

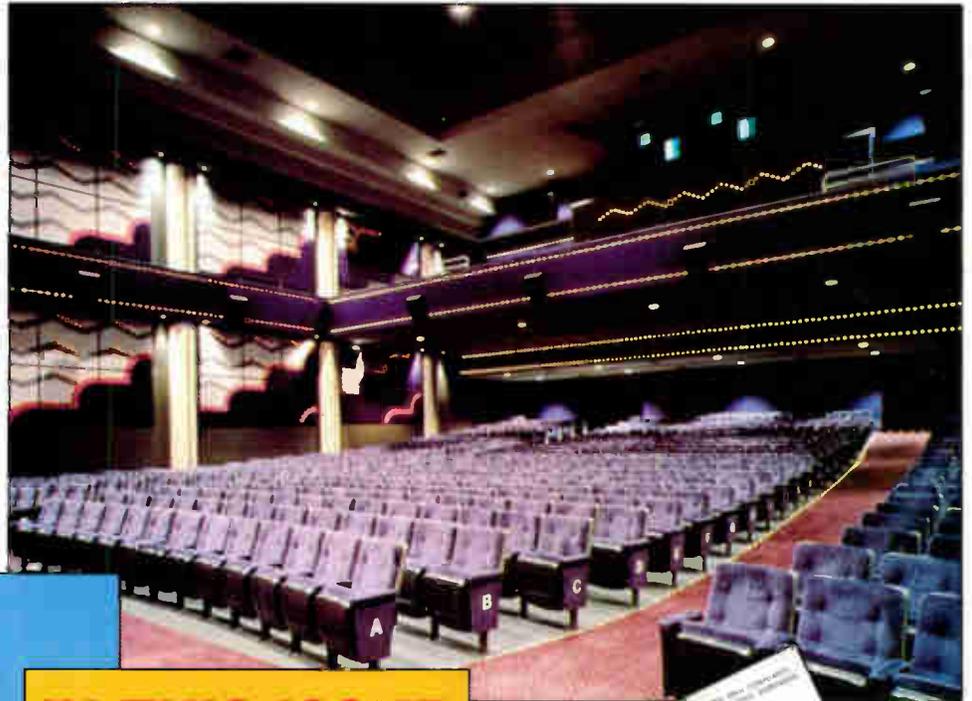
# SOUND COMMUNICATIONS

Volume 37 Number 9

September 23, 1991

## MOVIE THEATER SOUND

Popcorn, Raisinets, Diet Coke, and subwoofers. What's wrong with this picture? The sound supplier, say some. As new film formats move into the theatrical pipeline, more room may be available for the sonic expert to supply sensible audio equipment for the local movie theater — multiplex or otherwise. **48**



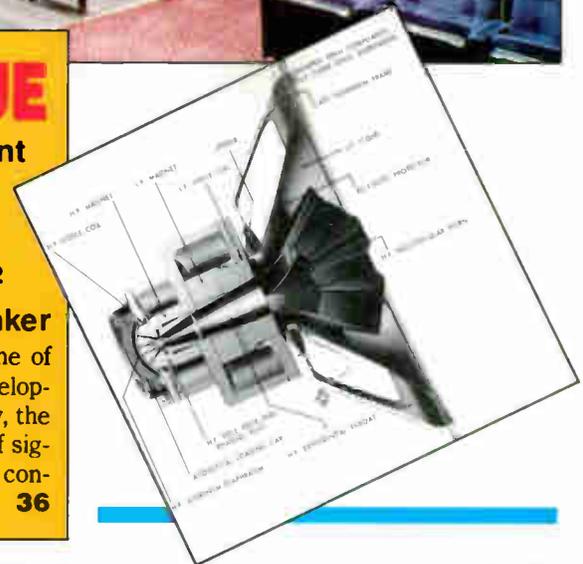
### IN THIS ISSUE

#### • Testing Test Equipment

What do you do with a \$2,000 power amp test system? Mike Klasco tells you as we continue to test the testing systems. **32**

#### • The Coaxial Loudspeaker

Saving space was undoubtedly one of the primary motivators for the development of the coaxial speaker. Today, the coax category covers a number of significantly different variations in construction as well as applications. **36**



## THE SPECIAL OLYMPICS

Forty-four audio manufacturers, augmented by reps, contractors and dealers, cooperated in setting up quality audio in 42 venues for this year's largest athletic event. Lack of power, hospital zones, and 140-volt requirements couldn't daunt this crew in their mission to donate good sound for all six systems. **18**

# 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**

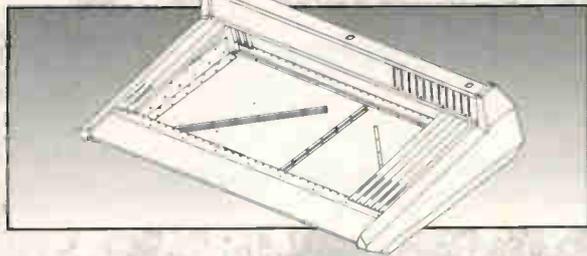
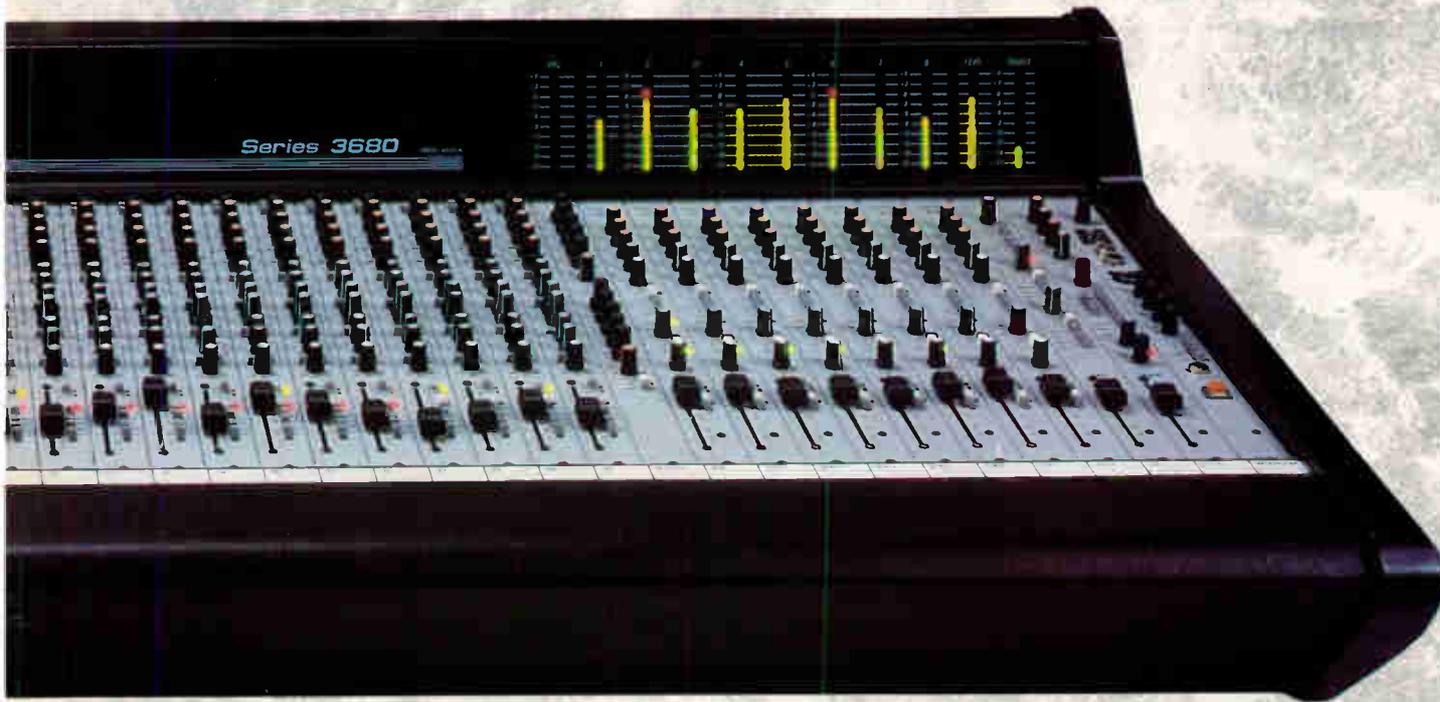
New electronically balanced input circuit offers 100 dB of common mode rejection, allowing the console to operate in most any environment without interference.



### — **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



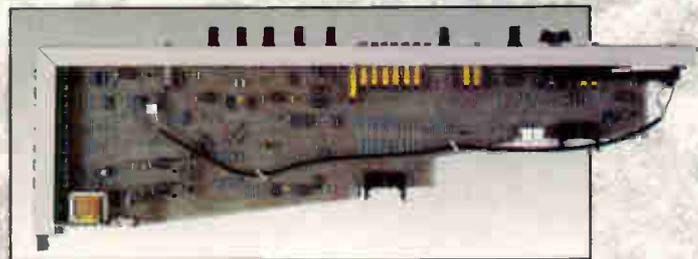
## MONOCOQUE CHASSIS CONSTRUCTION

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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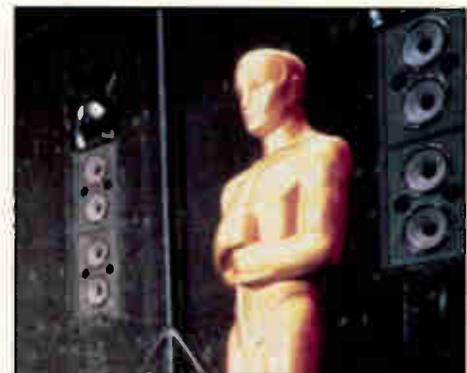
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SOUND  
COMMUNICATIONS

# Here it is in Black and White . . .



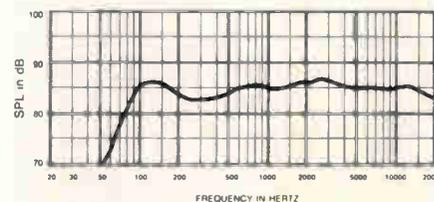
- PRO™ circuit independent high-frequency and low-frequency speaker protection
- Threaded inserts for mounting ease
- Rugged, weather-resistant, paintable, polystyrene cabinet
- 4-ohm version and built-in 70-volt transformer version with screwdriver-selectable taps

Electro-Voice S-40 compact speakers handle 160 watts of long-term power per EIA standard RS-426A. Both high-frequency and low-frequency driver protection is provided by EV's exclusive PRO™ circuits. The S-40T incorporates a 70/100-volt, built-in transformer that handles 30 watts. It also has a weather-resistant, covered barrier-strip connector with a grommetted cable exit.

The cabinet, available in both black and white, offers mounting ease with optional mounting bracket or Omni-Mount™ Systems Series 25. Low magnetic leakage makes the S-40 ideal for use near video monitors without interference.



Screwdriver selectable taps on 70-volt version



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## LETTER FROM THE EDITOR

# Real Writers and Live Engineers

Yes there really is a Pam Michael. And an Ed Foster, a Dan Sweeney, a Wes Alderson, and of course a Mike Klasco. All of the writers in Sound & Communications are real people. When Pam Michael recently phoned a manufacturer for some info for an article on coax speakers — the manufacturer was surprised. Seems he always thought Pam was really Mike Klasco. We did get an uproarious laugh here at the image of Mike Klasco in drag impersonating Pam Michael.

But I figured perhaps I should state what I thought was obvious. And also let you know our general policy. All of the writers in Sound & Communications magazine are real people. We don't use pseudonyms. In general, I don't believe in them, and I think our readers should know who's writing what.

We're proud of the people who write for us — and we want to credit their interests, because they're real and credible.

It's a truism for a magazine such as Sound & Communications that most people who know something about the business are working in the business. We appreciate the hard work our writers put in, and their efforts, and hope you do too.

At press time, we at Testa Communications are busily collecting information on the Audio Engineering Society convention taking place October 4 through 8 in New York. We are once again producing AES-TV News during every day of the convention, so if you're attending AES, don't forget to switch on AES-TV News in your convention hotel room. (The show can also be seen on the exhibit floor.)

Our television show at AES always includes symposia on technical issues of the moment. And this year's programs are no exceptions. Our symposia topics this year are: digital data compression; automated system standards; and post-production for the new media. These TV segments are often free-wheeling and feature the leading people in their fields. Past participants have included Wolfgang Ahnert, Neil Muncy, Tom Holman, and many other respected members of the audio industry.

You'll also see the latest products and marketing plans presented in an easily digestible way. So tune in AES-TV News while you're at the show.

Of course, we'll also be covering the show for Sound & Communications; so watch these pages for a roundup of products and programs of interest to contractors featured at AES.

AES is shaping up as a successful convention, with over 225 exhibitors and a widely expanded program of papers and workshops. The seminar and workshop program alone, chaired by Len Feldman and John Eargle, features such subjects as: forensic audio, digital compression, recordable cd's, dab, musical instrument acoustics and audio restoration.

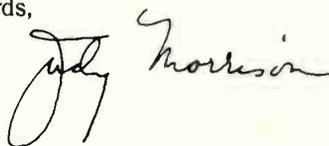
The theme of this 91st AES Convention is "Audio Fact and Fantasy — Reckoning with the Realities"; and 142 papers have been scheduled for the 16 technical sessions.

The location of the convention is the New York Hilton & Towers, where the exhibition space has been expanded and now includes two new exhibition floors. So there won't be any traipsing down to the Sheraton at this show. Additional committee meeting space, however, has been booked at the Omni Park Central and the Warwick hotels.

Prior to the start of the convention, there's a special treat for contractors. David Klepper is conducting a 12 hour tour of various houses of worship in and around New York City. This technical tour is scheduled for Thursday October 3, starting at 9:15 AM.

Our surveys show that a large proportion of Sound & Communications readers attend the AES show. So stop by our booth and say hello. We're always glad to meet face to face.

Best regards,



Judith Morrison  
Editor in Chief

## SOUND COMMUNICATIONS

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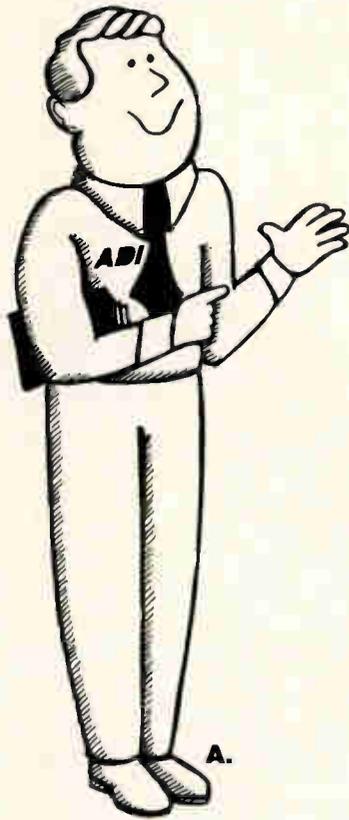
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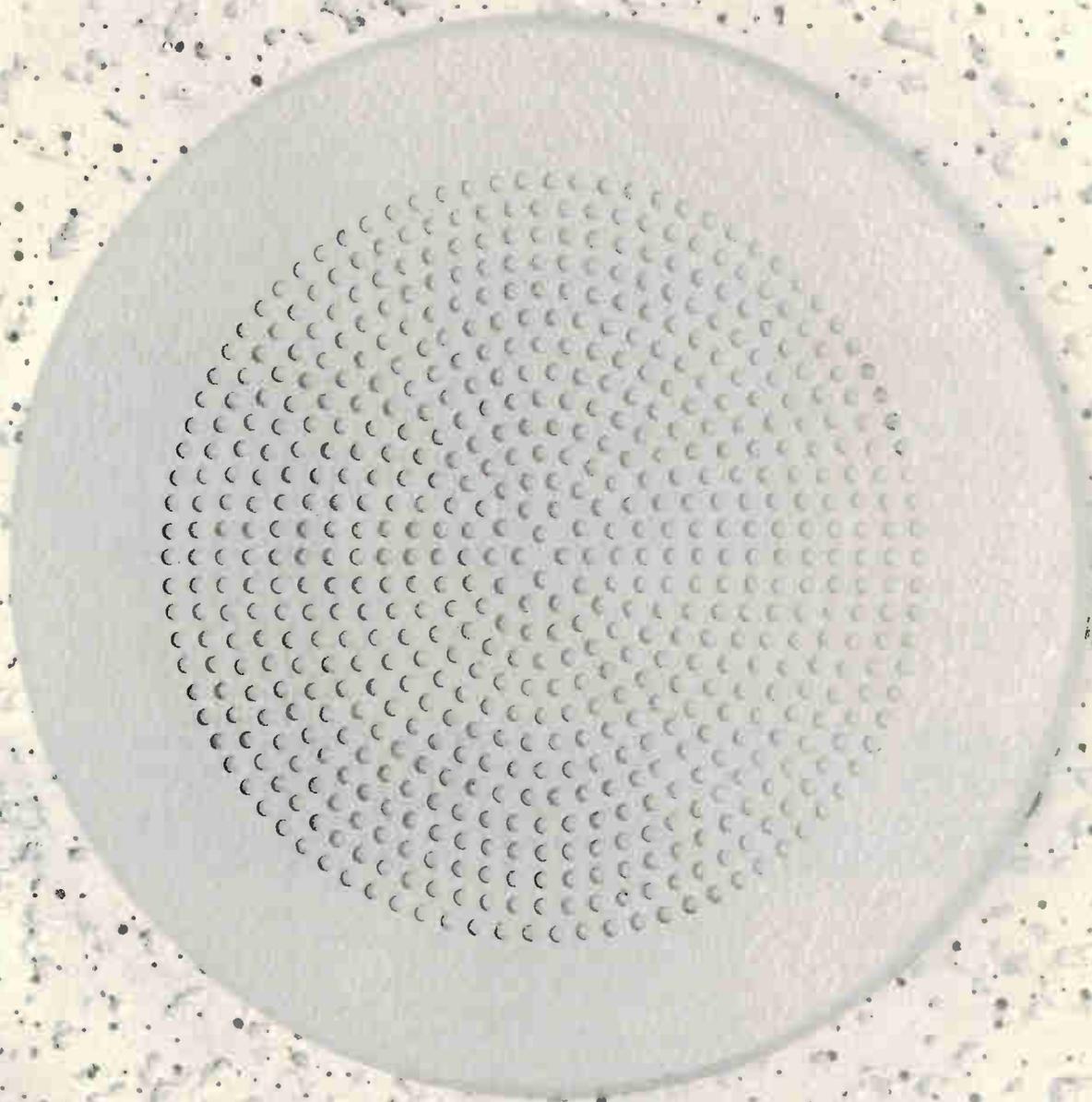
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# NEWSLETTER

## **ALLEN & HEATH TO SOUNDCRAFT**

Harman UK, a subsidiary of Harman International, and the holding company of Soundcraft Electronics, has acquired Allen & Heath, Allen & Heath USA and MBI. Allen & Heath, based in England, will be an independent trading company with its own dealer network and international distribution. In the U.S., DOD Electronics, now a subsidiary of Harman International, will handle the distribution of AHB markets in the North American market.

MBI will form part of a broadcast division within the Soundcraft group. Product design and manufacturing will be integrated with Soundcraft, but worldwide distribution has not yet been finalized.

## **IRP REPRESENTATION COMPLETE**

With the signing of Charlie Eaton for upstate New York, IRP has completed its conversion to manufacturers rep-based distribution. At press time 261 dealers had signed agreements, as the company's products essentially take on limited distribution.

## **AIPHONE VX SHIPPING**

Aiphone's VX Multi-Unit entry security system is shipping in a limited distribution setup. Lead time for the 240-station audio and video system can run up to six months and cost over \$100,000 in some of its configurations. A retrofit VY model is expected to be introduced. And next year, there is a possibility of an Aiphone system compatible with a home automation system. However, systems such as CEBus, X-10 and Smart House are in themselves incompatible, and since none of these has emerged as a clear leader, Aiphone, along with other manufacturers, has no introductions as yet. The company is showing up in an unlikely setting — soap operas, as shows such as *As the World Turns* and *General Hospital* feature Aiphone intercoms prominently on their sets.

## **SIA ACOUSTICS FOUNDED**

Sam Berkow has founded SIA Acoustics, "Consultants in Acoustic Measurement and Design." Berkow was previously an acoustical consultant and project manager with Artec Consultants and The Joiner-Rose Group. He was also a design consultant to Hyperception, and has developed a PC-based audible simulation system. SIA Acoustics also provides acoustical design services. The address is 8201 Fair Oaks Crossing, Suite 2070, Dallas, Texas 7231.

