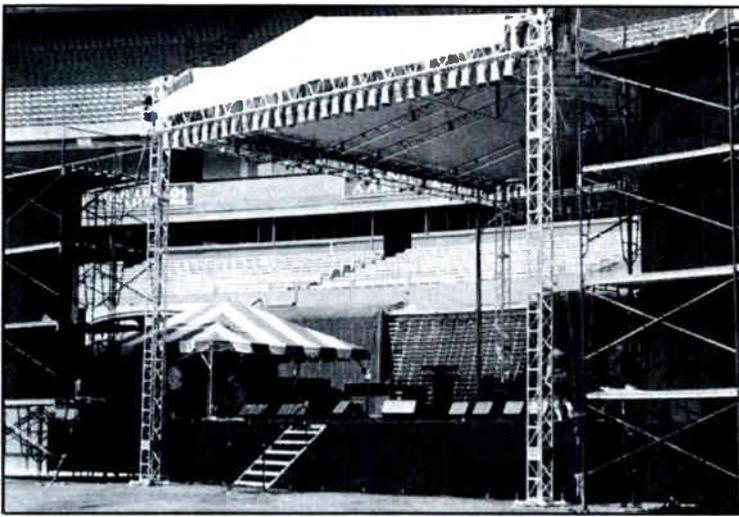
### Altec Lansing in Church

Altec Lansing Corporation has announced that the Bel Air Presbyterian Church in Bel Air, California has installed a new professional sound system using equipment manufactured by Altec Lansing. The church is frequented by Ronald Reagan. AMT Systems of Canyon Country, California directed the installation. Altec equipment includes five MRII564 Mantaray horns, three MRII594A Mantaray horns, 1674C and 1678C mixers, eight 2998A HF drivers, five 9442SA and seven 9444A/SA amplifiers, and two 8256 dual 15-inch enclosures.

### Videolarm Moves

Videolarm has moved into a new 51,000 square foot facility in Decatur, Georgia, tripling the company’s manufacturing and warehousing space. The new address is 2525 Park Central, Decatur, Georgia 30035. Ray Pagano, president and executive director of the company, said, “Increased product demand and expansion of current product lines have led to the need for this new and expanded facility. The increased space will also have a positive effect on Videolarm’s research and development efforts.” The 16-year-old company has received several patents for its designs. The company is best known for its dome enclosures and pan and tilt systems.





### TAD at Fulton County

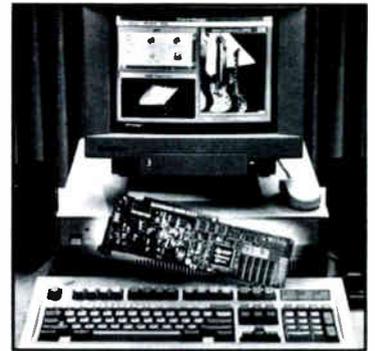
Technical Audio Devices and production company Roadworx Productions joined forces to demonstrate TAD's TCM-1821 sound reinforcement system at the open-air Fulton County Stadium in Georgia. Roadworx staff and Leon Sievers, senior product planner for TAD, arrayed 36 of TAD's two-way, 18-inch woofer TCM-1821 speaker systems for local radio station WFOX's "The Ultimate Oldies Show." The TAD array required only 16 amplifiers (four Crown 3600s per Roadworx Model 2230A house amp rack). No

subwoofers were used (the TCM-1821 is a full-range system). The top row of cabinets on each side of the stage (a total of 12) were inverted. The inversion directed TAD's Apaxial-design horns, normally tilted down at a five-degree angle, toward the upper decks. Additional equipment included 16 monitors from Woodworx Audio Systems in Greensboro, North Carolina, containing proprietary low-frequency transducers and TAD TD-4002 high frequency compression drivers. According to Matt Naylor, house engineer for Roadworx,

Fulton County Stadium is difficult to manage due to its round shape and unusual requirements — such as the 250-foot stretch between the mixing position and arrays.

### Texas Instrument Multimedia System

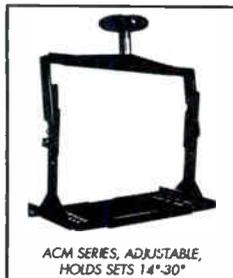
Texas Instruments has released details on Mwave, a programmable solution for integrating a range of multimedia functionality into the PC environment. Pricing is expected to start below \$100 for a family of hardware and software components. TI expects Mwave products to be in retail outlets in 1993. The Mwave Multimedia System is the first of several products to result from the IBM, TI and Intermetrics alliance announced in March 1992. TI's Mwave Multimedia System enables a compact motherboard subsystem or a single



*Texas Instruments Mwave Multimedia System is an open, programmable multi-tasking system for the PC environment.*

add-in card solution for Windows and OS/2 OEMs providing the functionality that previously required multiple cards. Initial products in the system include a software developers kit, system software, and a DSP. IBM plans to incorporate the Mwave system across its multimedia products for audio, image and communications. First system products are expected in 1993.

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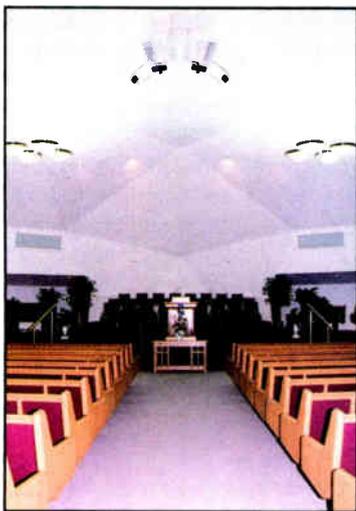


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## Church Installation by Audio Designs

An installation for a modern geodesic-dome styled church was completed in September by Audio Designs, Inc. of Downers Grove, Illinois. The Naperville Bible Church in suburban Chicago needed a place for Sunday church services in addition to a concert-ready area for youth group programs to include rock concerts, plays, etc. Audio Designs used equipment that included



Klipsch Split LSI cabinets and a Soundcraft Delta console, along with equipment by AB International, Rane, Lexicon, dbx, Aphex, Audio-Technica and Carver.