## **OPTIM AUDIO FORMED**

Optim Audio has been formed by Daniel Gravereaux and Irving Joel to serve commercial sound system dealers and installers. Gravereaux is the founder of Sound Engineering Technologies, a former director of the CBS Technology Center and a past president of the Audio Engineering Society. He serves as president of Optim Audio. Irving Joel is president of Joel Associates, a fellow of the AES, and a former chief engineer at A&R Recording Studios. He serves as vice president and director of marketing for Optim Audio. The new company carries loudspeakers, professional grade power amplifiers, control systems and associated electronic components. It's located at 733 Canal Street, Stamford CT 06902.

## **VIDEO ARRAIGNMENT**

The County of San Diego Court System is using Biamp Advantage 60li mixers for video arraignments. To avoid the costs of transportation and security, a live audio/video link has been established between the court and the jail. Science Applications International Corporation installed the system, which relies on two closed circuit television cameras and two mixers.

## **DIGITAL AUDIO LEGISLATION**

Bills have been introduced in both houses of Congress to enact into legislation the compromise reached between hardware and software producers of digital entertainment products. The bill's principal sponsors are Senators DeConcini, Inouye and Hatch; and Representatives Brooks and Hughes. Pro hardware is unaffected by the compromise or the legislation; but stringent limitations on the definition of professional machines are written into the compromise agreement and presumably will be in the legislation.

# NEWSLETTER

## **DIRECTORY AVAILABLE**

The 1991—1992 edition of The Equipment Directory of Video, Computer and Audio-Visual Products is available from the International Communications Industries Association. The Equipment Directory is published annually, and is available for \$50 prepaid or \$65 billed from the ICIA, 3150 Spring Street, Fairfax, Virginia 22031-2399.

## **DIGITAL DISK RECORDER**

Digital F/X has introduced the DDR-100 digital disk recorder for its Composium family of integrated digital video production systems. The recorder provides 100 seconds of recording capacity, is fully D-1 compatible, and plays back 4:2:2 component digital video "with no generational loss of image quality."

## **NEW PRODUCTS FROM SONANCE**

Sonance has introduced the largest number of new products in the company's history. The additions expand the company's line of in-wall loudspeakers to 10 full-range models and two subwoofers. Other introductions include enclosed loudspeakers, multi-room speaker switchers, and power conditioners. Scott Struthers, Sonance president, said, "The first half of the year has been a struggle for the entire consumer electronics industry. Custom installation and the manufacturers who provide product for it have not been immune to the trend. Sonance has come through this period on target."

## **CONSUMER TUBE**

Panasonic is planning U.S. introduction of the Super Flat consumer television "system," the U.S. version of the highly successful GOA set that has been sold in Japan for the last year. Super Flat incorporates new red and green phosphors, a new darker face and a new mask. "Active dome sound" with added active circuitry for the bass has been included. The sound system has been OEM'd from Japan to other TV manufacturers. The tubes will eventually be built in Troy, Ohio and Franklin Park, Illinois.

## **ALTEC STRENGTHENS PRESENCE IN EUROPE**

Altec Lansing reports that it is expanding its market in Germany, with 20 recent installations there using Altec Lansing sound equipment. Facilities include the Darmstadt Ice Stadium, the Bessenbach Sports Stadium and Christian Zais Hall.

## **DRAKE WINS ORDER FROM OMAN**

Philip Drake Electronics Ltd has won an order from Oman's Ministry of Information to supply its 6000 Series Talkback System and three customized PD 600 Systems for Oman Television. The new equipment is part of an expansion and modernization plan for Oman's Ministry of Information.

## **PROSHOW MOVES**

Proshow USA has relocated to new corporate headquarters at 6675 185 Avenue N.E., Suite 250, Redmond WA 98052. The new phone and fax numbers are: 206-861-4484 and 206-861-5995.

## **BELLSOUTH WINS HUGHES CONTRACT**

Hughes Aircraft Company's Space and Communications Group has awarded BellSouth Communication Systems an \$11.3 million telecommunications contract calling for BellSouth to install a Northern Telecom Meridian SL-100 SuperNode switching system, voice mail, and a Stonehouse Monies telemanagement system to serve 40 buildings on the Hughes El Segundo, California campus. Service will be provided to the campus via Hughes' existing fiber optic network, interconnecting the SL-100 host to remote nodes placed throughout the campus. New cabling will be installed in all 40 buildings.

## **STAGE HAND SALES DISTRIBUTES TOSH**

Stage Hand Sales is distributing the complete line of Tosh sound reinforcement equipment in the United States, primarily focusing on the Tosh powered mixers and mic-stand spot monitors. The Ohio based Tosh Electronics has handled the bulk of its P.A. sales until the deal with Stage Hand Sales. Tosh reps continue the sales effort.

# Sharp presents two new LCD Color Video Projectors. They're both brighter and lighter.



*XG-1500 ceiling mount*



*XG-1100 portable*

## LCD PROJECTION SYSTEMS

# SHARP VISION™

Now you can brighten up your presentations with two new convergence-free professional LCD video projectors from Sharp.

Both the XG-1100 (portable model) and XG-1500 (ceiling-mount model) are brighter, lighter and more compact. And, because they are Solid State LCD, they also set up in seconds\*.

The XG-1100, with its top-mounted carry handle and optional carrying case, is a smooth traveler. And the XG-1500, with its back-lit wireless remote and space-efficient design, is a natural for any ceiling, wall or even shelf-mount installation.

Both models incorporate industrial-type BNC video inputs as well as an S-Video terminal, so they connect easily to a wide variety of sources—including many PCs. Plus, for improved compatibility, the XG-1500 also features built-in RGB.

With both XG-1100 and XG-1500, you also get a 20"-100" zoom lens, a convenient scan reversal switch (for rear-projection use), as well as 3-wire (grounded) power cord. And, with a readily available long-throw lens, VGA or Mac II™ graphics interface, these projectors are all set for almost any special multimedia application.

\*Sharp's Twin-TFT Solid State LCD technology means absolutely no technical set up

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Simulated screen image



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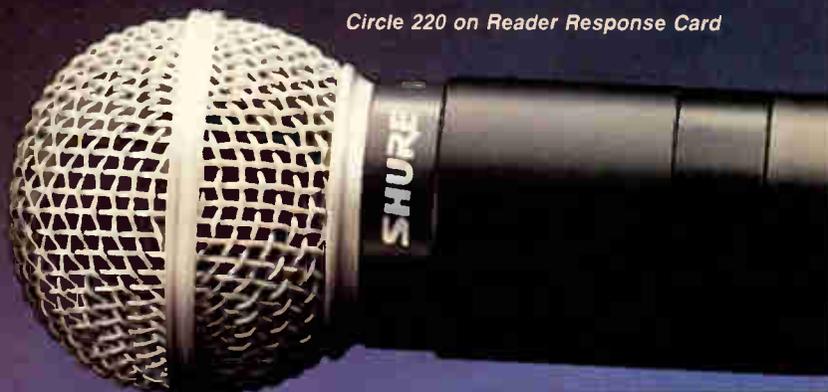
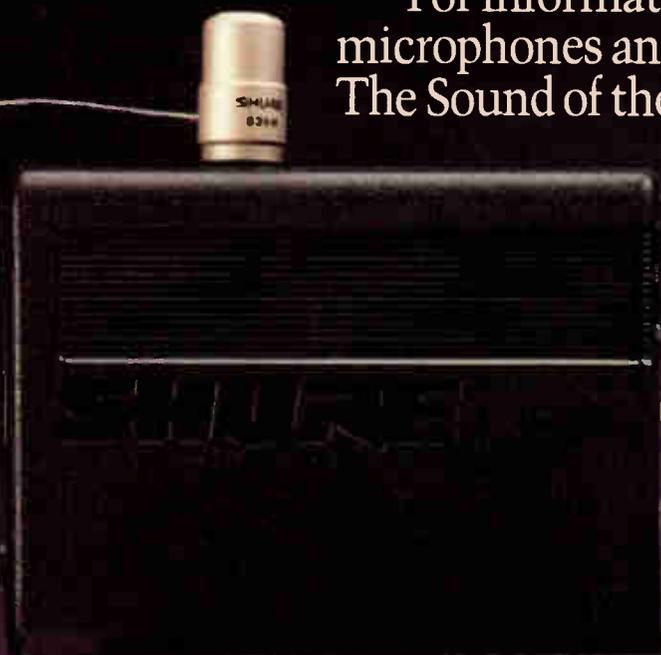
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## GUEST COLUMN

# NSCA AS A MAGNET

By Wes Alderson

**As a representative member of the NSCA Expo Committee for the past six years, I have had the privilege of watching, and sometimes participating in, the growth of NSCA. NSCA has grown to the point where it is now the most important organization for the Professional and Commercial Electronic Systems Contractor.**

Similarly, the NSCA Expo is the trade show which is the most essential SHOW to these contractors and contains elements of life safety, video and other disciplines — *not only sound*. In passing, we should address a common misconception. NSCA does *not* stand for National Sound Contractor's Association. It stands for National Sound & Communications Association. This includes elements in our industry other than audio, as noted above.

Many people are responsible for the ideas, energy and activities which have helped to make the NSCA Show what it is. One of the concepts which I personally believe has made the NSCA Show a success is the idea of the *NSCA as a Magnet*. As NSCA began to gather steam, more and more manufacturers decided to conduct events during/at the show.

This made good sense to the manufacturers. Since their accounts, their reps and the consultants were already at the show,

*Wes Alderson is President of WesTech Marketing, the California rep organization.*

the events sponsored by the manufacturers achieved maximum attendance and exposure. They also saved everyone a bundle of dough, since the attendees would otherwise have had to come from all corners of the nation.

But each time another manufacturer decided to have a sales meeting, a new product unveiling or a social event at the NSCA Show, there was an additional desirable effect: Each new event increased the attractiveness of the show and, just like a growing magnet, served to draw more people and more events into NSCA.

Bigger does not always mean better! This is one of the reasons that the Show Committee and Executive Director Bud Rebedeau spend some time making certain that the growth moves in the proper direction. We welcome your ideas and input.

NSCA continues to encourage manufacturers to conduct events such as sales meetings, product unveilings and social events at the Show/Expo. The reasons are the same:

- Reduced Cost
- Maximum Audience and Exposure
- Benefit to NSCA's Momentum

However, we also encourage you to provide us with ideas! We know that no organization or event ever pleases 100 percent of the people 100 percent of the time.

This year our Expo Committee meets in September at the site of the Spring 1992 Show in Anaheim, California. How about faxing us your ideas as to how the NSCA Show can be made even better? This is your opportunity to influence the trade show which is interwoven with your own future.

Your ideas may be sent to: Bud Rebedeau, NSCA, 10400 Roberts Road #D, Palos Hills, IL 60465. Fax: (708) 598-4888 ■

## HOLDING A WINNING HAND?



Does the card frame system you use offer over 160 different modules to choose from?

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If you didn't answer yes to all three questions, you don't have the winning hand. You don't have the INTEGRA III SYSTEM from Protech Audio.

The INTEGRA III SYSTEM is constructed with the designer in mind. It provides a menu of audio modules for each function. It allows the designer freedom to create. And by choosing the module with just the right combination of features, your customer gets exactly what they need, without the expense of unused features. In short, you decide which cards you want to play!

So, if you are betting your hard earned money, make sure you have the winning hand! Make sure you have the INTEGRA III SYSTEM from Protech Audio.

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Circle 273 on Reader Response Card

# By Popular Demand: the Return of the Answerman

**Response to the initial installment of the Answerman was extremely favorable but Answerman needs your input. So please send your queries to our esteemed audio guru today.**

*Dear Answerman,*

I need a speaker-box design program. When will you review these programs; what program would you recommend?

**Mike Hoover**  
**Hoover Technical Services**

*Dear Mike,*

A glance through *Speaker Builder*, a magazine intended for hobbyists but also read by professional speaker designers, shows over a dozen software programs for speaker design. Most of these programs essentially allow the user to plug in the Thiele-Small parameters into sealed box and vented boxes. *Voice Coil* is the newsletter for speaker design engineers, from Dell, the same publisher as *Speaker Builder*. Both these publications include reviews of these programs, and we have reprinted a few of these reviews in the past. In general, box size, vent tuning, and speaker parameters are user definable, and some of these programs include databases on hundreds of speakers.

Old Colony Sound is a good source for some inexpensive speaker design software, and a good program to start with is Boxresponse. Alternatively, with a modem, you can download shareware programs from the audio bulletin boards. If

you are more serious about speaker design software, then here follows a half dozen of the best:

One of the most refined, popular, and easy to use of these programs is Scientific Design Software's CASD. Aside from vented and sealed enclosures, and an enormous speaker data library, it has utilities for determining the correct passive radiator, vent dimension, and passive crossover design. It's IBM compatible.

### MOST OF THESE PROGRAMS ESSENTIALLY ALLOW THE USER TO PLUG THE THIELE-SMALL PARAMETERS INTO SEALED AND VENTED BOXES.

Scientific Design Software is also known for its CACD program. This is a comprehensive program that models the complex characteristics of speakers over the full audio range. Most of the program is dedicated to crossover network and equalization techniques (both active and passive). While some aspects of CACD would be most useful to high end audio speaker designers working with passive networks, there are also many powerful uses of this program for pro sound work. SDS's Loudspeaker Design Handbook accompanies their manual and is worth the cost of this program. SDS has introduced

four other acoustic and audio engineering software programs this summer Loudspeaker System Simulator, ac Circuit Analysis and Optimization, Transfer Function Analyzer, and Enclosure Simulation and Optimization.

If you want a program that can model the use of multiple vents, multiple woofers, high temperature and other non-linearity effects, then you should look into LEAP. For predicting large signal performance in high power applications, LEAP is unmatched by any other program. LEAP 4.0 promises to be an even greater jump over LEAP 3.0 than this program was over its competition. It's also IBM compatible.

If the Bose Tandem-tuned subwoofer, or their Wave Cannon, JBL's Triple Chamber Bandpass, E-V's Manifold boxes, and other multi-tuned techniques intrigue you, then the program Speak is for you. The hidden cost of this program is getting sued for patent violations! Aside from modeling complex boxes, Speak also does a good job on conventional bass reflex and sealed box designs. The manual is a little sparse for the serious price of this program and it's IBM compatible.

MacSpeakerz is one of the few speaker design programs for the Mac. Aside from the usual "what if" capabilities, speaker excursion, phase and impedance have been added to the latest version.

Low Frequency Designer from SpeakerEasy is another program that can help you design multiple tuned enclosures. IBM compatible.

We have received so much mail with questions about speaker design software that starting next month we will begin to review these programs. A listing of the relevant firms is below.

# THEY DO MORE THAN EXPAND THE CAPABILITIES OF YOUR AMPLIFIER.

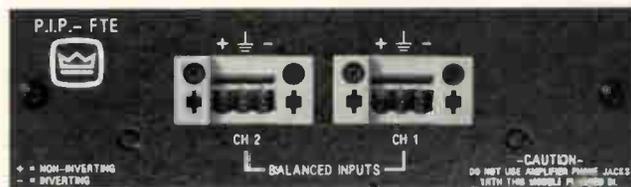
## THEY EXPAND THE CAPABILITIES OF YOUR BUDGET.

**P.I.P.-AMC** is the newest of our P.I.P. modules, and combines all the capabilities you need most in one high-performance package. DIP programmable, the AMC features a 4th-order Linkwitz-Riley crossover, "constant-directivity" horn equalization, filter-assisted B<sub>6</sub> vented box equalization and a signal-driven/error-driven variable-threshold compressor. In addition, the AMC can be used for bi-amping, tri-amping and "daisy-chaining" of amplifiers.



**THE NEW, TOTALLY PROGRAMMABLE, P.I.P.-AMC!**

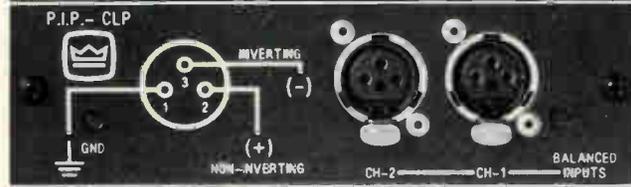
**P.I.P.-FTE** has balanced 1:1 transformers, 12 dB/octave RFI filter, variable 18 dB/octave high-pass filter and a 6 dB/octave 3 kHz shelving network for "constant-directivity" horn equalization. Barrier block connectors.



**IQ-P.I.P.** integrates a P.I.P. compatible amplifier into Crown's innovative and growing IQ System. Each channel of the amplifier can be remotely monitored and individually controlled from a personal computer.



**P.I.P.-CLP** is designed to detect and prevent overload. Uses Crown IOC<sup>®</sup> circuitry to activate an error-driven compressor. P.I.P.-CLP can yield up to 13 dB of additional signal safety margin without noticeable program change.



**P.I.P.-ISO** is designed especially for 25 to 140 V distribution systems where full isolation is required. Amplifier outputs are safely isolated from both the input terminals and the chassis. UL<sup>®</sup> listed to 1500 V isolation.



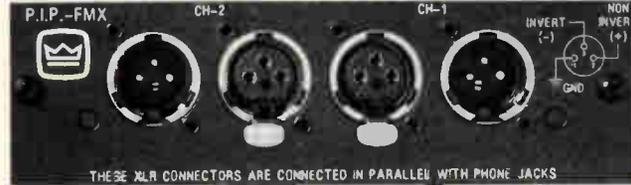
**P.I.P.-ATN** adds a 32-step precision attenuator for each channel to the features of the P.I.P.-FTE. These include balanced 1:1 transformers, 12 dB/octave RFI filter, variable 18 dB/octave high-pass filter and a 6 dB/octave 3 kHz shelving network.



**P.I.P.-XOV** is a versatile, economical mono 12 or 18 dB/octave crossover/filter. It features programmable routing and the ability to drive multiple amplifier racks from a single P.I.P. Also offers bi-amping and tri-amping capability.



**P.I.P.-FMX** facilitates "daisy-chaining" several amplifier balanced inputs together. Female to Male 3-pin XLR connectors are used to passively bridge the amplifier input.



**P.I.P.-FXT** uses balanced 1:1 transformers to isolate the source from the inputs. It comes with balanced Female 3-pin XLR connectors



There are two things most amp owners can't get enough of—more capabilities and a bigger bang-for-the-buck. Crown gives you both with one remarkable system.

The Crown P.I.P.<sup>®</sup> (Programmable Input Processor).

Introduced in 1985, the Crown P.I.P. system consists of high-performance modules that plug into the back of P.I.P.-compatible amplifiers such as our Com-Tech<sup>®</sup>, Macro-Tech<sup>®</sup> and Macro Reference.<sup>™</sup>

This growing series of modules economically expands your amplifier with capabilities like sophisticated crossovers and compressors—as well as our unique capabilities such as our computer-controlled IQ System<sup>®</sup>. Compared to outboard components, our P.I.P.s provide equal or superior performance for about half the cost. You'll save money, rack space and have fewer installation problems.



Compare the price of a P.I.P.-equipped Crown amplifier to that of any amp paired with separate components. You'll discover just how much economic sense the Crown P.I.P. system makes.

And nothing beats Crown for performance, value and long-term reliability.

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Circle 212 on Reader Response Card

# OUR CASSETTE DECKS ARE RACK-MOUNTED, WILLING AND ABLE.

If you're looking for cassette decks built from the ground up to handle the ravages of everyday industrial use, look no further than TASCAM.

Our 112, 112B and 122MKII Industrial Strength decks have rack rails that are integral to the chassis, not screwed-on retrofits. More importantly, their critical power supply weight is shifted forward to reduce shear forces which have been known to rip a typical consumer deck right off its front panel if dropped or moved.

TASCAM offers a complete family of Industrial Strength stereo cassette decks.

The 3-head 122MKII with front-panel bias and EQ, and unique Hysteresis Tension Servo Control to adjust take-up tension, back tension, torque and azimuth with open-reel precision. \$1,099.\*

The economical 112, a 2-head version of the 122MKII with Cue & Review for easy searching. \$679.\*

The 112B with +4 dBm XLR-balanced ins and outs. \$749.\*

And, for just \$859,\* the 112R, an auto-reverse cassette deck that's ideally suited for extended playback applications.

For more information, call or write TASCAM, the company whose Industrial Strength product line also includes CD players and mixers.



## TASCAM®



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Circle 240 on Reader Response Card

Old Colony Sound Lab  
P.O. Box 243  
Peterborough, NH 03458  
(603) 924-6371

CASD and CACD by SDS  
P.O. Box 3248  
Chatsworth, CA 91313  
(818) 718-1201

LEAP by Audio Teknology  
7556 SW Bridgeport RD  
Portland, OR 97224  
(503) 624-0405

Speak by DLC Design  
24166 Haggerty Rd.  
Farmington Hills, MI 48335  
(313) 477-5534

MacSpeaker by True Image  
349 W. Felicita Ave. Suite 122  
Escondido, CA 92025

Low Frequency Designer by  
SpeakerEasy  
46 Cook Street  
Newton, MA 02158  
(617) 969-1460

### Audio Bulletin Boards

These are sources for shareware or public domain audio software. We covered this topic in the April 1991 issue, although the Audio-BASE bulletin board listed below is new.

**AUDIO-BASE** —  
(voice) (515) 628-2243,  
(modem) (515) 628-8999

**Audio Projects** —  
(voice) (608) 831-3433,  
(modem) (608) 836- 9473

**AV-SYNC** —  
(voice) (404) 438-5858  
(modem) (404) 320-6202

**Sound Net** —  
(voice) (416) 530-4423  
(modem) (416) 530-4423

## UHF's time has come.

With the introduction of the Samson UHF\* Series, we thought it might be helpful to provide you with new information about this technology.

**1. UHF gets better reception.** Yes it does, in the sense that UHF operates at the higher frequency range of 902-952 MHz. There is a lot less *traffic* up in that bandwidth. And, more importantly, less RF interference and noise.

**2. New UHF technology has recently been made available.** For the UHF Series, Samson put four of our finest wireless engineers on the case. Using up-to-date developments like Di-Electric filters, Gas-Fet and new cellular technologies, they were able to bring UHF up to a higher level of performance.

**3. UHF sounds better.** A dangerous generalization perhaps, but it *does* have wider RF dynamic range. And because we're the first to use dbx† Noise Reduction in UHF, the resulting audio quality is even more impressive.

**4. More frequencies are available.** Samson offers seven UHF frequencies that can be used simultaneously. If you're already running a lot of VHF on stage, you can place our UHF frequencies on top of these without any interference.

# EIGHT THINGS YOU SHOULD KNOW ABOUT UHF

# WIRELESS.

## 5. Samson UHF offers more microphone options.

The all brass UH-4 hand-held transmitter is available with an incredibly wide variety of the industry's most popular mic elements. The streamlined UT-4 belt pack transmitter comes equipped with a broad range of high quality lavalier microphone capsules.

## 6. Samson UHF antennas set new standards.

Custom made so they are acutely sensitive to our bandwidth, Samson's high efficiency cellular antennas can be either front or rear-mounted. Because they are positioned at a 45° angle to the front panel, several UHF systems can be cascade-mounted in a single rack with all antennas in the clear.

## 7. UHF is more expensive.

**Until now.** Because of robotics assembly techniques and surface-mount technology, Samson was able to make UHF a realistically priced option for a whole new class of users.

**8. Write for a free Samson UHF White Paper.** Find out more about UHF and one company's approach to this exciting technology. A higher method that promises clearer reception for everyone in the wireless future.

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© 1990 SAMSON TECHNOLOGIES CORP.



\*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 Carillon Industries.

Circle 201 on Reader Response Card

# Special Audio at the Special Olympics

*Forty-Four Companies Cooperate at the Competition*

BY JESSE WALSH

Imagine providing 56 audio systems for 42 venues scattered throughout the metropolitan area of a major U.S. city, set up and operated by volunteers all within the span of less than two weeks.

Boggles the mind a bit, doesn't it? Yet that's exactly the challenge faced (and met) by 44 professional audio companies as they sought to make the 1991 International Summer Special Olympics an event that was both seen *and heard* by participants and spectators alike.

As its name indicates, the International Special Olympics is a major athletic event — in fact, it was the largest athletic event held this year. From July 19-27, over 6,000 athletes from more than 90 nations competed in an event that is much more than just a contest of physical skills and endurance. Beginning with a dazzling opening ceremony through countless athletic events and special celebrations, the focus is on the courage of overcoming the adversity of physical, mental and emotional handicaps in the pursuit of friendly competition and, more importantly, kinship.

Held in Minneapolis at venues ranging from the Hubert H. Humphrey Metrodome to the Mississippi River Flats Park, this year's Special Olympics was the recipient of donated \$2.5 million of equip-

*Jesse Walsh is the founder of Jesse Walsh Communications, a full service agency representing manufacturers in the audio industry.*



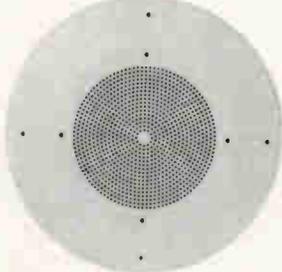
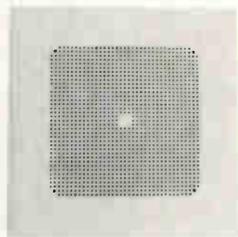
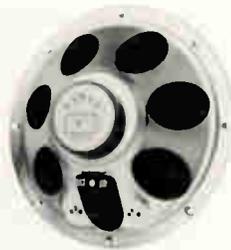
*Opening ceremonies of the Special Olympics at the Metrodome.*

ment, money and labor donated by professional audio companies. This was the largest group of audio companies ever assembled for a cooperative effort. Major companies such as Crown, Yamaha, JBL, Telex, Tascam and Community worked hand-in-hand to assure the success of this event. The sound team's goal, "To put forth our greatest efforts so that all Special

Olympic athletes and their families will be able to hear the results of their courage," appropriately spelled out exactly what the Special Olympics meant to these companies.

Crown International spearheaded this united audio effort, organizing and staging the equipment necessary for each venue. But acquiring the proper equipment was

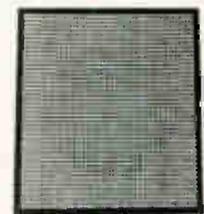
# Solve Your Customers' Hearing Problems.



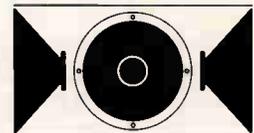
Most customers would rather listen to good sound than a good sales pitch. Because all they really want to hear is that your speakers and system components offer both quality construction and true audio reproduction. And do so at a price that fits their budget.

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Circle 204 on Reader Response Card

World Radio History

just the first step in a long journey toward successful completion of this daunting task.

In total, all 56 audio systems were designed by Sam Helms, president of Sigmat Corporation, Crown's representative for New York/New Jersey Territories. The systems were staged at Crown's Elkhart, Indiana facility. Racks containing electronic components were pre-assembled by Crown staffers, after hours. In fact, many Crown employees worked after hours and on weekends for a solid month to make sure that all systems were organized and in working order before being shipped out to the Special Olympics.

By early July, all of the gear was readied for transport to Minneapolis. Three 53-foot semi-tractor trailer trucks, donated by two Midwest shipping firms, were required to haul the hundreds of speaker systems, microphones, amplifiers, mixing consoles, as well as countless accessories and miles of cable. The total weight of this equipment exceeded 50 tons. Additionally, three 48-foot low-boy trucks were used by Eighth-Day Sound for their equipment, two 48-foot low-boys for cabinets and amplifiers from Audio Analysts and three 48-footers for the power distribution system were provided by SBP.

With the trucks arriving on July 12, setup crews had exactly one week to assemble audio systems at locations throughout greater Minneapolis, with some being as far as 30 miles out of the city itself. Sixty-four Crown employees and family members, augmented by smaller groups from many of the other participating companies, needed every second they could get to ensure that all of the systems were up and running at a satisfactory level.

Setup crews were linked via at least 100 radio and cellular telephones, allowing them to stay constantly in touch throughout incredibly long days leading up to the event. Audio control central was set up at a local Motel 6 and staffed by Crown personnel under the direction of Beryl Moore, Crown's corporate public relations director. This audio headquarters allowed for the coordination of system installation and

the delivery of equipment and staff meals. The crews remained in Minneapolis for the entire duration of the event, setting up and striking special systems, manning them during all performances and events, as well as providing assistance to other portions of the Special Olympics. A twelve-hour working day was considered easy.

By far the largest system was required for the opening ceremonies held at the Metrodome, home of the National Football League Minnesota Vikings and Major League Baseball Minnesota Twins. The 60,000-seat domed stadium presents countless acoustic challenges, largely due to a seven and one-half second delay at 2 kHz caused by its extremely high ceiling and a lack of acoustic-friendly building materials. Also, adding to the difficulty of providing quality audio was the high ambient level created when the stadium fills with spectators. The system was the largest and most powerful, totally over 500,000 watts, ever assembled in the dome.

A variety of entertainers and dignitaries participated in the opening ceremonies. From Prince to Randy Travis, Latin rapper Gerardo to Supreme Court Justice Byron White, the program offered a diversity of performers and personalities the likes of which has rarely been assembled for a live program.

Eighth-Day Sound of Cleveland, Ohio was contracted to provide audio for the large venues and high-profile events. Jack Boessneck, sales and marketing manager, described their design approach to the acoustic nightmare as a 360 degree high-level, near-field distributed system augmented by the house PA and the traditional left/right mains with center tower fill. The mains consisted of forty Audio Analysts S4s on each side while the 360-degree surround on the infield perimeter featured thirty-three Turbosound TMS 3s firing into the first level. Community KS 220s were placed behind the Turbosounds for infield monitoring. The delay tower utilized eight TMS 3s and the rear stage fill consisted of 10 TMS 3s. Special sub-bass effects were created using eight Intersonics Servo subs controlled by a volume pedal

in the booth. Crown's IQ 2000 system was used to monitor and control the amplification. "We were the first sound company to employ the IQ system in concert sound reinforcement," says Boessneck. "The IQ 2000 is especially helpful in testing individual cabinets and components by essentially being able to solo boxes by turning the amplifiers on and off at the console. If there is a problem with a component distorting or an amplifier clipping, you can actually see it happening on the screen and react immediately, making the appropriate adjustment without physically going out on the floor."

#### Special Olympics Sound Reinforcement

##### Companies:

American Pro Audio  
Apple Computers  
AST Sound Atlas/Soundolier  
Audio-Technica U.S., Inc.  
Babsco  
BBE Sound, Inc.  
Biamp Systems  
Bose Corporation  
Community  
Crown International Inc.  
C-T Audio Systems  
dbx, a division of AKG Acoustics, Inc.  
Dobbs Standford  
EAW  
Eighth Day Sound  
Goldline/Loft  
GRP Records, Inc.  
Horizon Manufacturing, Inc.  
International Wire and Cable  
Intersonics, Inc.  
JBL  
Klipsch and Associates, Inc.  
Koss  
MAA  
Middle Atlantic Products  
Maglight  
Morley/Accutronics  
Rane Corporation  
Rapco International, Inc.  
SBP Industries Sescom, Inc.  
Shuford, Inc.  
Soundtech  
Stanton Magnetics, Inc.  
Star Case  
Tascam  
Telex  
TOA Electronics, Inc.  
Tripplite  
Ultimate Support Systems, Inc.  
West Penn Wire Corporation  
Whirlwind  
White Instruments, div. of C. van R., Inc.  
Wix Mix  
Yamaha Corporation of America  
Zoom Corporation of America

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A STEREO  
COMPRESSOR,  
NOISE GATE,  
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PEAK LIMITER,  
CLIPPER



- Dynamics sensitive gating control
- Unequaled audio performance
- Individual isolated processing circuits
- 21 LED gain control metering
- Switchable input and output metering
- Balanced XLR inputs/outputs
- Tip/ring/sleeve balanced inputs/outputs
- Limiter link/voltage control jack
- Stereo auto-detect circuit

- Switchable detector loop
- Stereo gate key input
- Full stereo processing
- Threshold activation LEDs for all functions
- Parasweep integrated controls simplify operation
- Actual output monitoring limiting circuit
- Unsurpassed audio specifications



The MDC 2001 is a revolutionary new product that can improve performance in any audio application in which it is used.

In live sound, the compressor can smoothly and transparently control the musical dynamics. The gate and expander can totally eliminate stage noise, gate off microphones for higher gain before feedback, and eliminate drum and amp bleed. The de-esser will knock out excessive sibilance protecting your drivers and balancing the material. The all new exciter circuit brings out the upper harmonics for sparkling clarity, even at high volumes. The final peak limiter can be set to the maximum input voltage of the amps to prevent your system from ever being overdriven.

In the studio, the MDC can smooth out the dynamics of voices and instruments, eliminate background noise for much cleaner recordings and remove harsh "s" sounds before they saturate the tape. It can also add back in all the natural harmonic brilliance that is lost for recordings with crystal clarity. The peak limiter will prevent the tape from overloading and is

essential in digital mastering. And because the MDC is fully stereo, all the left/right balance stays intact.

In churches, theaters and fixed installations, the MDC is the one piece of gear that will provide level protection, noise gating, de-essing, signal enhancement and dynamic control in full stereo in a single rack space. All functions are independently controllable and may be taken out of the chain if desired. Ducking, keying, and linking jacks are provided, and the audio performance of each individual processing circuit is world class.

# ART

THE SOUND OF PERFECTION

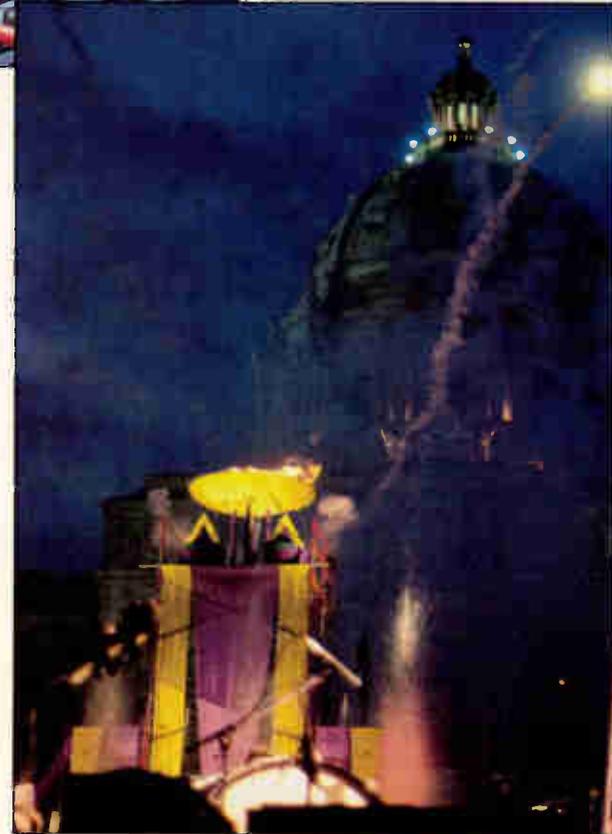
APPLIED RESEARCH & TECHNOLOGY, INC., 215 Tremont Street, Rochester, NY 14608, (716) 436-2720, Telex: 4949793 ARTROC, FAX (716) 436-3942

Kim Denton (left) of Harmony Concepts, Grand Rapids; and Rod Price of Eighth Day Sound, Cleveland.



Closing ceremonies at the State Capitol.

The Mississippi Flats River Park presented a real challenge. Not only because it was host to three separate Special Olympic venues, including the Olympic Village, Olympic Town and the Circle of Friendship, but there literally was no power available. The NSP Power Company needed to drop 20 poles to provide power and audio



### A SIMPLY ELEGANT SOLUTION.

Stretching budgets, improving sonic performance, delivering more for less is the promise of the TOA 1x3 D-1103 digital delay. A 740' maximum delay stepped in ten microsecond increments delivers the extended delay required for remote locations *and* the microsecond required for component alignment. Four non-volatile preset memories, balanced I/O's, and the category's best frequency response, lowest distortion and highest sampling rate are further proof that sometimes the most innovative solution isn't the most costly. It's TOA.



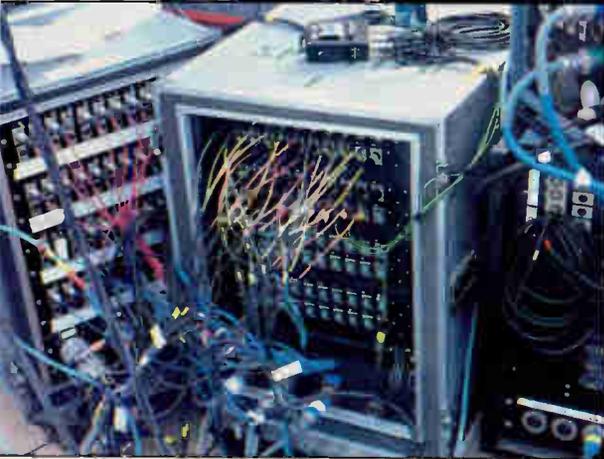
ENGINEERED SOUND PRODUCTS FROM:  
TOA ELECTRONICS, INC., 601 GATEWAY BLVD.,  
SOUTH SAN FRANCISCO, CA 94080  
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distribution to the park. Another problem was the need to control audio levels and directivity so as to not disturb the two hospitals on either side of the park. The entire park was covered by a very unique paging and background music system. With over 8,000 feet of speaker cable, it was necessary to install a 140-line volt system. Forty Atlas CJ-46 horns and PD-60T drivers tapped at 20 watts were driven by only three Crown Com-Tech 1600 amplifiers which used the switch selectable 140-volt function. The only transformers in-line were located at the drivers which contributed to better damping and more efficient use of power. Additionally, the entire system was controlled and monitored by Crown's IQ 2000 system. This was the first IQ 2000 ever in-



*Equipment racks (far left) for closing ceremonies. (left) Rear stage view of closing ceremonies.*

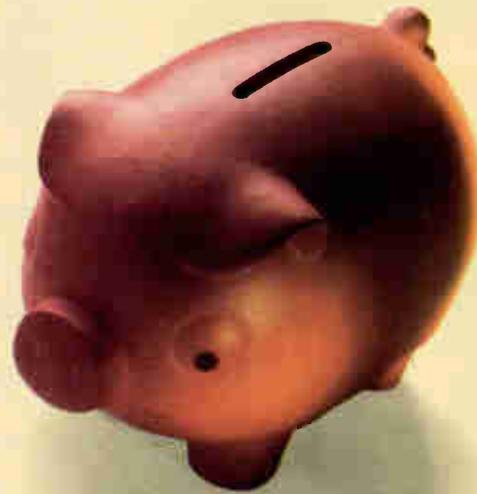
able to a Special Olympics program there would not have been the quality or, in many cases, audio at all if it weren't for the contributions made by these 44 audio manufacturers and their volunteers. This was a special event in the history of the audio industry that really puts life into proper perspective. Special Olympians — We salute you! ■



stalled in a 140-volt line application. The IQ was programmed to zone the entire park. Paging and/or background music could be assigned to all zones, a particular area or any combination of zones. Each venue within the park also required its own audio system, with the Circle of Friendship alone featuring three performance stages requiring individual systems. The Olympic Village sound stage featured a complete Yamaha system set up and operated by Yamaha volunteers.

A host of other notable venues throughout Minneapolis hosted events, including the Target Center, a 20,000-seat multi-purpose arena; the Williams Center, primarily used as a basketball arena by the University of Minnesota; the Minnesota State Capital in St. Paul; and the Burnsville baseball facility.

No one could have predicted all the challenges, problems and rewards of providing sound to an event of this magnitude. Was this event too big a job to be taken on by a handful of volunteers with donated equipment? Absolutely, but don't tell the individuals and companies who helped make the Special Olympics the success that it was. Certainly the entire audio industry and everyone involved can be proud of what was accomplished. Given the limited amount of financial resources avail-



## BANK WITH TOA.

What would you call a 1/3rd octave 28-band equalizer that outperforms the category leaders across the board, yet costs a fraction of what you're used to paying? A license to print money? A cash cow? Call it the TOA E-1231. Lowest noise and distortion, widest tunable high and low pass, balanced I/O's, feature-rich, TOA reliability. A whole new way to balance not just the sound, but the budget as well.



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Circle 245 on Reader Response Card

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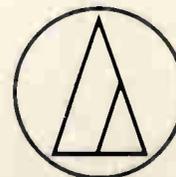
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# A BRIEF HISTORY OF THE AUDIO ENGINEERING SOCIETY

By Donald J. Plunkett

**The Audio Engineering Society is now in its fourth decade and throughout that period, the AES has been a continuous and dynamic force in the dissemination of information.**

Consequently, the Society has materially assisted in the development of audio engineering from a formless craft to an industrial/technological strength of major magnitude.