## Ace Audio Visual Installs Video Walls

ACE Audio Visual in Woodside, New York has announced the recent installation of a number of videowalls for the United Artists Theater Circuit as part of its Lobby Theater Program. The announcement was made by Marc Hochlerin, vice president sales and design for ACE and coordinator of the project. The walls, installed in theater lobbies, are used to show previews of upcoming films, which were produced on laserdisc by ACE Audio Visual's Laser Disc Division. These installations represent the first stage of a project intended to ex-



tend to all new or revitalized UA locations. Each wall uses Barco's Optisense 28-inch video monitors in either 2x2, 3x3 or 4x4 configurations as well as Laser Point Ram Wall custom electronics for programming and processing. ACE currently supplies and produces laserdisc previews to over 300 United Artists theaters in the United States and is working with international theater companies to provide similar services. Michael Reingold, city manager for United Artists Theater Circuit in New York, said, "It is such an impressive setup that it not only captures our customer's eye at the theater but has increased advertising on our Lobby Monitor Network."

## BASF Awards Rank Video

BASF named Rank Video Services America a recipient of the "Inventor's Award" for Rank's development of its Master Sharp quality and process control system. The presentation was



*Daniel Malcorps (left) of BASF and David C. Cuyler of Rank.*

made by Daniel Malcorps, BASF Corporation Information Systems Vice President. Accepting for Rank was David C. Cuyler, Executive Vice President. Created in 1975, the BASF Inventor's Award is given each year to the company, person or association which has made a major contribution to professional audio or videotape duplication. Previous recipients have been WEA, A&M Records, American Multi-Media and Concept Design.

## Fire Department Uses S-VHS

The Fort Worth Fire Department's video unit responds to two-alarm or larger fires and major Emergency Medical calls with Panasonic S-VHS equipment. The department shoots ENG-style for internal uses such as training and documentation, but often gets a wider audience when its footage is broadcast by local news programs. J.P. Hall is in charge of media services for the FWFD, and carries an AG-450 two-hour S-VHS camcorder in an un-insulated van to hundreds of emergency calls every year in "90-degree summer days and 10-degree winter nights." A Panasonic AG-460 Two-CCD S-VHS Hi-Fi camcorder is used as a back-up unit. Hall shoots S-VHS at the fire or rescue scene, dubsto 3/4-inch with time code for editing and masters on VHS for distribution. The cameras were purchased from Barry's Camera & Video in Dallas. Hall lauds the Panasonic regional representative, Marilyn Miles, who "is always there when we need her," although the units have been trouble-free according to Panasonic.

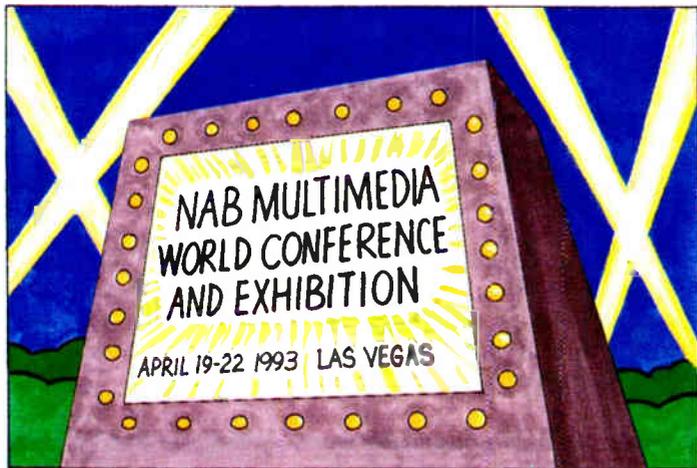
## New Installs for University

University Sound has announced diversified installations using the company's equipment. The Cambria County War Memorial Arena in Johnstown, Pennsylvania has installed a University 1802 preamplifier/mixer in the 80,535-square-foot complex. And the Orange and Rockland Utility Company has installed an array of University equipment in its Lovett Power Generating Plant in New York state. The facility has installed 56 Cobraflex III horns and 24 PH re-entry horns.

## Cristy Lane Theatre Gets Tannoy

The Cristy Lane Theatre in Branson, Missouri has installed 30 Tannoy Contractor Series speakers. Principal Design Consultant was John Westra of Milam Audio in Pekin, Illinois. Main floor coverage was provided by two concentric stereo arcs of 15 CPA 15 units each, with an additional four units slung beneath the balcony. A pair of CPA 15.2 subwoofers are built into the stage, helping to distribute a consistent stereo sound image across the 1,600 seat room. Foldback is provided by an overhead stereo array of four CPA 15s providing general stage coverage and eight smaller CPA 12 speakers as individual monitors to the stage. Westra said, "You don't find this design configuration very often. We use it in large venues where the customers want a big sound, loud, but not harsh. The stereo arcs can give a perceptual increase in level of four to six dB over the actual level but without the risk of irritating the listeners." The Tannoy Contractor Series speakers use Tannoy's Dual Concentric Differential Material Technology (DMT), which isolates and eliminates unwanted speaker biases and resonant frequencies. Westra added, "The theater operators knew what Cristy sounds like in the studio and on CD, and that's what they wanted her to sound like in the theater."

# This Is Just A Convention Like Woodstock Was Just A Concert.



*If you're involved in multimedia or broadcasting in any way, don't miss the NAB MultiMedia World Conference and Exhibition in Las Vegas, April 19-22, 1993.*

*No other convention brings together the multimedia world's key decisionmakers—those who create the content, those who deliver the content and those who provide the technology. In short, everyone who's anyone in multimedia will be at NAB MultiMedia World. So how could you not be?*

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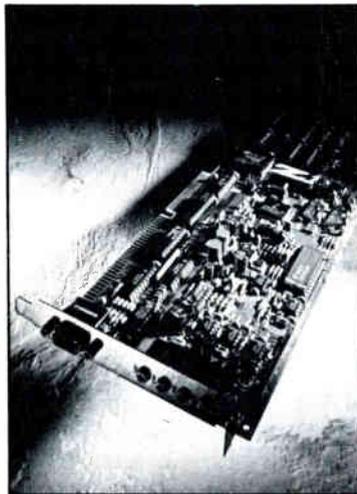
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### Multimedia PC Board

Antex Electronics has announced the availability of a 16-bit, broadcast quality, stereo sound board with 4:1 ADPCM data compression meeting both Microsoft Windows 3.1 and Interactive Multimedia Association industry standards. The Model Z1 has a dynamic range of 80 dB and a frequency response of 20 Hz — 20 kHz. The Z1 is also compatible with Sound Blaster and AdLib sound standards.