The AES was formed by a group of concerned engineers in 1948. They felt that there was a desperate need for an organization that could foster and continue the exchange of information of a technical nature and thereby, advance the various facets of the audio craft into a cohesive and viable technology. Prior to the formation of the Society, audio was part of the record industry, of broadcasting, of the film industry and of the performing arts. This fragmentation resulted in poor communication for all concerned.

In the early forties, during the second World War, the problem of poor communication was very evident. Those involved in the recording field and the record business in those years faced shortages of material. In an effort to locate new sources of vital materials, several key individuals recognized the value of exchanging information. At this time, a small group of

recording specialists banded together on both coasts of the United States. Because they were involved in the recording industry, this small group assumed the name Sapphire Group in recognition of their use and dependence on sapphire cutting styli. The group started to meet informally in New York City, and then an associated group of similar specialists started to meet informally in the Los Angeles area.

**THEY FELT THAT THERE WAS A DESPERATE NEED FOR AN ORGANIZATION THAT COULD FOSTER AND CONTINUE THE EXCHANGE OF INFORMATION OF A TECHNICAL NATURE.**

The group in the East carried the concept of exchanging information forward and started plans to form an organization. Timing was of the essence for the technology was starting to move rapidly. In addition, there was a lack of interest with the field of audio on the part of other electronics associations. Despite the importance of these new engineering destinies, the group of dedicated audio engineers aforementioned felt it was also imperative to find and shape a rightful place for audio, which, in 1948, was growing, but not in a cohesive manner.

Among the innovations being introduced rapidly at the time included the use of highly selective frequency discrimination to produce noise reduction. This development by the late Hermon Hosmer Scott

caused radio to look differently at records as a source of quality entertainment. The extension of frequency range on recording as exemplified by the British Decca full frequency range records of 1947 (FFRR) and the emergence of quality record reproduction equipment by engineers such as Norman Pickering made the hopes of the past a reality in 1947. In addition to these developments, news and examples of the new process of tape recording became visible, promising a major breakthrough in the coming years.

Therefore, the group of dedicated engineers, active in the field of audio, formed a steering committee for the formation of a society interested in the field of audio engineering. They gave it the most appropriate name — The Audio Engineering Society. These interested individuals included C. J. LeBel, who was to become the first AES President and a guiding light for the AES until his death in 1965, John D. Colvin, C. G. McProud, Norman C. Pickering and Chester A. Rackey. This committee was ably assisted by several others in the field and was effective in organizing the first meeting in March 1948. The meeting was held on a cold winter's night at the RCA Victor studios in New York City with about 150 interested parties attending.

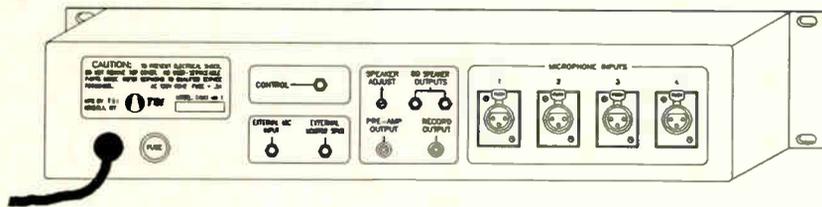
The dedication of the steering committee is apparent when you consider there was no mailing list available, just word of mouth, colleague to colleague. Suddenly, there was the basis of an organization.

This first meeting resulted in formulating operating rules and a second meeting in March 1948, again at RCA Victor, was more formal in nature. After organizational discussions, a formal lecture by Dr. Harry

*Donald J. Plunkett is the Executive Director of AES. This article is reprinted by permission from the AES 1991 Membership Directory.*

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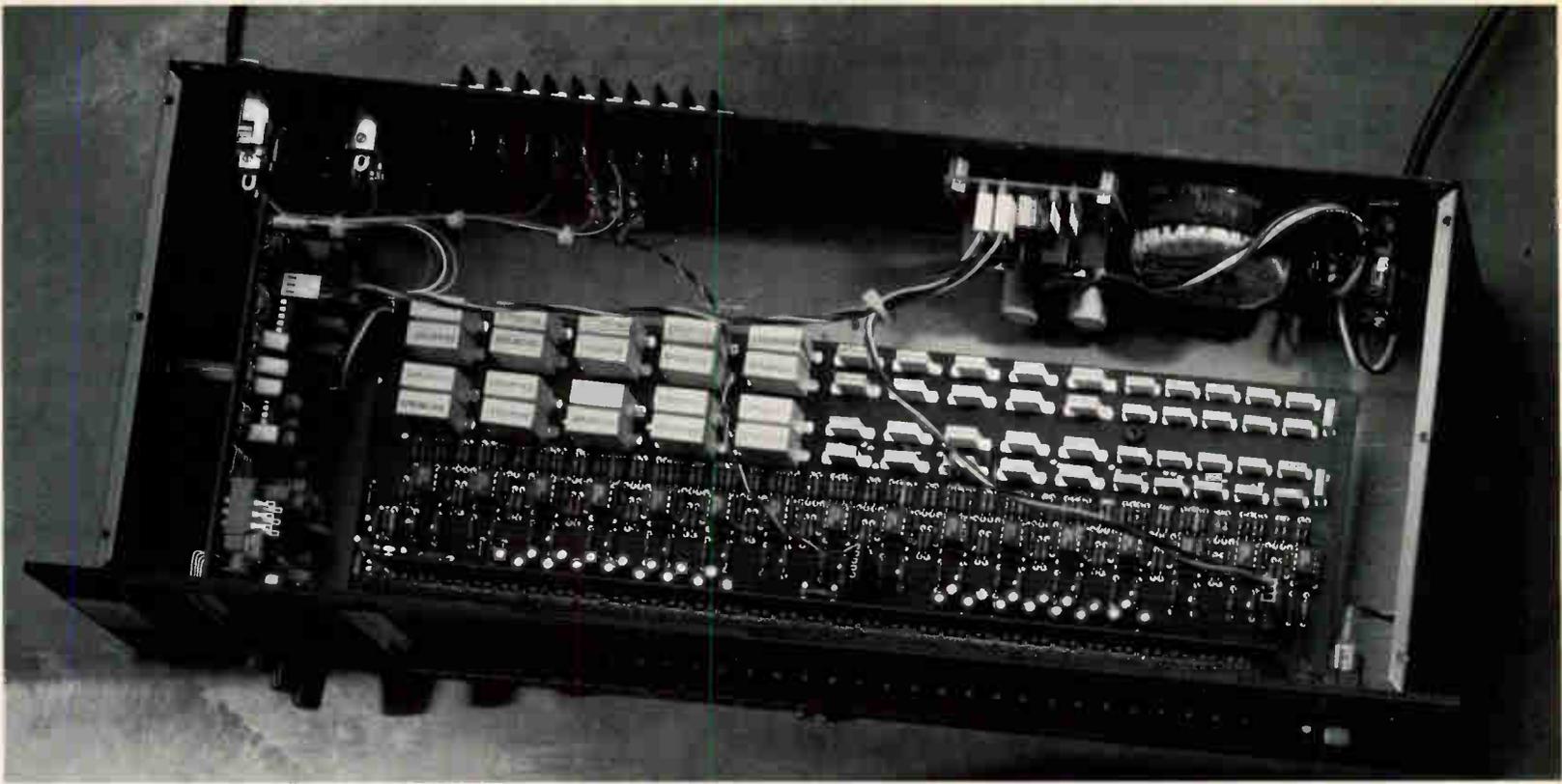
Olson on loudspeaker design started the technical information snowball rolling, and it has been rolling and gaining in magnitude in the ensuing years.

From this meeting, and others in 1948, the Society spread to other areas of the country, with a rapid development in the West in Los Angeles and San Francisco and middle West (heartland) of the United States.

Events were moving quickly; tape recording had arrived and the many technologies "bottled up" during the second war exploded, and audio became of interest to consumers. To continue the information explosion, the AES organized its first convention in 1949 which was a rather ambitious undertaking for a fledgling society. The convention was held in New York, in October 1949 at the Hotel New Yorker. This first AES convention filled two floors of the hotel with over 40 exhibits which were to have a major, long range effect on the life of audio and its devotees.

A program of importance, with papers presented, indicated the true need for an organization such as AES. This first convention also included the staging of live versus recorded demonstrations, which set the stage for future years of such displays. Such difficult but fruitful demonstration, did a great deal towards attracting not only the technically minded, but those in the creative field of music. Some of the first audio presentations of tape were previewed at the first AES Convention in 1949, plus binaural recordings, quality headsets and unique record manufacturing techniques, which were really a harbinger of the future.

The Society's conventions have continuously provided a growth pattern, both for the Society and the field of audio engineering. Meetings and exchanging concepts made the Society grow. The Society operation rapidly spread through the use of sections that were forming all over the U.S. By 1953, the Society jumped from national borders to an international profile, with the formation of a Japan section. This section still flourishes, as



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Number of Bands	31	30	30	30
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does the industry that the AES helped introduce into that nation.

By the late 1950s members were enrolled in Europe, and by the late 1960s, the AES membership had spread even to the East into the Soviet, basically because of

the Society's Journal. European and International membership is now a significant percentage of the AES.

The AES founded a technical Journal in 1953. Prior to that time, technical articles of interest and Society news was published

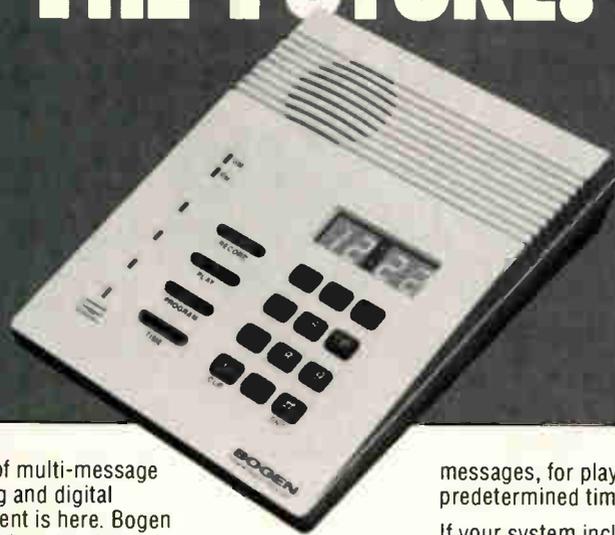
in a concerned and cooperative magazine, a pioneer of the time, entitled *Audio Engineering*. The Journal eventually became the means of international expansion. The Journal has become the audio reference and prestigious guide of technical development throughout the world. The Journal and its authors are quoted in the world technical press. The formation work by Lewis Goodfriend, the first editor, has become a cornerstone of Society information programs and international growth. In the ensuing years, an expanded program of publications has made the Society a vital worldwide force in the rapid transmission of new ideas via the printed word.

Complementing the Journal, the convention programs of the Society have annually aided the growth of the Society. The creation of a convention in Europe in 1971, by dedicated European members, has in a decade seen the Society grow tenfold in membership in that area. The annual convention programs have been vital in providing a theater for technical information and simultaneous expansion of AES horizons in several areas of the world.

The technical achievements of individuals were recognized soon after the formation of the Society, and annual awards of merit have been part of the Society's conventions. A separate listing of award recipients is furnished as an appendix to this brief history, but it is well to remember here, that if a small dedicated group of volunteers did not go beyond their hopes and energies, a Society may not have been created and the work recognized in the awards would not have been realized, or even perhaps not even undertaken by the individuals honored, for there would not have been an organization to help spread the news of their individual accomplishments.

The Society is a unique example of individual initiative, combined with the hard work of others, pulling together for a common purpose — the dissemination and encouragement of development of new technologies that push forward the frontiers of audio engineering. ■

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# Testing the Test Equipment

## *Sencore PA 81 Power Amplifier Analyzer*

BY MIKE KLASCO

**D**uring the last year we have examined computer-based acoustic analysis systems such as the MLSSA, SYSid, and Hyperception. We have surveyed and tested contractor's aids and tools such as electronic range finders, contractor's calculators, CD test disks, signal injectors like Forward Innovations' gizmo, and the like.

This month we are going to take a close look at Sencore's PA 81 power amplifier analyzer. The PA 81 combines 250 watt power amp dummy loads, dB/watt meters, monitor speakers, and DC sensing protection relays in an integrated package. The PA 81 is a useful instrument for a sound contractor, both for trouble shooting and for inspection and burn-in of power amplifiers prior to installation.

Sencore has been around for over 40 years, and is well known as a quality supplier of U.S. made test equipment for service shops. In the last ten years almost all of the U.S. firms in this end of the test gear business have either resorted to importing off-shore products, gone out of business, or gone up-scale. Sencore has taken the last route, combining innovative design and a higher grade of performance than the generic test devices that are imported from Korea and Taiwan.

About a year ago I came across Sencore's PA81 stereo power amplifier analyzer. I must admit that at first I could not see how they could charge \$2,000 for a



*The PA81 can be used alone, or in conjunction with a scope and distortion analyzer.*

power amplifier test system that could not measure harmonic or IM distortion. After all, for this kind of money, or for another grand, you could get something from Sound Technology or Amber; or Audio Precision's new portable analyzer (which is a stand alone and does not require hook-up to a computer like its bigger brother). Aside from distortion, why else would you want a power amplifier analyzer anyway? Well, the answer to that is what this review is about.

The first part of the answer is simplicity of operation. I have spent a lot of time

with computer-based test gear, and I am still enamored of the power of this approach. But I cannot deny that interfacing various boxes, fighting ground loops, noisy (EMI) computer power supplies, buggy software, and the hidden cost of training time for sophisticated operators of this equipment, means that computer-based test gear is not a solution for everybody.

In any case, this month we will take Sencore's PA81 through its paces and see how useful this instrument would be to a sound contractor.

So what do you do with this thing? If the PA 81 is not an amplifier distortion analyzer, what does it do? You can check this list and see if you want to read the rest of the review and find out how well the PA 81 lives up to its stated missions: inspection and troubleshooting of amplifiers.

Inspection of power amplifiers before shipping to job site:

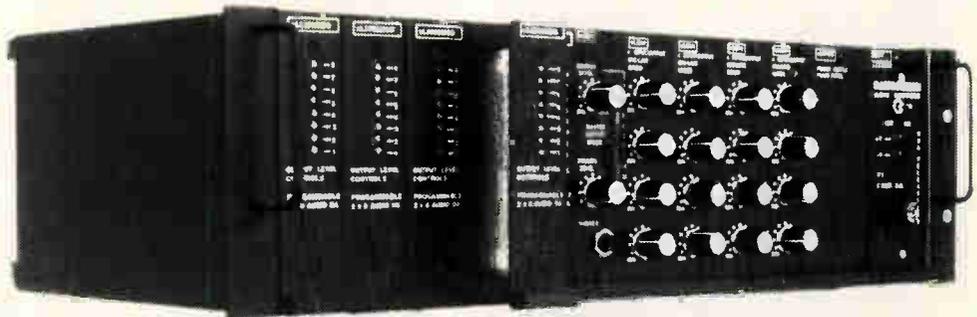
The PA81 can be used as a stand alone test jig for power amplifiers. For an input signal you can use a signal generator or directly connect a CD player (and a test CD) to the line inputs of the PA81.

Output of the power amplifier can be monitored on the dB/watt meters, the PA81's built-in monitor speakers, through headphones connected to the PA81's stereo headphone jack, or a scope connected to the PA81's scope outputs.

The dummy load resistors are fan cooled and can handle a long term amplifier burn-

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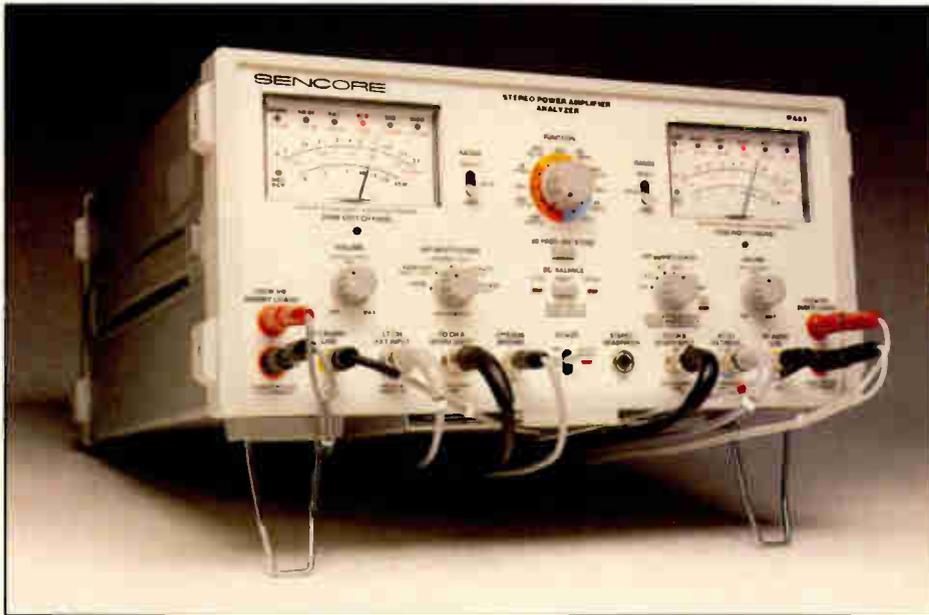
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The PA 81 is a useful instrument for trouble shooting, and for inspection and burn-in of power amplifiers.

in of 100 watts. Higher power level burn-in for limited time periods is permissible, with the maximum of 250 watts per channel for five minutes or 500 watts with the loads paralleled.

If 100 watts continuous is too wimpy for you, Sencore is more than ready for the big stuff. A second box arrived shortly after the PA81, and in it was the matching PM82. This is the Power Max high wattage accessory, which will handle 1000 watts per channel continuous, and up to 2500 watts intermittent, or 5 kW with both dummy loads paralleled. The PM82 is not a stand-alone instrument, and will only work with the PA81. The PM82 costs \$2,000.

If you know your way around the IEEE-488 bus, then you can interface the PA81 to a computer (which will need an IEEE-488 interface card) and you can automate your amplifier inspection process. Is this silly? Not if you are doing a large job, like a stadium, race track, concert/touring sound and need to check out 50 or 100 power amps at a time! Sencore does not provide the software, so you will have to be comfortable with programming.

Trouble-shooting on the test bench or job site:

The PA81 is transportable and can be battery operated. The optional battery pack lasts about 5 hours on a charge.

Using probes connected to the external input jacks, you can set the meters to measure DC volts, dBm, and dB program.

The built-in monitor speakers have selectable impedance, from normal 4, 8, 16

ohm settings, but also a 10k ohm setting, so you can tap into the amplifier circuit and listen to an input or drive stage of the power amp to see (hear) where things have gone strange.

The PA81 protects an amplifier's output stages from further damage due to high current when amplifier DC balance problems cause DC voltage to appear on the speaker outputs. A DC triggered breaker opens when 1 volt DC or more is present at either of the dummy load inputs. Each channel has a DC offset screwup indicator light.

Most sound contractors have a checkout bench, and if yours is like mine, you already have too much stuff connected by too many cables. The PA81 allows you to get rid of those big dummy resistors (and the small fan that you probably have nearby), and the PA81's internal monitor speakers eliminate the 4-inch speaker dangling from a wire. The DC offset indicator, protection circuits, and power meters are probably nice new additions to your checkout bench. The power meters each have six LEDs along the top, providing clear indication of power range (-60, -40, -20, 0 dB, +20, and +40). The operator can select the range or use the unit's autorange function. There is also an LED for negative DC volts indication on each meter.

### PHYSICAL DESCRIPTION

The PA81 is 14" wide, 7" high, and 17" deep and weighs a bit less than 16 pounds. The case is gray, has a handle on each

side, and has a metal body, with engineering plastic front and rear panels. Behind the panels are sheet metal. The circuit board with the power resistors is encased in its own subchassis which is fan cooled. The power supply is external. Construction and layout are clean, obvious attention has been paid to EMI and hum shielding, and the unit is robust and looks like it will withstand being dragged around.

### DOCUMENTATION

The 36-page instruction manual for the PA81 is well written and comprehensive. It includes front and rear panel diagrams, an operation section, maintenance tips and application notes. An index would be a nice addition. Just beneath the front panel of the unit is a 'pull chart' which contains clear instructions on using the PA81 for typical measurements. Sencore has also prepared additional application tips bulletins for the PA81. A separate manual for maintenance with schematics is included.

Using the PA81 as an addition to a full test lab: If you have a scope, and maybe a distortion analyzer, the PA81 is still a useful addition. Power amplifiers, when run at low levels, tend to be on their best behavior. High power operation means higher temperatures, which translates to shifts in component values, and occasionally intermittent and/or catastrophic failures. For troubleshooting intermittent high power related problems, or just evaluating the high output stability of a new power amplifier's performance, the PA81 is quite handy.

I will briefly mention a few things you can check for:

DC offset or balance problems. These are still common as amplifiers get hot, and especially as they age. This may cause premature clipping of the top or bottom of the waveform as the output level is increased. Using a signal generator (or sine wave test signal from a CD) and your scope, you can observe a flat top (or bottom) of the waveform. Excessive DC voltage may also be measurable on the output and you can use the PA81's external input and meters to check this.

Clipping. Premature clipping can be caused by a transistor biasing problem (or no bias), power supply component failure, or a problem in the driver stage. Clipping is checked the same as DC offset, using a sinewave source and a scope.

Open Load Testing. After a power amplifier has been serviced (such as in replacement of the output transistors), it is always a good idea to first perform an open load test. With an open load, no current will flow, and if you have screwed up, it is unlikely that you will damage much. Aside from the low impedance loads, the PA81 has an open load setting.

The PA81 uses non-inductive load resistors, and it is too bad the PA81 does not also offer one or two "nasty load modes." For example, subwoofers that are paralleled can be a highly reactive load. Big magnets, big voice coils, and low impedance can really set off some power amplifiers' volt-amp protection circuits, especially if the power amp is bridged. It would be a nice additional feature to be able to evaluate this with the PA81.

The SR68, a Cheaper solution. The PA81 is a reasonable value for what it does (and for what is inside of the box). But if you do not have \$2,000 to spare for a power amplifier analyzer, then you ought to consider Sencore's SR68 Stereo Read-out troubleshooter. At \$600 this is a more modest device than the PA81. The SR68 consists of two meters that read out in dB or watts. Amplifiers can be tested at up to 100 watts per channel short term, or the SR68 can be substituted to check a suspect speaker load. The dual meters are useful in monitoring both channels simultaneously as well as checking channel separation (to -40 dB). Impedance settings of 10 K ohm, 4, 8, 16, or 32 ohms are offered through switch selection. Operation is ac or optional battery, so this might be a preferred solution if the amplifier load to be monitored at the installation is at an awkward location. Sencore tells me that they are phasing out the SR68, but that they still have a few hundred left.

Conclusion. The PA81 is a worthwhile addition to any test bench that must check

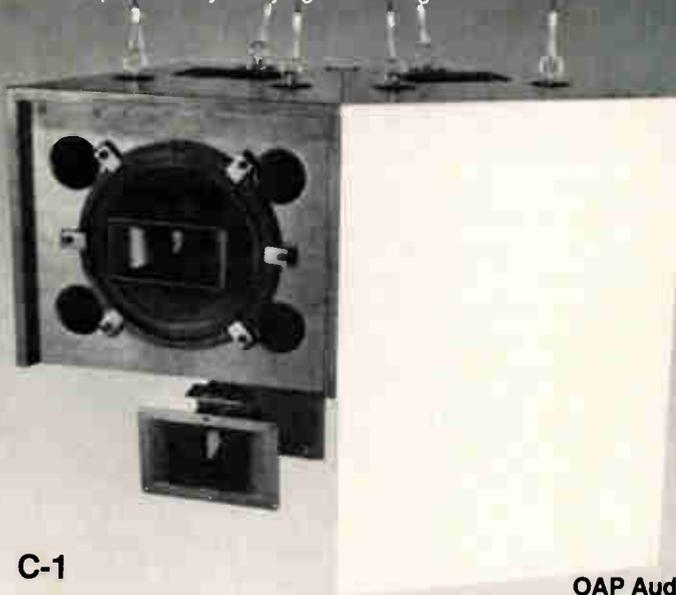
out or trouble-shoot amplifiers that are to be used at high power operation. The PA81 can be used alone, or in conjunction with a scope and distortion analyzer. It is well constructed, everything worked as claimed, and the manual was readable. If you have the money, then you can go all the way and also buy the PM82 and warm

your lab while you test power amps at up to 5 kW. Conversely, Sencore can supply you (at least until their supply runs out), with the SR68 amplifier tester, if you have more pressing places to put a few grand.

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# Coaxial Loudspeakers

*From Beginnings to Present Day*

BY PAMELA MICHAEL and MIKE KLASCO

Loudspeaker design has changed surprisingly little since 1924 when Chester W. Rice and Edward Kellogg of the General Electric Company patented the dynamic loudspeaker that was the forerunner of today's speakers. Prior to 1924, loudspeaker technology had advanced slowly and uneventfully (with the notable exception of the exponential horn developed by American physicist Arthur Webster in 1919) from the early electrodynamic patent issued in Germany to Werner von Siemens in 1874. The daunting nature of the design problems to be faced is one of the principal reasons for the rather slow pace of loudspeaker development and innovation.

It is certainly no mystery as to why the loudspeaker is generally considered the weak link in the audio chain: the challenges are many — the frequency range of human hearing is 20 to 20,000 cycles per second, and sounds vary greatly in intensity and character; factors such as efficiency and uniformity of response and directivity also must be taken into account. Luckily, some of the difficult requirements of reproducing sounds accurately are mitigated by the infrequent occurrence of certain sounds and by the compensating nature of the ear.

In principle, it is fairly easy to achieve good mid-range and high frequency response, but efficient production of bass requires space: surface area to push the air, or a horn with a large aperture. There are ways around this dilemma, some more effective than others. Space — size —

*Pamela Michael is a freelance writer in the Sound & Communications industry and Mike Klasco is Sound & Communications' Technical Editor.*

however, seems to have been one of the last frontiers broached by designers. The challenges of fidelity and power handling apparently proved difficult enough to occupy engineers for many years.

Saving space was undoubtedly one of the primary motivations for the initial development of coaxial loudspeakers in the 1940s. Today, in situations where every inch might count — in automobiles, on stage, in recording studios — the advantages of coax construction are still apparent. In making a two-way speaker into a single unit by building the high frequency element within or in front of the woofer, designers gained the additional benefit of

## **Saving space was undoubtedly one of the primary motivations for the initial development of coaxial loudspeakers in the 1940s.**

reducing some of the interactive effects by putting everything in one location. In this way, due to the spacing between the drivers, you're able to get the tweeter's sound radiation much closer to the woofer. Thus, the sound source is closer to "point-source," a situation considered ideal by most designers. Most of the early coaxes were intended for use as studio monitors, where precise imagery is important and output requirements are not ex-

cessive (at least compared to sound reinforcement).

The coax category covers a number of significantly different variations in construction as well as a wide range of applications. The first coax was from Altec Lansing. Its beginnings can be traced to the early 1940s and was designed by Jim Lansing. The Altec coax is comprised of a woofer with a compression driver mounted behind the woofer's magnetic structure. Through the center of the woofer is a tapered vent which forms the initial horn flare. The pole piece extends beyond the cone and continues on as a horn.

The larger the horn mouth is, the lower in frequency the horn can be taken based on considerations of loading and pattern control. The larger the horn is, the more it shadows the woofer's midrange output, causing diffraction and interference effects. It is also a bit of a challenge for the design engineer to work up a compliance and seal for the woofer's voice coil gap between the horn and the woofer, as there is no longer a dust cap.

An alternative approach, the "dual concentric" was introduced by Tannoy a few years after the Altec Duplex coax was introduced. These transducers were similar in that a woofer and compression driver were used. The difference was that the low frequency cone is used as a direct extension of the high frequency horn. Only a short transition flare is used to smooth the high frequency compression driver's expansion and instead of continuing as a separate horn, the cone is used as the horn. Shadowing problems from the woofers output were eliminated and phase



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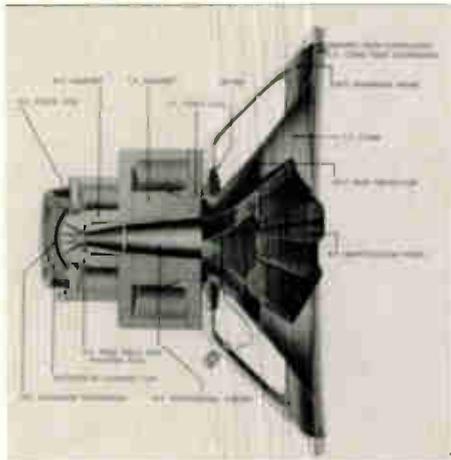
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*Coax History: (from left to right) cross section of the Altec Lansing 604E, the E-V model SPI5 coax and the JBL 2145 coax.*

linearity and smoothness improved in the crossover region. The dust cap problem is eliminated by using an acoustically transparent dust cap. Unfortunately, you get rid of one problem, you always manage to accumulate others. By using the cone as part of the high frequency horn, you have a circular pattern rather than a rectangular pattern.

A separate horn allows different horizontal and vertical patterns, and your high fre-

quency horn flare is not at the mercy of the woofer cone's body shape as with the Tannoy axio-symmetric approach. Since most rooms are rectangular, the "axio-symmetric" pattern is not always appropriate. For well behaved rooms, short or medium throw applications, critical monitoring, or in the special coverage situation of ceiling speakers, the typically smoother response of axio-symmetric speakers hold their own.

Still other considerations are the woofer voice coil diameter and the compression driver dome diaphragm diameter. The larger the woofer's voice coil diameter, the larger the compression driver's diaphragm can be. Proper selection of these parameters depend on acoustic output requirements, cost considerations, crossover point, and so on. There is no set rule here, just a lot of wisdom and witchcraft. For example, an experienced speaker engineer

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If you didn't register for The NSCA Trade Show at the Hyatt Regency Cincinnati, you missed hearing a single Soundsphere #168 loudspeaker providing background music to four levels of the large atrium. This includes the lounge bar where music in the evening, emitting from the speaker, provides piano-bar type ambience.

Richard Carlson, the Hyatt general manager stated, "The Soundsphere speaker in the four-story atrium lobby of the Hyatt Regency Cincinnati has really enhanced the hotel's atmosphere. The system is clean and crisp in quality, and is a pleasant addition to our Sun-garden Lounge, our restaurant Findlay's and all the public areas into which it reaches."

The baseball theme of banners and the large Cincinnati Reds cap is continued in the permanent "Home run," a floating White #168 Soundsphere loudspeaker. Allen Volz of Industrial Communications and Sound, the contractor, mentioned that "it was a very easy and simple installation."

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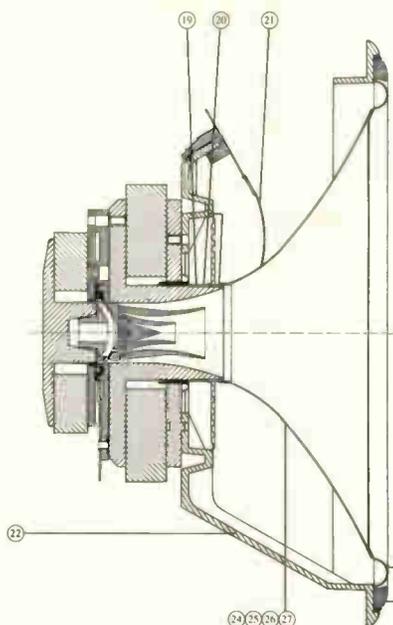
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can use a large voice coil diameter on the woofer and still get clean mid-range from it by using the right cone materials, optimum cone body shape and voice coil wire selection. A horn that would seemingly "shadow" the woofer can work as a phase equalizer if the proper dimensions and absorptive materials are used. There are numerous examples of outstanding and flawed designs in both the separate horn coaxial and combined cone/horn coaxial designs. Altec and Tannoy were joined by RCA, Stentorian, B.T.H. and a few other manufacturers in the coaxial business in the 1950s.

In the 1960s coaxial speakers became popular with do-it-yourself audio hobbyists. Raw frame coaxes from Altec, JBL, Jensen, Electro-Voice, University, Stevens Trusonic, and even Pioneer were built into living room end tables, wall cabinets,



*Tannoy Monitor Series Low frequency unit.*

even into walls. Many of these coaxial, such as JBL's "Composite" transducers, used a direct radiator tweeter mounted in front of the woofer. The popularity of stereo made the combination of the high frequency radiator within the woofer appealing, although most of these transducers wanted to be in enormous enclosures. Coaxials gave way to triaxials

using mid- and high-frequency horns. Eventually the compact but inefficient acoustic suspension speaker system killed off the raw frame audiophile transducer/bass reflex enclosure business.

Autosound engineers embraced coaxials because of the space limitations in automobiles, and the inexpensive coaxial was born. Typically these speakers mount a tweeter in front of the woofer, like the original JBL "Composite" transducer, but are far more modest in their construction. With many off-shore suppliers manufacturing these commodity speakers, vendors to the sound contracting industry adopted these speakers for applications in ceiling installations (and we will also cover this category in Part 2 of this article).

TGI/Tannoy is still strong on coaxial loudspeakers. Sales & Marketing Director Bill Calma cites the recent prolifera-

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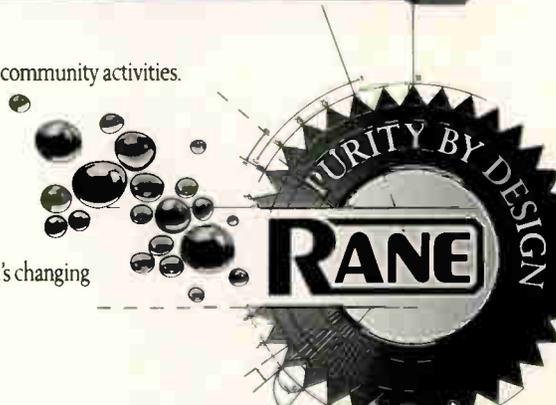


Today's church facility often serves many functions: worship, lectures, concerts and other community activities.

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little at all. By locking in selected parameters you can prevent the system from being pushed too far. It can set delays up to 1.3 seconds in increments of 20  $\mu$ sec. While digital EQ

lets you do all kinds of fine-tuning. Right from the box, the C20's ROM contains programs all set to make the S1520S sound great. And there's plenty of memory left over to store your own modifications.

The system also includes the Y20. It's the heart and soul of YST. The Y20 monitors Back EMF. While it

impregnated cone. The system is available with an interchangeable medium format horn in 60 or 105 degree versions. And best of all, the S1520S is just the first in a line of high-end Yamaha speakers that will have YST.

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## One YST S1520S System fits all.

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lot more. So you can customize the sound to whatever situation you get into. Whether it's a picnic for the company big-wig or a convention for thousands of them.

The C20 can give users total programming access or limit it to very

electronically synthesizes parameters for the woofer. The result is more precise woofer control with less distortion and less acoustic interaction between the drivers.

The Y20 also gives you the ability to use any professional power amplifier you want. And because it's designed to fit right into the amp rack, there's no need for added sense wires to the speakers. And calibrating it is a simple set-it-and-forget-it procedure.

Now back to that YST speaker. It's got a 15" high power, high sensitivity woofer with a carbon fiber



grid system. So it lets you attach cabinets to each other. The grid hardware locks into

Aeroquip stud fittings built into the top and bottom of the cabinet. So arrays of any size and shape can be easily constructed.

There is no other system like the YST S1520S. It's the one that's digital. It's the one with YST. It's the one system that fits all. It's the one that's available from selected Yamaha dealers and contractors.

# YAMAHA

tion of point-source drivers (up from a handful in 1980) as an indication that Tannoy's research and development emphasis on phase coherent drivers (which must be point-source) is well placed.

"While the industry is in a frenzy of designing hardware and software packages to manipulate speakers to behave better," he says, "we feel it is more necessary to concentrate on improving the drivers themselves. There is no computer program or software that can solve problems inherent in the transducers themselves; they can only control them better. We're staunch advocates of the point-source approach."

Tannoy's new Contractor Series, introduced at NSCA in April, represents the company's sixth retooling since 1947. Tannoy also offers a Monitor Series of coaxes. The company has paid special at-

tention to materials, adhesives and cabinet construction, utilizing "Differential Material Technology" and extensive CAD modeling in the design process. Their approach to crossover network design is rather minimalist (their own word for it). The series includes System 8 NFM, which has an 8-inch Dual-Concentric driver; the System 10 DMT with a 10-inch Dual-Concentric; the System 12 DMT with a 12-inch; a 15-inch System 15 DMT; and the System 215 DMT which features a 15-inch Dual Concentric and a 15-inch bass unit.

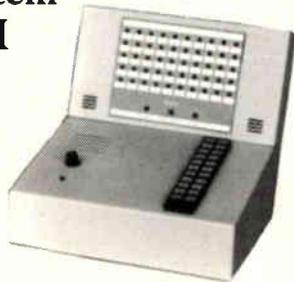
Altec's 604-8K is a refined version of the original 604 studio monitor. The current 604-8K incorporates several technological advances in its design. Its power has been increased as materials for drivers improved, and earlier revisions included Altec's Mantaray constant directivity horn

with improved high-frequency dispersion and their "Tangerine" phasing plug, designed to reduce the problem of high-frequency loss. (Altec's other coaxial speakers use direct radiating tweeters and will be discussed in the next installment of this article.)

Another speaker that started out as a refinement of the original 604 was the UREI coax, now marketed and owned by JBL. The first generation UREI studio monitor introduced a number of important refinements to coaxial. These were one of the first speakers to be time aligned using Ed Long's techniques. Group delay in the crossover was used to compensate for the slightly offset acoustic centers of the woofer and compression driver. The horn design was patented, it featured a diffraction buffer for impedance matching (improved transient response), and slots in

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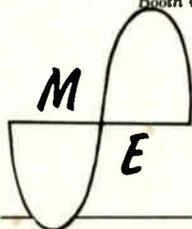
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the sides of the horn for minimizing mid-range shadowing effects. UREI's products have gone through a number of generations, with the current generation being based on JBL transducers. Aside from the original 15-inch diameter coaxial version, a 12-inch coaxial was introduced a few years ago. UREI products are sold as complete speaker systems rather than components.

JBL has traditionally had a "Composite speaker" in their product line and their most recent coaxial effort, the 2100 Series, includes both compression drivers and direct radiator dome high frequency units. These include the 2142H, 2152H and 2155H. The 2142H has a 12-inch woofer and a dome tweeter (more on this in Part 2). The 2152H and 2155H are, respectively, a 12-inch and a 15-inch woofer with titanium dome compression drivers with

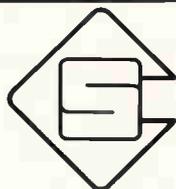
JBL's diamond surround fitted to what JBL calls their "Flat-Front Bi-Radial horn," which provides a smoother power response, lower distortion and a more constant coverage over the operating bandwidth. The horns are larger than what is typically used in coaxial for better control of the coverage in the voice range. Both the 2152H and the 2155H are equipped with wound-on-edge voice coils.

PAS's CXL-80C speaker is generally of similar configuration to the Altec and UREI coaxial, but with an added element of flexibility. It has a 12-inch bass driver and has a bolt-on driver assembly that will accept any standard four bolt 1-inch compression driver, theirs or one of your choosing — a nifty feature in some job situations which allows the sound contractor to tailor the speaker to specific applications. Model CXL-2580C has a 15-inch woofer and the

same unique bolt-on driver feature. Their model CX15-80C has a 15-inch woofer and will accept any 2-inch compression driver.

PAS makes good use of the compact frontal area presented by a coax in their stage monitors, although one of the first efforts at a coaxial stage monitor was demonstrated by Turbosound in 1986 with their TFM-2. This is a 15-inch coaxial transducer which was then loaded by a sophisticated horn. The horn loaded both the woofer and the compression driver. This interesting design has very high output with compact frontal area, but the monitor is deep due to the compression driver mounted behind the woofer and the short horn in front of the woofer.

This interchangeable compression driver feature is also offered by Eden, a small, thirteen year old midwestern company that handbuilds their products.



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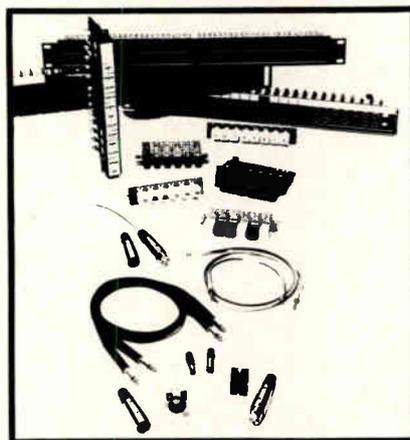
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Anyone's screw-on type high-frequency driver can work on the back of their coax, which uses a standard 1 $\frac{1}{8}$ -inch thread coupler, or you can use Eden's ferrofluid cooled driver. Eden's loudspeaker approach is similar to Tannoy's in that they go through the pole piece and have an exit horn built into the steel pole of the speaker and use the cone as the final horn section. Says Eden President David Nord-schow, "We've given up some flowery aspects of the specifications — the ones that don't mean too much in the real world — and concentrated on making a solid, rugged device that's pleasing to listen to, but operates in a little more restricted bandwidth."