### Omni Films Uses DOD

DOD has announced that its Series II equalizers are used in the large-format projection systems of Omni Films International. The Sarasota, Florida-based company specializes in the design, manufacture and sale of 70mm large-format theater systems and production of 70mm films for those sys-



tems. Omni Films uses DOD 430 series II equalizers in the processed six-channel surround sound system included with the systems, with an option of additional low-frequency speakers available. The equalizers are installed in the lamphouse unit of Omni's projection systems, which project 1-perf and 8-perf 70mm film on to screens that in some theaters stretch as high as six stories.

### Branson's Grand Palace Gets System

JBL has announced that the Grand Palace Theater in Branson, Missouri includes JBL Array Series cabinets, ES52000 Digital Controllers, Audio/Digital electronics, JBL electronics, and Soundcraft consoles. Phil Somers, based in Nashville, Tennessee, acted as Sound Consultant for the project. Nashville-based Spectrum Sounds was the installing contractor. "The Grand Palace people wanted a system with extremely high quality and extreme flexibility, allowing incoming artists the option of using the house system instead of bringing in their own production," says Somers. He added that, "The Grand Palace people wanted to develop a largely single source manufacturer relationship for reasons of technical liaison, service, pricing and fur-

ther system evolution." The Grand Palace represented a 1 million dollar investment. The 4,000 seat indoor theater will have featured 322 shows in 209 days during the 1992 season. The Branson area itself attracted around four million people in an eight month period last season.

### Audio Monitor for VTRs

The AMP-1A/D2 from Wohler Technologies is a single-rack-space, powered stereo monitor designed specifically for flexible monitoring of the four discrete audio channels on D2/D3-type VTRs. Magnetic shielding (less than 1 Gauss at any surface) allows installation of the unit immediately adjacent to video monitors. Specs include an output of 98 dB SPL at two feet, and a frequency response of 80 Hz to 15 kHz  $\pm$ 7 dB.

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## Mitsubishi Videoconferencing Showcased

Mitsubishi Electronics America, Inc. is showcasing its Series 8000 videoconferencing system. At the heart of the unit is Mitsubishi's MVC-8100 video codec, enabling the Series 8000 to provide CCITT standards "at a low operating cost." The Series 8000 is interoperable with major videoconferencing systems from manufacturers in the United States and Japan. According to Jerry Silvia, Mitsubishi's marketing manager, demonstration of the Series 8000 allows the company to show "conformance to ISDN standards and interoperability, as well as an overall commitment to promoting videoconferencing. As an example, Mitsubishi offers flexible financing such as try-and-buy evaluation sys-



*Mitsubishi Series 8000 all-in-one mobile videoconferencing system.*

tems, dealer affiliate programs . . . rental, lease and demonstration systems.

### REP NEWS

#### Crestron Announces Reps

Crestron Electronics has announced that Southeastern Communications Systems, Inc. (SECOM) is its new sales repre-

sentative for North Carolina, South Carolina, Georgia, Tennessee, Alabama and Mississippi.

Crestron has also announced the appointment of Douglas Lowe at Advanced Audio/Video Systems, Inc. as Regional Manager for both Florida and Puerto Rico.

#### Ikegami Reps Appointed

Ikegami has announced that several representatives have joined the Closed Circuit Video Systems Division sales force. Included in the lineup are: 1 Volt Associates of Silver Spring, Maryland and Richmond, Virginia for Maryland, Washington DC, South Carolina, Virginia and North Carolina; Linton Inc. of Jasper Texas for Louisiana, Arizona, Texas, Oklahoma, Colorado and New Mexico; LMS Marketing, Reynoldsburg and Fairfield, Ohio, for western Pennsylvania, West

Virginia, Michigan, northwestern New York, Ohio, Indiana and Kentucky; and Access Direct Marketing, Orleans, Ontario for Canada.

#### Main Line Named

Lowell Manufacturing Company has appointed Main Line Marketing to represent the company in Florida.

#### Grosse Joins Enright

Kitty Grosse has joined The Enright Company in sales of professional video and multimedia products. Grosse was previously with the Photo and Sound Company, most recently as sales manager for southern California and Arizona. The Enright Company represents "professional video and multimedia equipment manufacturers" in California, Arizona, Nevada and Hawaii.



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# PRODUCTS

## Tascam's Digital on Hi-8; A JBL Array

By Steve Jacobs

### "Affordable" Digital Multi-track

Tascam has introduced the DA-88; an eight track digital recorder that has a compact 8 mm cassette transport that records on Hi-8 tape. It has the capability of recording up to 100 minutes on a standard 120 tape. Up to 16 DA-88s can be locked together for up to 128 tracks.

Also available is the RC-848 remote controller for the DA-88. The unit directly controls up to six DA-88s and has standard punch in/out and transport operations, as well as locate functions. Retail price for the DA-88 is \$4,499, and the RC-848 retails for \$1,499.

Circle 1 on Reader Response Card

### Rackmount Sound Synthesis

Kurzweil has introduced the rackmount version of the K2000 sound synthesis system, the K2000R. It is designed for sound designers and music production. The K2000R is a rackmountable stereo digital sampler/synthesizer that offers eight megabytes of on-board sound RAM and 16-bit sampling capabilities.

Circle 2 on Reader Response Card



### Array Additions

JBL has introduced two Array Series systems, the 4893 high power compact subwoofer system

Steve Jacobs is the Associate Editor of Sound & Communications.



stem and the 4894 high power two-way loudspeaker system. Both models feature Vented Gap Cooling woofer technology, S.A.F.E. rigging hardware and high power performance in a compact box.

The 4893 features a linear SFG motor structure. Both units are designed to work with the JBL ES52000 digital controller.

Circle 3 on Reader Response Card

### Systems and Controllers

Meyer Sound is introducing its MeyerPRO series of sound rein-

forcement speaker systems and associated controllers. The "cost effective" line consists of three product categories from compact to full-range systems.