A different approach to flexibility, in this case coverage, is offered by OAP in their C-1 speaker system. A coaxial speaker (a PAS 12-inch with a 60 × 30 horn) is used for far-field coverage, plus a separate and adjustable 90 × 40 horn is used for near-field coverage. The C-1 is popular with

**Coaxes "offer a tight, smaller box, tight pattern control and not a lot of bleed from one unit to another."**

sound contractors in church installations and its trapezoid shape and integral hardware lend itself to arrays. (OAP is also about to introduce a high output horn-within-a-horn coaxial and this will be discussed in Part 2.)

Also new are four coaxes from Sammi. Sammi, using the trademark SAAT, is a new brand name in U.S. pro audio. Actually, the firm was founded in 1962 as Korea's first speaker company and is a major OEM supplier with a number of factories, including one in Kentucky. Sammi's coaxes are the CX08-B50, an 8-inch; CX10-A100, a 10-inch, CX12-A200, a 12-inch; and the CX15-A200, a 15-inch. The 8-inch and the 10-inch use the cone for the horn, the 12-inch and the 15-inch have a small,



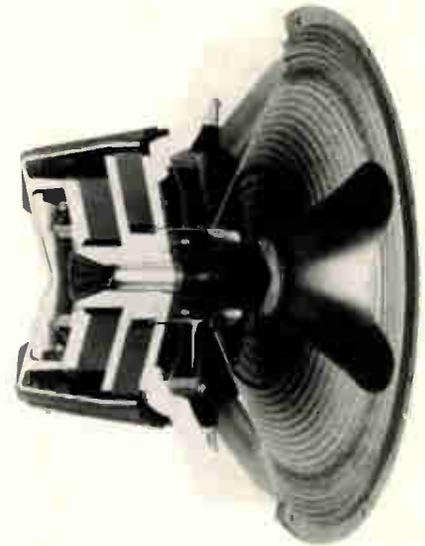
*The Emilar ELC 15 D coax.*

separate horn bolted on. All versions, including the 8-inch and 10-inch, use a true compression driver behind the woofer.

E3MC, manufacturer of Emilar speakers, is introducing a new, spherical stage monitor at AES, with 15-inch coaxes and custom crossover. Norman Collins, E3MC President, says this space saver will also be useful in bars and small enclosures. The Emilar line includes a 10-inch, two 12-inch and a 15-inch coax, the ELK10, ELK12, ELC12, and ELC15, respectively.

Gauss, a sister company to Altec, offers a high-sensitivity, small slant stage monitor coax (Model 3285). It sacrifices a little bottom end for increased sensitivity, and a little on the top for some extra power handling, typical engineering trade offs in coax design. National Sales Manager Paul Hugo says, "A lot of people are interested in coax for stage monitoring. And no wonder — they offer a tight, smaller box, tight pattern control, and not a lot of bleed from one unit to another when multiples are used on stage."

The 3285 is also being used in high ceiling applications (over 30 feet) in conventions centers, ballrooms. At the high end of the market at just under \$1,000, the Gauss, like coaxes in general, can still be very cost effective when replacing two or three other speakers of lower sensitivity or power handling. The 3285 is also being installed in churches and clubs when supplemented by a subwoofer. Hugo cited a sound contractor who used the 3285 in a church in North Carolina and installed the subwoofer beneath the riser. Gauss also has a 12-inch coax, the 3288, intended for the studio market, though not as a close field monitor. Hugo suggests that the 3288 is a good choice for a mobile studio, or the like. The box is 1 $\frac{1}{2}$ -feet-2-feet, too big to put on a console bridge, though. Gauss Model 3588 is a real full-range 15-inch speaker, at 3-4 cubic feet internal volume.



*Cross section of the Gauss 3285 coax.*

Radian, like Tannoy, uses the cone as an extension of the horn. Starting out in the studio monitor realm, as so many coax manufacturers do, Radian now offer coaxes for many applications in 8-inch, 10-inch and 12-inch models, and has four different lines. Radian Director of Sales and Marketing Jeff Phillips says that when Radian looked at fields outside studio monitors the engineering trade offs that afford lower efficiency but give a wider bandwidth didn't

**"People would rather lose an octave in the bass and gain a couple of dB in efficiency. The approach we use gained up to 4.5 dB."**

make sense. "People would rather lose an octave in the bass," he says, "and gain a couple of dB in efficiency. The approach we use in the 500/2 Series gained up to 4.5 dB on some of the models — they're being used in high powered applications for ballrooms, portable sound, gymnasiums, and so on. Coaxes make a lot of sense where you need a lot of sound coming from one source, but need a small and inconspicuous box."

The Contractor 500/2 Series speakers have 1-inch compression drivers on the back and feature Radian's proprietary "HH" phasing plug. The Radian 500 Series is an economical alternative package suitable for live music, voice reinforcement and other high level applications for



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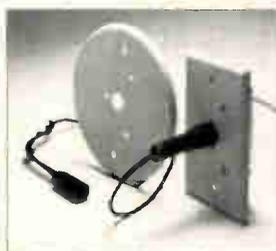
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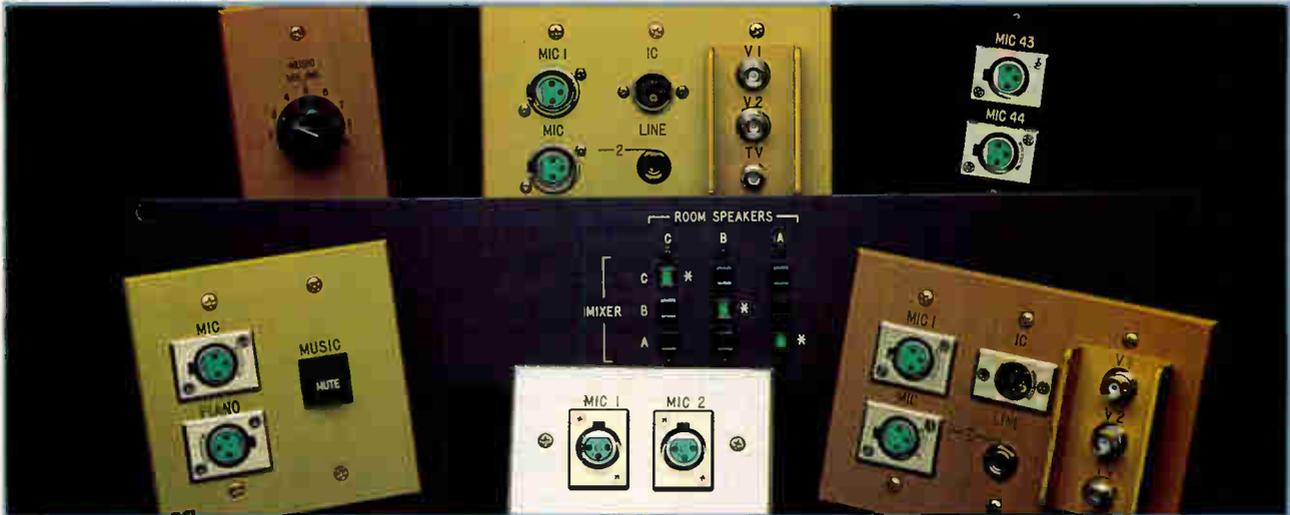
sound contractors; the 5000 Series is essentially the same package, but with heavy duty cast aluminum frame construction. Radian's Monitor Standard Series is based on the same coax principles, designed especially for the recording studio and other critical applications. These systems are available for both close field use and far field use.

One of the output limitations of coaxial are thermal problems. Most modern high output woofers use vented pole pieces or other refinements of this technique to cool the woofer's voice coil. With a compression driver mounted behind the woofer and using the vented pole for a path for the high frequencies, vented pole piece cooling must be omitted; therefore most coaxial

**Most modern high output woofers use vented pole pieces or other refinements of this technique to cool the woofer's voice coil.**

speakers are more vulnerable to power compression effects and voice coil burnout at high power levels. An unusual solution to this is used by the Bond DF-12 in their coaxial. A centrifugal blower forces air from outside the cabinet to cool both the low and high frequency drivers. The DF-12 uses a 12-inch woofer and a compression driver with a choice of horn patterns including 40 x 40 and 60 x 60 and 80 x 40.

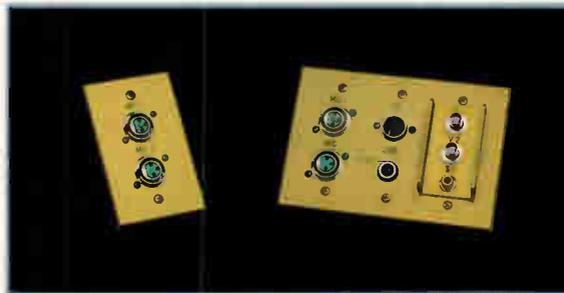
In Part 2 of this article, we'll take a look at derivative coaxes, from modest bread and butter ceiling speakers that merely mount a tweeter in front of the woofer, to more ambitious direct radiator and waveguide high frequency transducers integrated into the woofer from E-V, JBL, Altec and others, to Tannoy's radical ICT inductive coupling technique that bypasses the need for a high frequency magnetic structure, to high output horn-within-a-horn coaxes from Frazier, Community, Renkus-Heinz, OAP, Electro-Voice and others.



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World Radio History

# New Markets for Audio Contracting

## *The High Performance Movie Theater Sound System*

BY DANIEL SWEENEY

**M**otion picture theater installations represent one of the most common applications of sophisticated sound engineering principles in public address. Yet for most sound contractors, more theater installation is a business that has been entirely conceded to others — principally to theater outfitters whose expertise runs as much to popcorn machines as to loudspeaker coverage patterns and room acoustics. In spite of growing acceptance of stereo and surround sound by the exhibition industry, in spite of the widespread public awareness of Dolby soundtracks and THX authorized audio systems, the group best qualified to provide upgraded sound quality to the movie going public isn't in the business in any significant way — at least not yet.

Nevertheless, a few sound contractors around the country have made a profitable business of selling to the exhibitions industry, and with the probable conversion of most venues to stereo during the nineties, a very appreciable retrofit business will develop. Whether this will result in major opportunities for sound contractors remains to be seen.

### **HIGH PERFORMANCE SOUND SYSTEMS AND THE THEATER EXHIBITION INDUSTRY**

The Motion Picture Exhibitors Association, the trade organization for theater owners, estimates the total number of public screening rooms to be on the order

of 30,000 nationwide. Other estimates are lower by as much as 50 percent. Dolby Labs, for instance, estimates the combined number of screens for both the United States and Canada to be under 16,000. Nevertheless, informed opinion on the whole seems to favor a higher number — 25,000 screens minimally.

### **Most existing theaters in fact are provided with much the same sort of sound system prevailing forty years ago.**

Of the total, probably less than half are equipped for stereo or surround sound presentations. Larry Jacobsen, Vice President of the AMC theater chain and a well known figure in the exhibitions industry, estimates approximately 11,000 stereo rooms nationwide (Jacobsen's estimate of the total screen population is 24-25K). Most existing theaters in fact are provided with much the same sort of sound system prevailing 40 years ago, and many have equipment of that vintage. Generally the vacuum tube power amplifiers have been replaced with solid state types, but in other respects little has changed. The op-

tical pickups are of ancient design, and almost always of ancient manufacture, and speakers are often antique types such as Altec A4s.

Furthermore, many theaters have but a single speaker and a single amplifier. There are obviously a great many houses whose audio systems are urgently in need of a facelift.

Of the ten thousand or so stereo houses in the country, most are equipped only to show Dolby stereo optical tracks encoded in Dolby A. Dolby has been urging the industry to upgrade to the more powerful SR noise reduction system, and has persuaded the film makers themselves to adopt SR en masse, but to date only a little over 1,000 houses have been provided with SR cards. Theaters equipped to show films in the discrete six channel formats, namely the Dolby six track magnetic A and magnetic SR formats, Kodak/ORC Cinema Digital Sound, and the new Dolby six track digital are far fewer in number, totalling less than a thousand. Most such theaters are 70mm houses, because until very recently discrete six track was limited to 70mm releases.

Dolby has established dominance in stereo recording and playback for motion pictures, but it is not entirely unchallenged. Kodak, in partnership with Optical Radiation Corporation, offers both 70mm and 35mm six track digital optical systems, and the format, called CDS (Cinema Digital Sound) has appeared in such major

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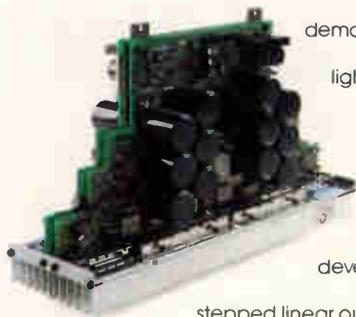
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releases as *Dick Tracy*, *Days of Thunder*, *The Doors*, *Edward Scissorhands*, and *The Terminator II*, among others. Ultrastereo Corporation, based in Van Nuys, California, has offered surround sound matrix recording and playback equipment for many years, and many hundreds of low budget releases have been recorded in Ultrastereo, though Dolby has maintained a virtual lock on the major movie releases. In addition, Kintek and Aphex have sold theater decoders for decoding the Dolby motion picture matrix, and Shure Brothers is considering debuting such a product. But of the rivals only CDS can be considered a serious challenger, because only CDS has seen its system used in major releases, and only the CDS really constitutes a distinct format in itself (Ultrastereo uses the same basic motion picture matrix employed by Dolby).

It should be stated for the benefit of those with a dim recollection of motion picture technical history that Dolby was far from the first to tout multi-channel sound for the movies. Fantasia brought surround sound to film back in 1940, and a decade later Cinerama Corporation brought out an



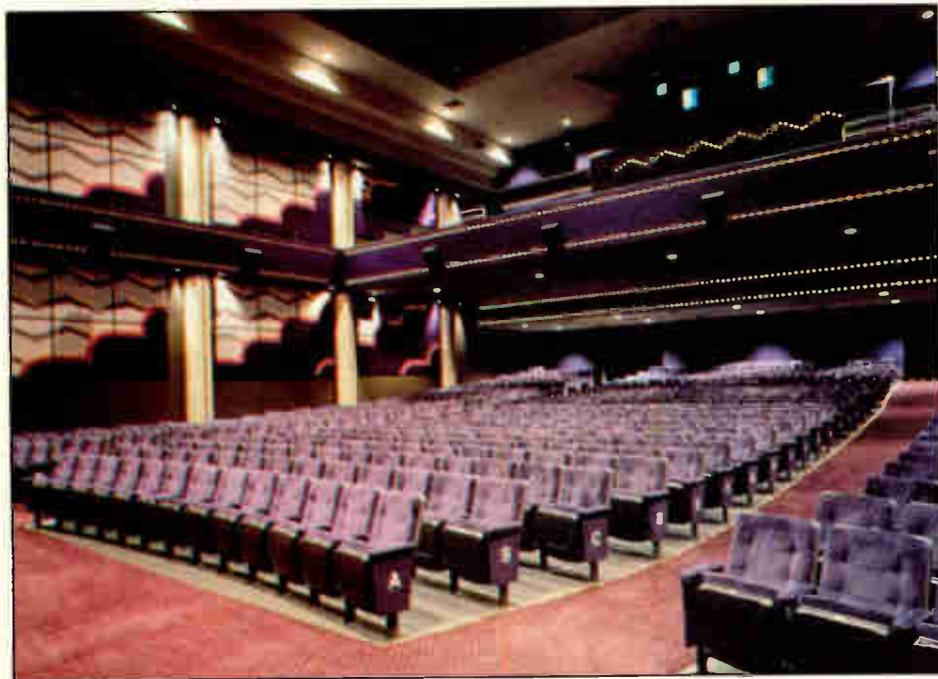
*Installation at Academy of Motion Picture Arts and Sciences, Samuel Goldwyn Theater in Beverly Hills.*

eight track magnetic recording system which is still unsurpassed in certain respects. A few years later Cinemascope and Todd-AO brought four- and six-channel magnetic recording into vogue. Multi-channel became commonplace in the "roadshow" presentations of the fifties and early sixties, but the magnetic systems of the time were always problematic, and were never installed in more than a

couple of thousand theaters, by the most generous estimates. By the late sixties many such systems had been removed, and almost no stereo movies were being released.

Dolby revived stereo in late 1976. Dolby optical stereo utilized a surround sound matrixing technique borrowed from the moribund Sansui QS quadraphonic system, and Dolby combined it with Dolby type A noise reduction to improve the miserable signal-to-noise ratio of standard optical to the point where the tracks could be narrowed enough to be split into stereo left and right. Dolby also made some modifications in the Todd-AO six-track magnetic standards, and applied A type noise reduction there as well. Both Dolby systems worked well, and won instant public acceptance in a spate of popular releases including the *Star War* epics, *ET*, and various other Lucas and Spielberg efforts. By 1980 most major releases were appearing in Dolby prints.

Today virtually all major releases both here and abroad are encoded in the Dolby MP matrix. As indicated, SR optical is rapidly becoming standard in the film industry itself, but Dolby A prints are still routinely struck. There is, unfortunately, a backwards compatibility problem in regard to the new SR process. Dolby A tracks can be played back unencoded with acceptable results, but the more powerful



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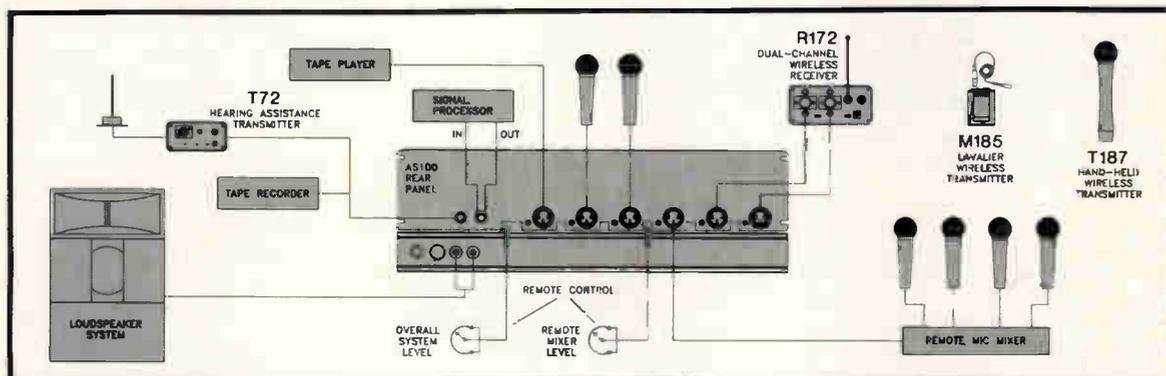
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SR system often sounds badly compressed when played back without decoding, and even when Dolby A decoding is present, SR reproduction may be marginal. Because of the compatibility issue and the extreme conservatism of the exhibition industry, Dolby A is likely to be with us for a long time, and Dolby SR is likely to come

on very slowly. Indeed, with the challenge of the new digital formats discussed below, there is a real possibility that Dolby SR may never gain real ascendancy as a playback system. It should be noted here that Dolby as a company has never really acknowledged the SR compatibility problem, but, nonetheless, it is widely re-

cognized in the industry.

Dolby six track magnetic audio recording, which has been the premier format for the past 15 years, is confined to 70mm releases, and 70mm itself is restricted to high budget spectaculars. As a matter of interest, the true 70mm cameras used in the blockbusters of the fifties and sixties are no longer employed in film making, and all current 70mm releases are simply blowups from 35mm. More's the pity.

Today the production of magnetic sound tracks for exhibition is at an all time high, but most industry observers foresee the gradual obsolescence of magnetic movie sound. Both magnetic recordings on film and magnetic playback heads are subject to fairly rapid wear, and magnetic pickups are expensive to maintain and repair. In the past, magnetic sound tracks offered very perceptible advantages in fidelity over analog optical, but the arrival of digital optical formats is almost certain to bring about the end of magnetic analog sound.

The immediate future of multi-channel playback in the theater is rather uncertain at present due to the emergence of two totally incompatible rival formats, Cinema Digital Sound (CDS) developed by ORC/Kodak, and Dolby's new digital optical system.