700 line consists of an upright PA cabinet and a separate subwoofer. The MeyerPRO series includes a line of control electronics units. These dedicated system controllers offer frequency and phase response alignment and system protection circuitry in a two-channel design.

Circle 4 on Reader Response Card

### Single Channel, Non-Diversity

A single channel, highly-sensitive, non-diversity wireless microphone system, the WT-780 has been introduced by TOA Electronics. Incorporating many of the internal components of TOA's commercial wireless systems, the VHF professional unit operates between 168 and 216 MHz and is available with a number of transmitters.

Features include TOA's double squelch system which consists of tone-key circuitry and a traditional noise squelch.

Circle 5 on Reader Response Card



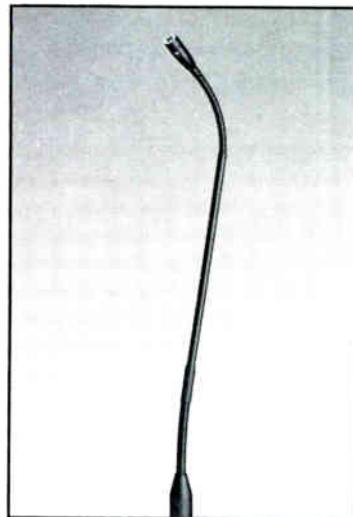
### Podium Mic

Audio-Technica U.S. Inc. has added the PRO 35QML podium microphone to its PRO series of microphones.

The PRO 35QML is a mini-cardioid condenser model, designed for use on podiums, lecterns, pulpits and similar applications. A locking base plate can be bolted to a wood surface which minimizes theft potential.

The mic features low-mass diaphragm technology, in which the permanent charge is fixed on the back plate rather than on the moving element.

Circle 6 on Reader Response Card



### Mixing System

Fostex Corporation of America has introduced the DCM-100 digitally controlled mixer and the MIXTAB controller. Designed as two discrete units, the DCM-100

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Pinnacle Audio 200 Seo Lane, Farmingdale, N.Y. 11735, USA. Tel: (516) 240-9660 Fax No: (516) 420-1963.

Circle 228 on Reader Response Card

and the MIXTAB controller work together to form a complete mixing system.

The DCM-100 is a single space rack mountable mixer that is controlled via MIDI messages that can be recorded by MIDI sequencers. MIXTAB is the human interface to the DCM-100. The DCM-100 can store up to 100 settings in snapshot memory. When it's recalled, any difference in settings in knobs and faders is reflected on the MIXTAB by the blinking speed of the corresponding tri-color LED.

Circle 7 on Reader Response Card



### Stage Monitor System

Community has introduced the CSX58M stage monitor system. The CSX58M is a three-way bass reflex loudspeaker system with its own internal passive crossover network.

The low end contains two 12-inch transducers while the range from 1.8 to 10 kHz is directed to a one-inch entrance pattern control horn driven by a compression driver that contains a titanium diaphragm.

Power handling is rated at 200

watts continuous pink noise, 500 watts program.

Circle 8 on Reader Response Card

single mono 12-band parametric equalizer.

Circle 9 on Reader Response Card

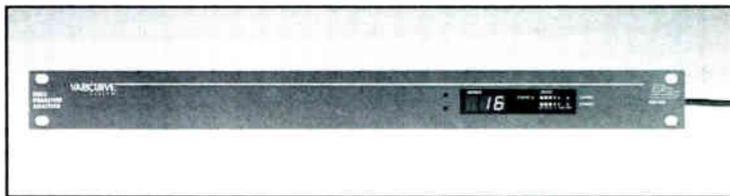
### Equalizer/Analyzer

BSS has introduced the FCS-920 Dual Varicurve Equalizer Analyzer slave to expand the line of the Varicurve system of EQ processing and control elements. Configured as two separate channels of programmable six-band parametric equalization with an integral 30-band RTA, the FCS-920 can also work as a stereo-linked pair or as a

### Three Configurations

DDA has introduced the Forum console line. The Forum comes in 24-, 32- or 40-input configurations and consists of three models including the Forum PA with eight group outputs, the Matrix with eight group outputs in an eight x eight matrix, and Composer with full 24-track monitoring and meterbridge.

Circle 10 on Reader Response Card



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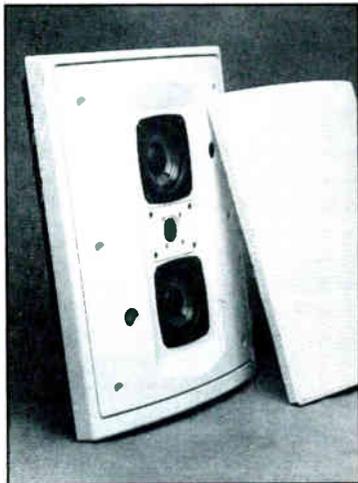
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## FREE INFORMATION

Use the Reader Response Cards in this issue to find out more about companies that interest you.



### On-Wall Speakers

Sonance has introduced its first on-wall speaker, the SoundFrame 400. The two-way, three driver speaker is intended for use where in-wall speakers would be inappropriate or impractical, such as in brick or other solid wall

construction. The model is three and 1/2 inches in depth.

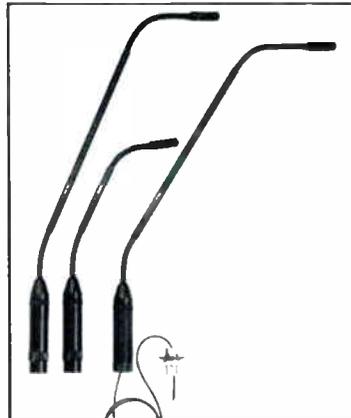
The vented enclosure speaker uses two four-inch woofers and a one-inch soft dome tweeter mounted in a "Woofers-Tweeter-Woofers" array with the tweeter centered between the woofers.

*Circle 11 on Reader Response Card*

### Electret Mic

Telex Communications, Inc. has announced its Microneck electret condenser microphone series. The EGM Series includes permanent and quick mount unidirectional goosenecks, and is available in either a 12- or 19-inch style.

Perma-mount electret goosenecks (models EGM-40P/EGM-41P) feature a threaded flange for mounting on a mic stand, a threaded adapter for mounting to a po-



dium, and an XLR-3M mic connector. The EGM-40Q/EGM-41Q quick mounts have an XLR-3M for easy removal.