Both systems are nominally 16 bit with basic specifications equivalent to those of the compact disc, and both in fact use data compression techniques to permit the use of relatively low resolution optical tracks for storing otherwise unmanageable quantities of digital data. Both are also six-track discrete. The methods by which data compression is achieved, and the means by which data is distributed on the film stock are quite different in either format, but the really significant differences are in the areas of pricing and compatibility. Dolby digital prints all contain Dolby SR optical tracks as well, and thus can be played theoretically on any equipment. Kodak/ORC prints are not backwardly compatible. Dolby is also aiming to sell the playback equipment for their new system for several thousand dollars less than the approximate \$20,000 asking price for the



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

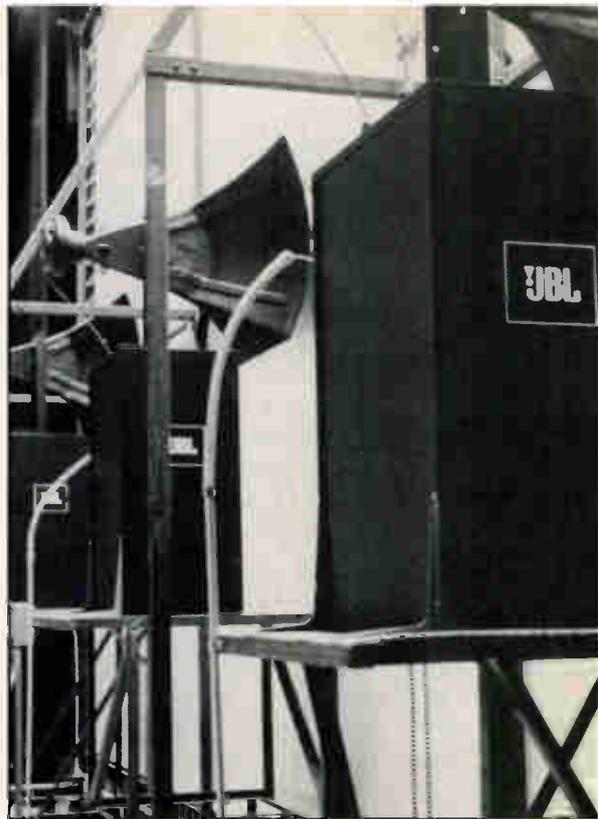
Kodak/ORC system. Whether this pricing disparity will in fact prevail cannot be determined at this time.

In addition, a number of companies have announced dual format synchronized systems including the National Film Board of Canada and Strong-Ballantine, a major manufacturer of projection equipment. Such dual systems must be regarded as distinct dark horses due to the traditional aversion of the exhibition industry toward the whole dual format notion, but the Strong-Ballantine playback system, the most serious of these contenders, will be priced at less than half of the cost of the digital optical film systems which may be significant in an industry which tends to look askance at expensive upgrades.

The whole issue of where the industry is going in terms of formats is of more than academic interest to installers of sound

equipment in motion picture theaters. Installing the actual playback equipment for decoding digital sound tracks is a relatively simple operation, and certainly not the basis of anyone's installation business, but the impact of digital on the rest of the audio chain may be considerable, depending upon the nature of the existing installation. A house equipped for 70mm SR magnetic is probably not going to upgrade speakers or amplifiers to go to a digital system of similar basic specifications, but a mono house or even a house with basic surround sound installation is unlikely to spend the money for discrete multi-channel digital unless the new format results in noticeably more impactful presentations — which it won't unless the whole system is upgraded.

Few in the industry doubt that some kind of digital optical system will eventually



A typical movie theater install.

become standard. The tendency in the industry has always been toward uniformity and standardization, and a long-term coexistence of competing formats would be against all precedent. Dolby, by virtue of

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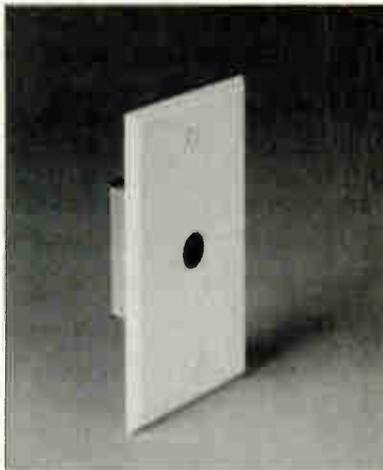
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its entrenched position in movie sound and the backward compatibility of its system, seems to be more strongly positioned than the Kodak/ORC consortium to carry the day, but the appearance of Dolby digital releases is at least a year away, which provides Kodak/ORC with a two year lead in which to promote its system with both the studios and with the exhibitors. The consortium has already made a fair start in wooing the film makers, though with less than 80 theater installations nationwide, business on the installation end appears to be stalling.

Such uncertainty in the software realm creates problems for sound contractors attempting to sell theater owners on upgrades, simply because many owners have adopted a wait and see attitude. They'll see about going digital when the industry settles on a format, and if the industry settles on Dolby digital they may not even bother because the new releases will still have the SR track.

### MOTION PICTURE SOUND RECORDING AND PLAYBACK

High performance movie theater sound systems differ from most other public address systems in one very important respect: they're stereo — in fact they're actually surround sound with four to six channels of information.

I've mentioned the motion picture (MP) matrix several times previously: This MP matrix is broadly similar to the old Dynquad system of four channel sound developed by David Hafler for consumer use about 1970. The actual film physically contains only a pair of stereo tracks, but these tracks are mixed down from an original four, and are subsequently decoded into four channels of information on playback. Special circuits called matrix multipliers or logic steering circuits, which were not available in the old consumer quad equipment, allow the extra channels to be decoded with high separation, producing a close approximation of a discrete multi-channel presentation.

The playback channels include normal stereo left and right, a center channel

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which carries most of the dialogue, and a surround channel which normally provides a kind of ambient soundfield, and which emanates in a diffuse manner from a multitude of back and side speakers. The surrounds are also engaged in front to back pans, and vice versa, where the sound source appears to move in depth. Motion picture sound mixers very rarely attempt to localize sound sources to a hard surround position since the speaker arrangement doesn't lend itself to such placement.

In the discrete formats, CDS, Dolby digital, and Dolby magnetic, the stereo and center outputs are retained, but a separate subwoofer output is provided (the sixth channel is generally retained as a control track). In some instances left and right stereo surround channels are specified

(these are standard in CDS but not in Dolby magnetic).

Except for the signal source, similar playback equipment is used for high quality reproduction of both matrixed and discrete formats.

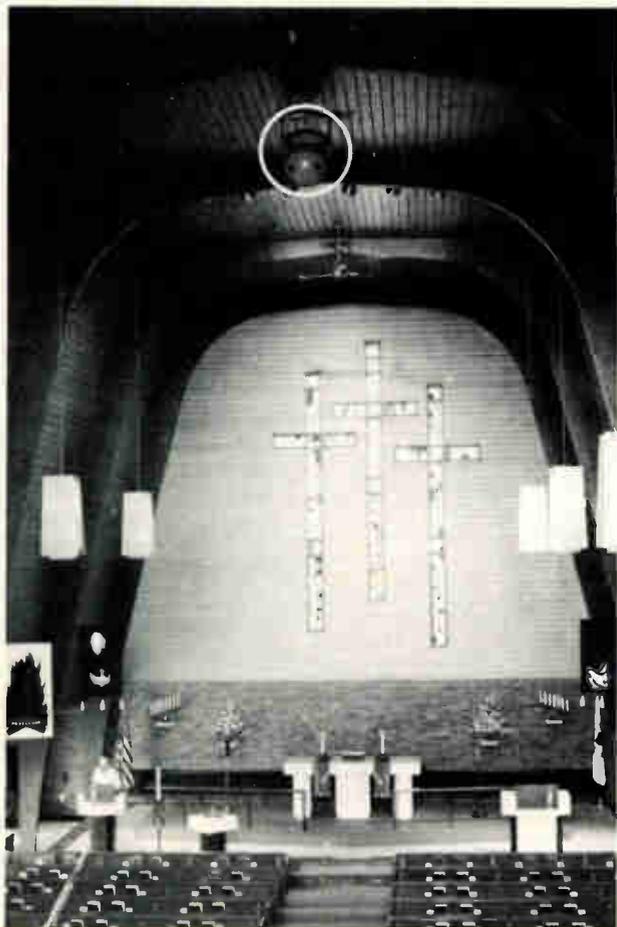
The three front speakers are generally identical, and are positioned in a row behind the screen. Most newer installations use constant directivity horns for frequencies above 500 Hz, and large woofers in a vented box for frequencies below that. Most speakers actually employed in theater installations are not specifically designed for that application. They're simply high output professional sound reinforcement types, though it should be noted that two speaker companies, JBL and E-V, account for almost all of the sales, with relatively insignificant market share

going to Klipsch and Bose.

Bi-amplification of front speakers has become increasingly common, in large part due to Lucasfilm's THX program (of which more in the second part of this series), but most stereo theater installations still use passive crossovers. Surround speakers are never bi-amplified.

Surround speakers are generally small two-way direct radiators used in multiples. There is little standardization in the type of speaker employed for surround applications, and one frequently sees small home high fidelity speakers handling surround information. In the matrixed formats, surrounds do not produce frequencies below 100 Hz, but in discrete formats they are full range.

The best equipped movie houses tend to be characterized by the use of compo-



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This Soundsphere installation was done by Monroe Sound in Monroe, MI. They have also installed Soundsphere loudspeakers in many other local churches, gyms, and auditoriums. A representative of Monroe Sound stated that, "Soundsphere speakers are a quick and easy installation. My employees can finish more jobs in a shorter time period resulting in improved cost efficiency for the church and for the company."

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nent powered subwoofers, and subwoofer installations provide one of the most immediately conspicuous upgrades that can be made to a system that is already stereo capable. Kintek's powered subwoofers are popular in movie theaters, though JBL, Klipsch, and Intersonics products appear with some frequency as well.

Ordinary high powered professional 70 volt amplifiers predominate in movie theater installations. Products by QSC, BGW, and Crest are popular. Electronic crossovers are fairly rarely used in movie theaters though they're specified in the THX system. Lucasfilm itself manufactures the THX crossover. Other, non-THX electronic crossovers are available from JBL and E-V.

Most of the equipment used in theater sound systems will be immediately familiar to the seasoned sound contractor. The "A

chain," that is, that portion of the signal chain preceding the electronic crossover or power amplifiers is what will be unfamiliar. In most systems this will consist

**The best equipped of the movie houses tend to be characterized by the use of component powered subwoofers.**

of the projector with its optical pickup and line level output, and a Dolby decoder containing matrix decoding circuitry, noise reduction, and third octave equalization. As

indicated, competing units are made by Ultrastereo and Kintek. Dolby six-track magnetic playback calls for a different Dolby device, and CDS playback requires a "penthouse" attachment placed over the projector. Kodak/ORC recommends the use of a Yamaha digital equalizer in a digital loop communicating with the penthouse.

Playback equipment itself should pose no really serious problems for the sound contractor, but the tuning of the system and the acoustics of the room may present the contractor with challenges not ordinarily encountered in more conventional installations.

In the second segment of this series, we shall explore both the peculiar acoustical environment presented by a movie theater, and the marketing problems and possibilities confronting the contractor seeking to enter this business. ■

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# SATELLITES AND COMMUNICATION

By Keith Bose

**Each night when a news anchorman speaks with a correspondent in London, this is in fact a satellite teleconference; each participant is having an interactive teleconference with the other person and we are witnesses. The technique has been highly developed.**

The war in the Mideast was brought to television viewers by hundreds of teleconferences between studios in the United States and cameras on the scene.

A conference becomes interactive when parties speak and are seen from other respective locations. A setup may have certain stations with only interactive audio but with other stations capable of both interactive audio and video. Nightly TV news broadcasts are excellent examples of video conferencing conducted under professional direction. Certain correspondents may have only telephonic connections, hence, only interactive audio. Others are obviously interactive in both video and audio. In the television news conference an anchor person, supported by a hidden program director, is the moderator. In a corporate teleconference the director may be a corporate monitoring official. A teleconference can become an electronic classroom by employing an instructor with interactive video and students with only interactive audio, or in combinations. Communication satellites make this all possible.

The satellite as a common carrier is



PHOTO COURTESY OF SATELLITE TRANSMISSION SYSTEMS, INC.

*This MCI Pacific Gateway Station is a typical hub. A station of this kind may be simultaneously sending computer data, a television remote feed and teleconferences along with thousands of overseas telephone conversations.*

revolutionizing world communication, making long distance video teleconferencing possible at moment's notice. Although the satellite and land linkage for audio and video is owned by the common carriers who have dedicated enormous amounts of capital, the end stations offer an opportunity for entrepreneurs. Equipment for video teleconferencing is available at reachable cost and is being produced by many companies.

A satellite communications installation may be leased by contract from project to project, or if a firm has heavy communication needs it may be owned outright and installed under contract. The investment firm of Edward D. Jones & Co. for instance has 1300 offices over the United States, each now equipped for satellite reception. Video originates with the firm's own up-link. Interactive video can be scheduled using land lines from a given site to the

uplink, or "hub." From there it reaches all offices by satellite broadcast. The same satellite link is used for sending financial data between computers. A video transmission may be made at night when the link is free from traffic and recorded on VCR's that are commanded from the hub station, making it possible to roll and rewind the tape by central command. A video teleconferencing studio has been installed for either live daytime use or to the VCR's at night.

Firms and institutions are using satellites for training or dispensing factual information. The United States Distance and Learning Association (USDLA) has been organized to promote education and training at all levels by electronic means.

Satellite communication is relatively new. But the natural laws governing orbiting bodies such as satellites were first

discovered by Johannes Kepler three hundred years ago. Kepler would have been able to tell us that if an object is somehow accelerated in a given direction and placed above the earth over the equator at 35,800 km (22,245 miles), the object will orbit the earth in exact synchronism as the earth makes its complete rotation each day. At any point on earth the object will therefore appear stationary. The object will have a *geosynchronous* orbit.

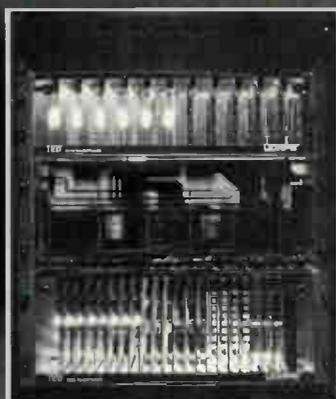
Many satellites now orbit the equator in a colossal ring 22,245 miles beyond the earth's surface. More are added each year. They are launched from rockets of the United States, the Soviet Union, France and China by government and private consortiums. More nations are entering the race to develop suitable rocketry. The satellite with its communication equipment must be capable of surviving for at least

ten years in a space environment.

A satellite launch is very expensive and a large rocket is necessary. The launch should be in an easterly direction to take advantage of the earth's rotational velocity of 1042 miles per hour at the equator (25,000 miles per day). The launch should be as close to the equator as possible. The European Space Agency launch site at Kourou, French Guiana, at approximately 5 degrees north latitude, comes as close to ideal as any so far established.

Our Cape Canaveral launch site is less advantageous at 28 degrees 22 minutes latitude. The Soviet launch pads, all beyond 45 degrees latitude, require the most launching thrust for geosynchronous orbit. It should be pointed out that most military satellites and some communication satellites are not in synchronous orbit, hence must be tracked as they move across the

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World Radio History

sky.

It has not been possible to place a satellite in geosynchronous orbit with a single stage rocket. Three stages are required, or the satellite can be launched from a special rocket from the U. S. space shuttle in low orbit. When orbit is reached, it is necessary to "tweak" the position and correctly face the antenna and solar pickup device. This is done by ground commands to the satellite. The thrust produced by a nozzle releasing a compressed gas is often sufficient to move the satellite once it is in orbit.

A satellite system can consist of one hub and any number of receiving systems. Because all geosynchronous satellites are in a ring at the equator, their latitude will always be zero when they are included in a giant sphere with the earth as its center. It is thus only necessary to know the

*longitude* of a given satellite to locate it relative to any point on the earth so long as the *longitude* and *latitude* of the point on earth is known. A satellite can be located by using the longitude of the satellite and the longitude and latitude of a ground station. It is first necessary to subtract the longitude of the ground station from the longitude of the satellite (longitude is measured west from the zero longitude of the Greenwich Observatory in England).

The intersecting point of ground station latitude and the longitude difference is then used as arguments in a chart. The answer may be interpolated. A very close value can be found by means of spherical trigonometry, but this is usually unnecessary, since the dish antenna may be aimed from an approximate point capable of faint reception and lined up by noting

signal strength.

Once an antenna is installed and oriented, most ground stations, including those for home use, include the electromechanical equipment required to point the antenna dish at a given satellite which has a known set of coordinates.

No two satellites can occupy the same point in space. A satellite that is intended to broadcast a signal over a footprint must be separated from others in the equatorial ring by enough angle so that the signals of one may not interfere with the other when a dish is pointed at one or the other. By agreement, each satellite must be separated from the other by two degrees to prevent interference when transmitting and receiving. This limits the number of satellites that can ever be placed in orbit with foreseen technology, but there is still plenty of space left. Since all satellites

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*This earth station, now a Korean satellite hub, was originally set up for the 1988 Olympics as a turnkey installation of Satellite Transmission Systems.*

contributes about 40 dB; the rest must be electronic. A low noise amplifier (LNA) near the antenna feed horn is the first step of amplification. Because the LNA must be close to the feed horn, it must operate in an outside environment and be supplied with power. The signal from the LNA may be converted to a lower frequency and sent inside on coaxial cable.

The first successful common carrier transponders operated in the microwave C Band from 4 to 6 gigahertz. The newer transponders operate in the 12 gigahertz Ku Band. The operating frequency has important considerations. The characteristics of the transmitting and receiving dish must be related to the wavelength of the signal. The higher the frequency the shorter the wavelength and the smaller the minimum size of the dish. Thus, the newer Ku band signals may be received on a smaller dish. A higher frequency carrier can provide a wider bandwidth or channel capacity.

Common carrier signals for satellite transmission are sent by wire, optical cable, or microwave to a hub station. The hub station employs more than a minimum size dish to provide greatest gain over the widest range of channels. A large hub may at one time carry thousands of telephone calls, computer data, and at the same time several important television programs — and video teleconferences.

Channels may be leased for a single time slot or for a year or more. They may also be subleased to specialized firms that provide certain services. More than one hub may address a single satellite. Leasing satellite time depends upon the service required. Usually the process involves tiers of subcontractors. The subcontractor may handle only the audio or telephone portion of an operation. The hub provides a permanent location with very high capacity and good audio-video fidelity and data accuracy. Nevertheless, it is possible to employ portable uplinks on moments' notice to transmit over less bandwidth. Such systems are used in emergencies and appear at accident scenes and events for television production or may be used in corporate communications.

transmit in the same frequency band, the signals are not separated by a tuner, but by directional characteristic. By using both horizontally and vertically polarized signals, twice the amount of frequency space can be added to a transponder.

The receiving dish of a home satellite system and many commercial installations is usually capable of receiving more than a single satellite. This means that the dish must be mounted on a drive system capable of moving to the exact position to point to a given satellite on command. Such receiving dishes are cleverly designed with a mechanical linkage that follows the geometry of satellite location.

The communicating device in the satellite is the transponder capable of receiving at one carrier frequency (the uplink) and broadcasting at another (the downlink). Several transponders may be in a satellite, each covering a frequency band. The uplink signal is focused into a narrow beam pointing directly to the satellite. The downlink signal, however, is broadcast over a wide area known as the footprint. Power to operate the transponder is derived from solar cells.

The microwave signal from the satellite is relatively weak and requires large receiver gain. The receiving antenna (dish)

servicing commercial and home satellite systems is a way to break into the satellite business. Roger Betz is a young entrepreneur in New York's Long Island who is braving economic vagaries and staking his future on satellites. Six years ago he quit his job and went into telephone servicing. Before long he became interested in satellite communications and began to find customers who needed service on satellite receiving systems.

"I found that servicing satellite receiving systems is a profitable niche," Betz says. "The original dealer can supply service beyond warranty, but I can do additions and repairs on call." Betz finds that even in his area, which is well covered with ordinary TV cable, many people and businesses may have special requirements that are not satisfied by the cable companies, who primarily furnish consumer entertainment. One example is stock and commodity reports. Betz's firm also deals in complete system installations wherever a customer is in reaching distance.

In more elaborate installations, a video teleconference may be from a teleconference room. Less elaborate conferences are being held every day. Impromptu teleconferences may be held using a direct dialed number for facsimile and phone.