*Circle 12 on Reader Response Card*

### Mic Power

Nady Systems has introduced the StarPower series of hard-wired microphones to the U.S.



market, after having been in the European market. The Nady SP series is designed for concert and studio vocal applications. The mics feature all-metal construction with a unidirectional element that is mounted in a shock absorbing cartridge.

*Circle 13 on Reader Response Card*



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### Data Acquisition

Leader Instruments Corporation has made available the model 300-PC data acquisition kit which offers uploading and downloading of waveforms and data between the memory card used with the model 300 handheld DSO/DMM and a personal computer.

The software enables computer control of stored waveforms. In the long word length mode, waveforms can be expanded, scrolled through and printed. Waveform data can be used for processing, analysis and statistics, and can be incorporated into word processing or spread sheet reports.

Circle 14 on Reader Response Card

### 300 Ohm Preamps

Winegard Company has added four preamplifiers all with 300 ohm input, 75 ohm output. The preamps are designed to be paired



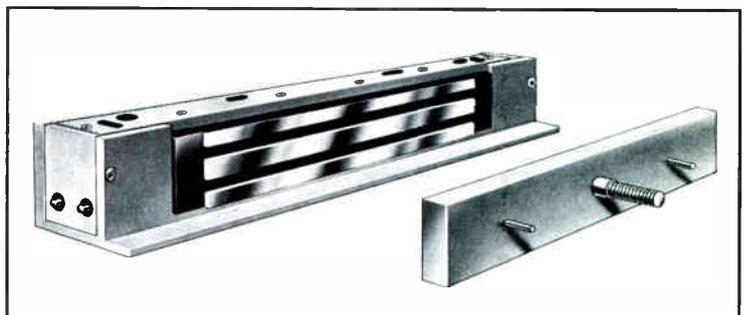
### Ultralock Covers

Dortronics Systems, Inc. has made available the 1100G Series one-piece extruded aluminum housing covers with integrated tamper guard, for its Ultralock electromagnetic locking devices.

Circle 15 on Reader Response Card

with 300 ohm antennas. They are housed in ABS material for resisting damage to input and output connections due to UV exposure. Each model features two FM traps, both selectable and tunable.

Circle 16 on Reader Response Card



# SR6000 from TAC

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of Eq with parametric  
and swept High Pass  
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parametric, the  
is easy to  
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### TOTAL METERING

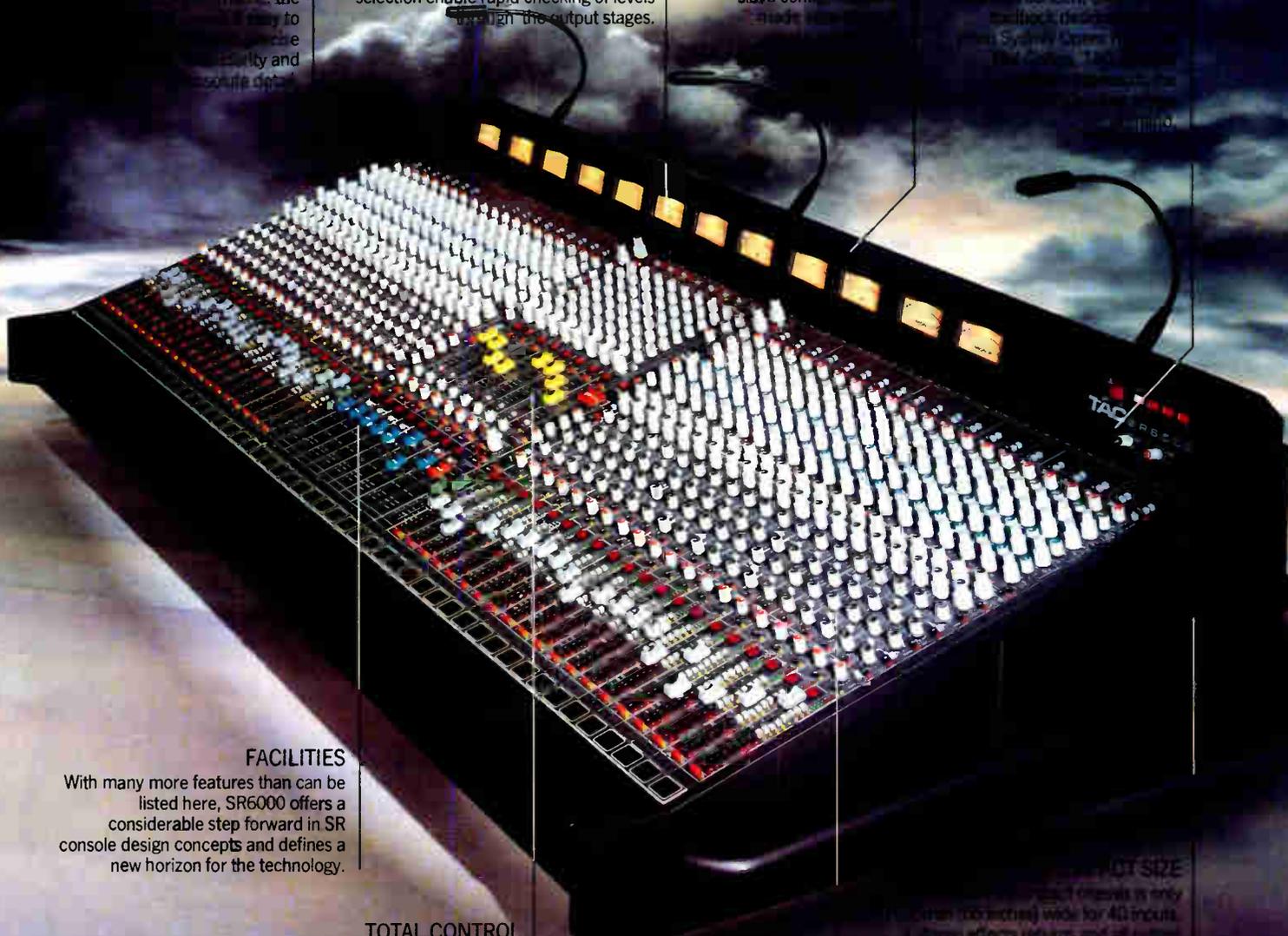
A 7-stage LED meter located next to the mute switch of each channel gives an immediate assessment of levels from signal present to +12dB. 12 VU meters with individual multi-source input selection enable rapid checking of levels through the output stages.

### MASTERS & SLAVES

Linking of multiple SR6000s in master-slave configuration enables

### PEDIGREE

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and manufacture of  
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and Sydney Opera House  
The console TAC  
the



### FACILITIES

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

### TOTAL CONTROL

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

### SPLIT-AUXILIARY SYSTEM

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

### SMALL SIZE

each channel is only  
wide for 40 inputs.  
effects returns and all other  
facilities. Robust steel construction  
loaded with side lift bars and  
concealed and space under the arrival  
SR6000 to be transported and  
distributed easily in the secure  
knowledge that all circuitry is fully  
protected from external impact.



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### DMMs

Beckman Industrial has introduced the model 2020 and model 2030, the first models in a line of four-digit professional-grade digital multimeters.

Features that distinguish the models include True RMS and Fault Finder. True RMS can be AC or AC/DC coupled for both voltage or current, and is meant for measuring switching power supplies and nonsinusoidal waveforms with AC and DC components. Intermittents, bad contacts, and broken wires that cannot be found with a digital meter can be found with the Fault Finder.

Circle 17 on Reader Response Card

### Mixer-Power Amps

University Sound is expanding its line of mixer-power amplifiers by introducing the MA-1206 for use in professional sound applications.

The MA-1206 provides 120-watts output and provides six inputs, with input channels one through five featuring balanced XLR connectors, while channel six offers mono-combining left/right RCA phono jacks to accommodate stereo tape or CD players.

Circle 18 on Reader Response Card

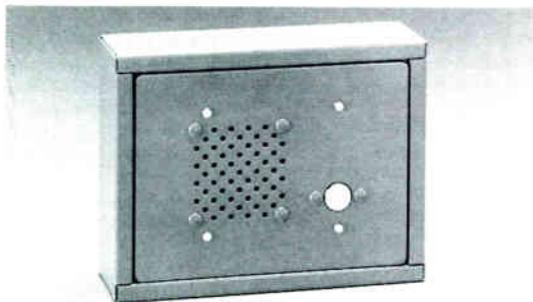
### Color CCD

Burle Security Products has augmented its CCD camera line with the addition of the TC270 series color CCD camera. The TC270 Series 1/3-inch format CCD camera designed for professional video surveillance systems.

The camera exhibits standard resolution and enhanced sensitivity at 1 lux for useable video with features such as backlight compensation, selectable electronic shutter/automatic iris, digital adjustment control, fixed or automatic white balance and double insulation.

Circle 19 on Reader Response Card

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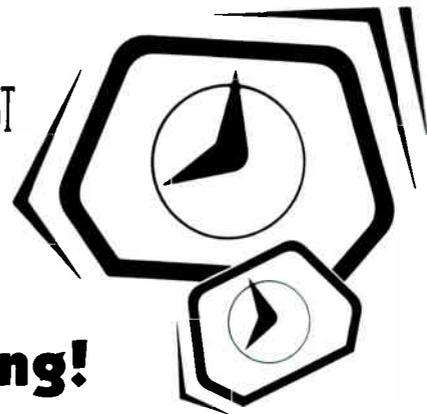
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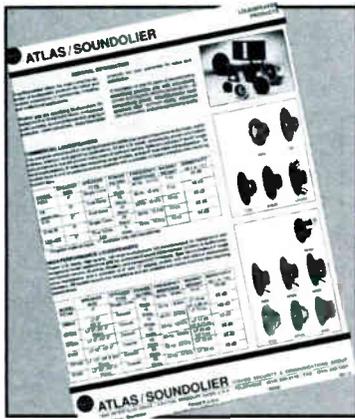
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## LITERATURE

### Atlas Speakers; Math's Fiber Optics

#### Loudspeaker Varieties

Atlas/Soundolier has announced a Loudspeaker Product Summary (SC1-2). The piece is designed as a first step in assisting contractors and architects in selecting and specifying sound products. The guide should be used to verify product selections, identify product substitutions, or introduce new customers to the product line.



The six-page booklet describes Atlas/Soundolier loudspeaker varieties: commercial, high performance, indoor/outdoor, environment-resistant and explosion-proof. Also mentioned are loudspeaker/transformer/baffle packages, ceiling loudspeakers systems, mobile communications products, reflex sound projectors, compression drivers and line-matching transformers.

Circle 20 on Reader Response Card

#### Fiber Optics in Short Form

Math Associates Inc. has introduced its short form catalog and newsletter. The catalog contains product information and application information. The newsletter contains detailed focuses on data, security and applications.

Circle 21 on Reader Response Card

#### EMI/RFI Tutorial

A free tutorial covering the basic concepts of EMI/RFI problems in electronic enclosures is offered by

Equipto Electronics. It can be presented by the company's representatives at a site requested via a 14-minute VHS tape and product sample.

Seminar subjects include FCC and military specifications. EMP and TEMPEST concerns are covered and alternatives to solving these problems are discussed. Shock and vibration solutions, including seismic, are included as well.

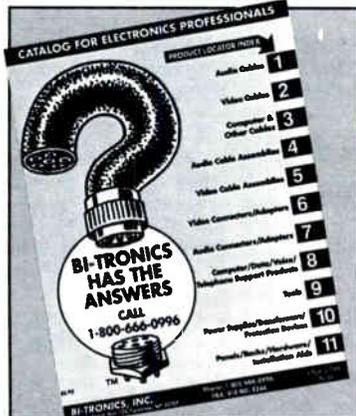
Circle 22 on Reader Response Card



#### Electronics

The 1993 catalog is available from Bi-Tronics, Inc. The firm provides connectors, cable, adaptors, cable assemblies, tools and accessories. The 140-page catalog includes bulk cable and connectors and adaptors along with information on Bi-Tronics Part Number/Crossover Service.

Circle 23 on Reader Response Card



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## PEOPLE

### JVC Promotes; Pehringer to Telex

#### JVC VPs

Thomas McCarthy and Tad Iwasaki have been named Vice Presidents of JVC Professional Products Company.

McCarthy was named vice president sales and marketing where he is directing the overall sales efforts in the United States, including the development of marketing strategies, supervision of the sales staff, and dealer and customer relations. McCarthy previously served as general manager of sales and marketing for the company. He has held various position at JVC for almost 15 years.



McCarthy

Iwasaki was promoted to the position of vice president of general administration.



Iwasaki

In his new position, Iwasaki is administering the company's overall finances and accounting, and overseeing inventory and budget controls. He previously held the position of general manager, accounting and finance and has been with JVC for 23 years.

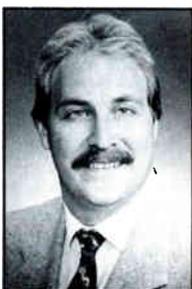
#### Placken to Contact

Jerry Placken has been tapped by Contact Distribution Ltd. to assume duties including the implementation of nationwide marketing and sales programs as well as responsibilities to specific sales regions for the Canadian-based distributor.

Placken has spent the last five years as International Marketing/Sales Manager at Adamson Acoustic Design Corporation.

#### Telex Picks Pehringer

Telex Communications, Inc. has named James Pehringer Sales Manager for Assistive Listening Systems in the Pro Audio department. A contributor to the hearing health care industry for more than 11 years, Pehringer has held positions as a clinical audiologist, researcher, hearing aid dispenser and manager of sales and marketing for various companies.



Pehringer

His responsibilities include focusing on the application and expansion of the Telex wireless FM hearing assistance system product line, and act as a resource for achieving communications accessibility under the Americans with Disabilities Act.

#### Meyer Names Jones

Ralph Jones has been promoted to the newly created position of vice president of development at Meyer Sound. In his new position, Jones is heading the team responsible for short and long term strategic corporate planning, product planning, and future direction of the company.

Jones has been with Meyer for the 13 years the company has been in existence, and was most recently Meyer's marketing manager.

#### Payne Promoted

Javelin Electronics has promoted Raymond Payne to the position of executive vice president. In his new role Payne has overall responsibility for Javelin engineering and quality assurance. He is further responsible for the company adoption of ISO-9000, the strategic direction of the company, and emerging technologies and their applications.

Payne has been with Javelin in various positions since 1975.

#### Switchcraft President

Keith A. Bandolik has been promoted to President of Switchcraft, Inc., a wholly owned subsidiary of Raytheon Company. Bandolik most recently headed the company as Vice President and General Manager.



Bandolik

Bandolik has been with Switchcraft for 14 years and has held positions in product management, distribution, quality management, sales and marketing.

#### VP at AmPro

Frank Genovese has been named East Coast Vice President for large screen projection systems manufacturer, AmPro. Genovese has as-

sumed responsibility for East Coast marketing and sales efforts. Prior to joining AmPro, Genovese served three years as President of consulting firm Genovese & Associates. Previously, Genovese held the position of Senior Vice President with Barco, Inc.

#### Fostex Appoints Cunningham

Fostex Corporation of America has appointed Steve Cunningham to the position of vice president of sales for the company's line of professional audio products.

In his position, Cunningham is responsible for managing the company's sales functions including: forecasting, promotions, and management of the inside and outside sales force.

Prior to joining Fostex, Cunningham was general manager and vice president for J.L. Cooper Electronics.

## CALENDAR

### Upcoming Events

#### JANUARY 1993

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

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

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

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

#### FEBRUARY

**ComNet:** Washington, D.C. Contact: (508) 879-6700. February 1-4.

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

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

**National Hearing Conservation Association (NHCA):** Albuquerque, New

Mexico. Contact: (515) 243-1558. February 18-20.

#### MARCH

**National Association of Music Merchants (NAMM):** Frankfurt, Germany. Contact: (619) 438-8001. March 3-7.

**Audio Engineering Society (AES):** Berlin, Germany. Contact: (212) 661-8528. March 16-19.

**Image World - The Government Show:** Washington, D.C. Contact: (914) 328-9157. March 17-19.

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

#### APRIL

**National Sound and Communications Association (NSCA):** Orlando, Florida. Contact: (800) 446-NSCA. April 2-4.

**National Association of Broadcasters (NAB):** Las Vegas, Nevada. Contact: (202) 429-5300. April 18-22.

# Planning For The New Year?

## Plan on Using

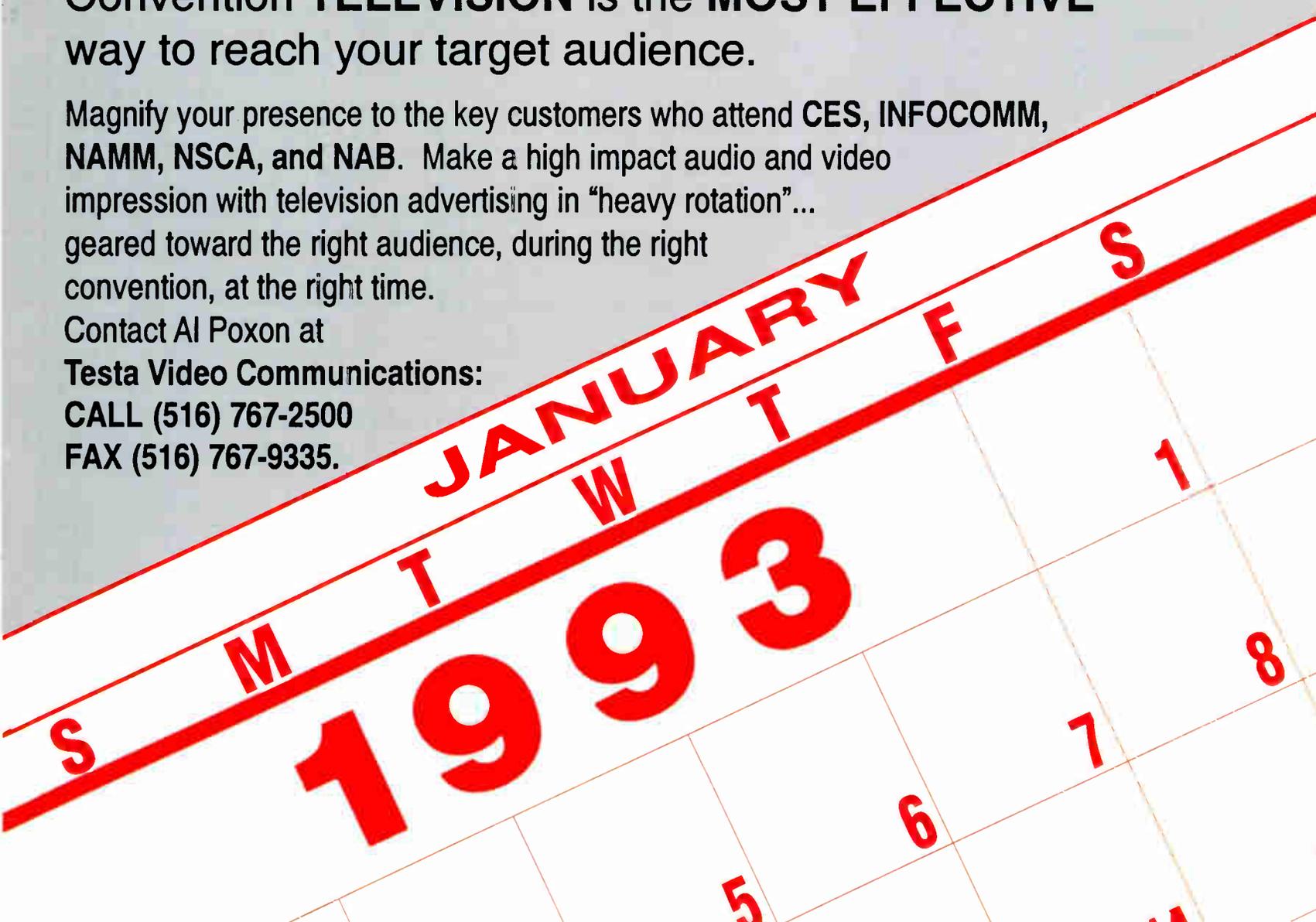
# TELEVISION

<p><b>CES-TV NEWS</b>  at the Consumer Electronics Show  January 7th-10th, 1993  in Las Vegas  June 3rd-6th, 1993 in Chicago</p>	<p><b>NAMM-TV NEWS</b>  at the National  Assn. of Music Merchants  January 15th-18th, 1993  in Anaheim</p>	<p><b>NAB-TV NEWS</b>  at the National  Assn. of Broadcasters  April 19th-22nd, 1993  in Las Vegas</p>
<p><b>INFO-TV NEWS</b>  at INFOCOMM  January 14th-16th, 1993  in New Orleans</p>	<p><b>NSCA-TV NEWS</b>  at the National  Sound and Communications Assn.  April 2nd-4th, 1993  in Orlando</p>	<p><b>AES-TV NEWS</b>  at the Audio  Engineering Society  October 12th-15th, 1993  in New York</p>

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## AD INDEX

Company	Page	RS #
AAMP of America	57	227
AB International	71	210
Ace Backstage	26	287
Acoustical Supply International	41,44	233
Acoustone	60	288
Aiphone Communications	13	205
Applied Technical Systems	97	235
Ashly Audio	5	201
Audio Logic	CIII	222
Audio Technica	67,77	221,246
BBE Sound	26	286
Behringer	35	226
beyerdynamic	76	272
C-T Audio	62	282
Cal Switch	89	258
Community	18	248
Conquest Sound	25	250
Crown	47	202
EAW-Eastern Acoustic Works	21	209
Frazier	72	263
FSR	40	271
Furman Sound	33	262
Gem Sound	85	253
Gold Line	33	283
Heliotrope General Inc.	97	237
IED-Innovative Electronic Designs	45	247
IMA/NAB	83	219
Image Communications	90	273
Klark Teknik/Pinnacle Audio	87	228
Labelle Industries	90	269
Lucasey Manufacturing/Impart	81	255
Mackie Designs	31	204
Menlo Scientific Acoustics	84	254
Meridian Communications	97	236
Middle Atlantic Products	38	264
Modular Audio Products	97	238
Multilink	93	270
OAP Audio	34	260
Opamp Labs Inc.	97	239
OWI	69	261
Oxmoor	37	203
Parasound	75	206
Peavey-Architectural Acoustics	CII/3	211
Pivotelli/Grant Products	62	280
QSC Audio	22,23	245
Quam Nichols	8	218
Quam-Nichols	40,92	275,276
Rane	63	249
Raxcess Metalsmith	32	284
RCI Systems	39	225
Sam Ash	60	281
Samson Technologies	48	217
Sennheiser Electronics	79	223
Sescom Inc.	97	241
Sharp LCD	11	216
Shure Brothers	19	215
Sonic Systems/Soundsphere	17,78	256,257
Speco	65	252
L.c. electronics	97	240
TAC-Total Audio Concepts	91	208
Tannoy/TGI North America	61	207
Tektone Sound & Signal	32	285
The Music People	24	251
University Sound	7	220
UREI Electronics	CIV	
West Penn Wire	15	214
Winsted	76	274
Yamaha Pro Audio	59	213

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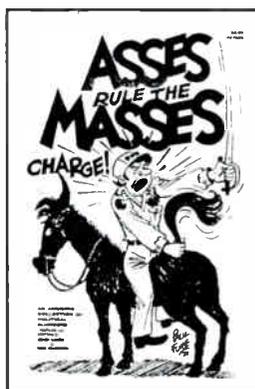
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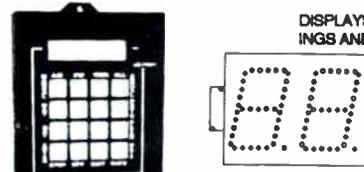
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Tape Players	TOA	TEAC	AEI
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Video Monitors	BURLE	SANYO	SONY/PANASONIC*
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\* Indicates tie

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Speakers	ALTEC LANSING	ELECTRO-VOICE	DUKANE
● CD Players ●	SONY	● TEAC ●	● TOA ●
Tape Players	TEAC	TOA	SONY
Amplifiers	TOA	CROWN	BOGEN
Video Monitors	BURLE	VICON	MITSUBISHI
CCTV Cameras	SANYO	VICON	HITACHI

\* Indicates tie

## SURVEY METHODOLOGY

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

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