The idea of teleconferencing is not new. Technology has only made it more feasible. Before the days of television, conferences were held with only audio and telephone equipment and radio links, and the composite sounds were broadcast to a radio audience. The famous wartime broadcasts of Edward R. Murrow from London included a high frequency radio link. The static and fading of the transatlantic link gave drama to the sound of bombing and sirens. Now a telephone audio link for a teleconference can be established with any available noise-free dedicated line, or in a pinch even a common direct dial telephone call. Satellites provide telephone or audio and video linkage to all points on the earth, and video conference equipment is now offered by many domestic and foreign firms. Growth in satellite communication is certain. ■

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## PEOPLE

### Bag End Appoints Vitale; E-V Names Watson

#### Sales at Bag End

John Vitale has been named Sales Manager at Bag End Loudspeakers. Vitale joins Bag End after a management position at The Sound Post, a music store in Evanston, Ill.



Vitale

#### Engineering at Electro-Voice

Al Watson has been named Vice President of Engineering at Electro-Voice. Watson will be primarily responsible for the acoustic engineering effort of the companies in the Mark IV Audio Group, which includes Altec Lansing, Gauss, Vega, University Sound, Klark-Teknik, and Dynacord in addition to Electro-Voice. Watson will also be assisting President Paul McGuire in the strategic direction of Electro-Voice.

#### Richardson Appointments

Richardson Electronic's Security Systems Division has appointed Tom Brown as the division's National Sales Manager and Chuck Kuhfuss as District 6 Sales Manager. Brown will be responsible for directing sales throughout the United States. The regional sales offices will report to him. Kuhfuss will be responsible for sales covering Texas, Oklahoma, Arkansas, and Louisiana.



Brown



Kuhfuss

#### Blount at Dynair



Blount

Jesse Blount, Jr. has been named Vice President, Sales & Marketing of Dynair Electronics. He will be responsible for all corporate marketing and sales activities including marketing plan development, product management, sales management, and advertising. Blount has held senior executive positions at ITI Graphics Systems, Aurora Systems, Xerox, and Memorex and has been in private practice as a marketing consultant to the video, graphics, and display technology markets since 1987.

#### Burhans at Tannoy

Tannoy has appointed Jerry Burhans, President of marketing firm Burhans/Burhans, supervisor of the OEM sales of their new ICT transducers to major U.S. manufacturers. Burhans, a former Muzak affiliate president and founder of Sonacom, a St. Louis based audio contracting firm, will also oversee ICT industrial and contractor sales throughout the U.S.

#### Sales at Leasametric

Leasametric, an electronic equipment renting, leasing, sales, and service company, appointed Everett Harrington Vice President of Sales. Harrington joined Leasametric in 1988 as the Western Regional Sales Director.



Harrington

#### Scally at Odetics

Odetics Broadcast Division has appointed David Scally sales engineer for the south central U.S. Scally has worked in Odetics Broadcast Service Department since 1987. Prior to this, Scally spent 10 years working in the engineering departments of two television stations.

#### Wynkoop at NYNEX

NYNEX Mobile Communications has named Barry E. Wynkoop Vice President and General Manager of the company's New England region. Wynkoop has overall responsibility for NYNEX's operations in New England including engineering, network operations, customer service, finance, and sales. Wynkoop previously worked as General Manager of U.S. Sales for General Electric Company, where he developed its video teleconferencing business and later managed the Data and Mobile Systems product lines in North America.

#### Sales Rep at Fuji



Berke

Fuji Photo Film U.S.A., Inc. has named Bruce Berke Representative of Sales for the Professional Motion Picture Products Division. Berke is responsible for marketing Fuji's professional motion picture products nationwide to directors of photography, production executives, independent film makers and other industry executives.

#### Croce Markets Outline



Croce

Marcello Croce has been named Director of Marketing for Italian pro sound company, Outline. Croce will work on the development of marketing strategies for Outline, with an eye on the United European

Marketplace of 1992 while also taking responsibility for Outline's Sound Systems Design Department.

## CALENDAR

### Upcoming Events

#### OCTOBER

**Audio Engineering Society 91st Convention:** New York, NY: Contact: (212) 661-8528. October 4-8.

**CEDIA (Custom Electronic Design & Installation Association):** San Francisco, CA: Contact: (708) 598-4888. October 9-13.

**1991 International DJ Expo:** Lake Buena Vista, FL: Contact: (516) 767-2500. October 14-16.

**EIA Fall Conference:** San Diego, CA: Contact: (202) 457-4900. October 16-19.

**Syn-Aud-Con Seminar:** Norman, IN: Contact: (812) 995-8212. October 17-19.

**Comdex/Fall '91:** Las Vegas, NV: Contact: (617) 449-6600. October 21-25.

**SMPTE (Society of Motion Picture and Television Engineers):** Los Angeles, CA: Contact: (914) 761-1100. October 26-30.

**ISA/'91 (Instrument Society of America):** Anaheim, CA: Contact: (919) 549-8411. October 27-November 1.

#### NOVEMBER

**CyberArts International:** Pasadena, CA: Contact: (408) 446-1105. November 14-17.

**WESCON:** San Francisco, CA: Contact: (213) 772-2965. November 19-21.

#### DECEMBER

**American Society of Mechanical Engineers (ASME):** Atlanta, GA: Contact: (212) 705-7795. December 1-6.

**Image World Miami:** Miami, FL: Contact: (800) 800-KIPI. December 2-6.

#### JANUARY 1992

**Consumer Electronics Show:** Las Vegas, NV: Contact: (202) 457-4919. January 9-12.

**NAMM (National Association of Music Merchants):** Anaheim, CA: Contact: (619) 428-8001. January 17-19.

## Video Badging; Franchise on Wireless; Joint Videoconferencing

### Video Badging System

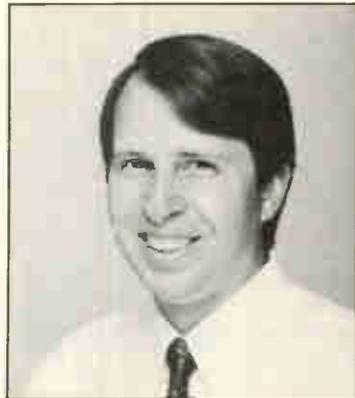
Data Link Information Solutions and Sony Security Systems have developed an electronic pass and security system. Data Link's electronic pass systems provide customers with the ability to issue temporary black and white visitor passes or permanent color badges. A typical single workstation consists of a PC, VGA color computer monitor, RGB color video camera, color video printer, and specialized video imaging computer boards. In addition to offering Data Link the ability to source all its current hardware needs, Sony is also strong in technologies which may emerge as increasingly important in the future of badging applications, such as the Mavica line of still image cameras and transmission systems such as the Digital Information Handler.

### Vega Forms Video Franchise

Vega has announced the availability of a special dealer franchise for video. According to Gary Stanfill, president of Vega, "The need for wireless equipment in the video industry is growing rapidly — about 25 percent annually." Vega is developing products intended especially for this market, including the new VX-20 portable system.

### Videoconferencing Agreement

GPT Video Systems and Todd Communications have joined forces in a distribution agreement. Under the agreement, Todd will distribute GPT's full range of System 261 Videoconferencing products which adhere to the CCITT H.261 recommendation. System integration, installation, maintenance and customer service will, according to the company, be integral to enhancing GPT's service and distribution opportunities in the U.S. The British GPT's U.S. general manager, Thomas Gove, said, "The impressive background and stability of Todd . . . provides a technological advantage to customers when purchasing videoconferencing systems." Tom Uppman, vice president of Todd Communications, indicated that his company's commitment to GPT Video Systems is in response to GPT's long-term commitment to developing a complete video communications product portfolio based on new worldwide standards. "We are proud to recommend to our customers a videoconferencing solution which is as technologically advanced in terms of sophistication and quality, as it is simple and economical to use," said Uppman.



Frank E. Ostrander

### Ostrander at Renkus-Heinz

Harro Heinz, president of Renkus-Heinz, has announced that the "company's reorganization of its research and development staff" has been completed with the appointment of Frank E. Ostrander as chief engineer. Ostrander is responsible for overseeing the company's research and development efforts in both acoustic and electronic products.



John Bolstetter

### Bolstetter Named VP

John Bolstetter has been named a vice president of Mark IV Audio, Inc., primarily responsible for coordinating and assisting in the management of timely financial reporting for all of the companies in the Mark IV Audio group. Bolstetter also will be assisting Mark IV Audio president Robert Pabst with "other financial and operational projects." Bolstetter joined Mark IV Industries as division controller for Protective Closures Companies, Inc. in 1983, and most recently served as group controller for Mark IV Industries, Inc.

### Tavcom Distributes Gyyr

Gyyr has named Tavcom Ltd. as the company's exclusive European sales agent, "underscoring Gyyr's commitment to the European closed circuit video equipment security market," according to the company. Headquartered in Denmeat Hants, England, Tavcom provides sales and support for all of Gyyr's export products, including time lapse video recorders, quads and CCVE accessories.

### Comcast Appoints Darvassy

Nicholas E. Darvassy has been appointed general manager of the financial products division of Comcast Sound Communications in New York. He will be responsible for the marketing, administration and engineering functions of Comcast's voice trading systems. The announcement was made by company president F. Jerome Purcell. Comcast Sound claims the largest independent network of Muzak franchises and "the nation's largest independent sound contractor."

### ICA Elects New Board Members

The International Communications Association has elected four new members to serve on its Board of Directors: E.W. Bender, Dennis Krysmalski, Paul Martin and Michael L. Doyle.

Michael J. Kilbane has been elected President of the International Communications Association. Kilbane is General Manager of Systems Development for Diamond Shamrock. ICA is a non-profit league of over 700 corporations, governments and universities worldwide which are major users of data, voice, and video equipment and services.

### Club Installations

Electro-Voice concert speaker systems have been installed in a number of major nightclubs, according to the company. The Ritz in Manhattan has an installation by Applied Audio which consists of a combination of MT and DML systems, used for both live and house music. The new system was part of a major renovation. Applied Audio has also installed MT and DML systems in the Ocean Club in Rochester, as well as a new ClubLand in Worcester, Massachusetts.

### Interior Design Legislation

Texas Governor Ann Richards has signed into law legislation regulating interior

designers. The new law brings to 14 the number of jurisdictions that regulate the standards and qualifications of the professional interior designer. The adoption of the bill caps a seven year effort led by the Texas Association of Interior Design. Under the new law, the title "interior designer" may be used only by those who are registered or exempted by the State of Texas. Registration requirements include a combination of six years of education and experience and passage of a registration examination.



### Compact Video Imaging Terminal

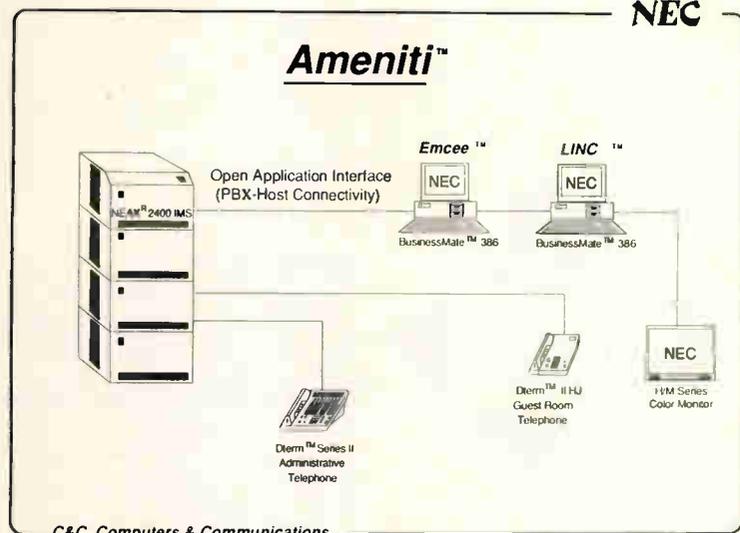
Harris has unveiled a new compact handheld video imaging transmission system, which can be used to capture, process and transmit high resolution color or monochrome images, text and graphics, via narrowband radio and telephone channels. The lightweight terminal is designed for use in harsh tactical environments, and is suited for reconnaissance, surveillance and intelligence operations, according to the company. It is part of the Harris Digital Video Imaging Transmission Systems.

### Clippings Service

Max Kay Public Relations, which represents several companies in the professional audio and musical instrument fields, has extended the availability of its international press clippings service. The service is now offered to all musical instrument and professional audio equipment manufacturers, regardless of their affiliation with Max Kay PR. Prices start at \$250.

NEC

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### NEC Introduces Hospitality Products

NEC America has introduced several products for the hospitality industry. Ameniti is an integrated hospitality system combining an array of products with three core components: the NEAX 2400 Information Management System, a PBX, Emcee, a new system with specialized applications for the lodging industry, and LINC, a guest room entertainment/information system developed by Image Stream Communications. Guest services applications available through Emcee include the hotel messaging system from the television or voice mail. Enhanced software for the NEAX 2400 supports up to 8,000 rooms. NEC and Image Stream have signed a joint development agreement to develop new applications for the hospitality industry. The applications reside on NEC's 386 personal computer platform and use NEC's Open Application Interface technology. Each LINC room terminal communicates with a LINC Room Management System via a modem that transmits video and data signals to the room terminal through the hotel's own RF cable system.

### Decline in Construction

According to the International Council of Shopping Centers, a tightening of available credit on the part of banks caused much of a 33 percent decline in shopping center construction starts in the U.S. last year. The decline also accounted for a decrease in shopping center construction employment — 95,600 in 1990 compared to 123,000 in 1989, and in contract awards, down to \$5.8 billion from \$7.4 billion one year earlier. However, ICSC reports the highest increase ever in shopping center renovations and expansions — up 35 percent from a year prior. According to ICSC, there were 36,650 shopping centers in the U.S. at the end of 1990, generating \$723.3 billion in retail sales, an all-time high.

### Pioneer Appoints to Display Division

Pioneer Communications of America has appointed Leonard Blascovich director, display systems division, reporting to Pete Imamura, president. Prior to joining Pioneer, Blascovich was the vice president and director of Information Display Systems Division of SAIC, responsible for Eidophore large screen television projectors and systems. In addition, Tom Muniz has joined Pioneer's display Systems Division as national sales manager. Muniz was with MallVision, the joint venture between Pioneer, United Artists Entertainment and United International Holdings; and before that was a sales manager for Electrosonic Systems in the Videowall Display Division.

Pioneer has introduced the RM-V2000 Projection CUBE System, with cubes measuring 40 inches diagonally and stackable and linkable to form a giant screen. The new product has "almost zero reflection, and the industry's first use of Auto White Balance in a multivision system."

### Ampex Recording Reorganizes

Ampex Recording Media Corporation is undergoing a reorganization "aimed at increasing productivity while continuing heavy investments in new recording format technologies." The company has eliminated 250 positions worldwide. R&D and manufacturing engineering have been consolidated. According to company president Thomas J. Wheeler, "In the face of prolonged recessionary pressures . . . Ampex must continue to invest heavily in new format technologies and accelerate deliveries of new metal particle cassette products in the near term." In 1992 the company expects to unveil a tape for the new component digital recording format it has recently announced. Earlier this year, Ampex opened a \$17.5 million metal particle coating line.

### NHCA Criticizes OSHA

According to the National Hearing Conservation Association, the new Occupational Safety and Health Administration criterion for recording hearing loss "flies in the face of the recommendations of every competent professional organization in the field." The NHCA claims that the OSHA directive requiring recording of shifts in hearing levels averaging 25 dB or more could ignore progressive noise-induced hearing loss which never reached the 25 dB trigger level. NHCA says that recording a work-related average hearing change of 10 dB is more in keeping with the present noise standard and is more protective of workers.

### University of Utah Media Services

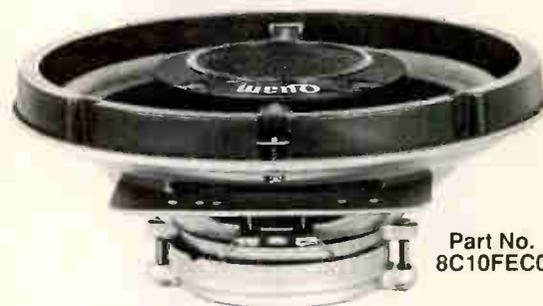
The Eccles Broadcast Center has been constructed to bring together media services for the University of Utah. The Broadcast Center houses a public televi-

sion station, public radio station, the State Educational Telecommunication Operations Center, and the administrative office. Architects for the 63,000 square foot center were Babcock Design Group of Salt Lake City and Rees Associates of Oklahoma City. Acoustical design consultants Russ Berger Design Group of Dallas oversaw the architectural acoustics and technical facility design. The facility includes a 3,500 square foot television studio, audio post production suite, open plan vtr/rack room, control rooms, production rooms, and administrative spaces.

### Gentner Public Offering

Gentner Electronics Corporation has reported that it expects to undertake a public offering of its securities. The offering is expected to be for approximately \$3,000,000 and to consist of units of common stock and warrants. The company's stock has been publicly traded since 1985.

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Circle 282 on Reader Response Card



### Multi-Play CD and CD/Laserdisc

Pioneer Electronics has introduced the PD-TM1, a three-magazine, multi-play CD changer designed for continuous play of up to 18 discs. Pioneer's one-bit direct linear conversion system is incorporated in the unit. The consumer model retails for \$510. Features include "last address play" with fade-in, which allows listeners to begin disc playback from the last track played. In addition, the company has introduced a multi-play and single-play auto-reverse cassette changer to the consumer market. The CT-WM77R is designed to accommodate six cassettes in deck one, and one cassette in deck two. The unit provides relay play, all rewind, and a timer relay function for automatic playback of the

has been under development for some time to implement the planned year-long testing effort at the Advanced Television Test Center. The goal of the effort is to help the FCC set the new standard by June 1993. Six ATV systems are scheduled for testing, including ACTV by David Sarnoff Research Center; Narrow MUSE by NHK, DigiCipher by General Instrument Corporation; DSC-HDTV by Zenith Electronics and AT&T; ADTV by Philips; and ATVA by MIT.



Hyman Stansky

### Stansky Joins Freed International

Hyman Stansky has been appointed to the sales force of Freed International, according to Jerry Freed. Hyman's responsibilities cover the eastern U.S., Europe and South Africa, as account executive. He is a professional musician with ten years of sales management experience.



six tapes. For audio and video multiplay, the company has introduced the CLD-M90 five-CD/LaserDisc combination player. Using a 12-inch unified tray to store and play up to five CDs, the CLD-M90 additionally allows users to play a LaserDisc, without removing the loaded CDs, for undelayed video source playback. Pioneer's proprietary CD transport mechanism lifts selected CDs from the outer loading configuration and then uses a rotating arm to relocate the discs to a central tray position for playback. A CLV scan mode allows users to scan a picture while listening to a muted audio track offering one second sound bites.

### No Opposition to Interactive TV

The National Association of Broadcasters has announced that it won't oppose a new interactive TV service, but asked the Federal Communications Commission to take steps to prevent any interference the new service may cause to adjacent TV channel 13. TV Answer is a wireless, interactive video data service that proposes to use the nation's airwaves to offer viewers home shopping, banking, and educational services off the home TV screen. The service works using a handheld remote and menu-driven system, allowing viewers to interact with TV programming without picking up the phone. In its comments to the FCC, the broadcasters noted substantial developmental progress by TV Answer, but said many technical details need to be ironed out.

### Advanced Television Testing

The official testing of advanced television transmission systems vying to become the "high definition" television broadcast standard officially began this summer. Special apparatus designed for the testing



### Dolby Demos Digital Film Sound

Dolby Laboratories has demonstrated publicly for the first time its compatible digital 35 mm print format, Dolby Stereo SR-D. The multisound format provides both six-channel digital and four-channel analog optical soundtracks on the same print. SR-D prints will be playable in virtually any theater, as the new digital track does not affect the picture or normal analog soundtrack areas on the film. Release prints and theater equipment to play the digital soundtrack will be commercially available in 1992.

### Echelon Distribution

Echelon Corporation has completed the initial phase of its international distribution strategy. In addition to distribution in the United States through its "strategic business partners" Motorola Inc. and Toshiba Corp., Echelon has signed distribution agreements with Motorola and independent distributors in major European markets in Japan. Echelon's product consists of low-cost, intelligent distributed control technology and tools and components that allow products from different manufacturers to communicate and work together. Echelon's international distributors are selling the Lonbuilder Developer's Workbench, a set of tools supporting the design and development of Lonworks-based products.

### Mark IV Installs Global Network

The global group of Mark IV Audio companies has begun implementing a computer network system between each of its companies as well as branch facilities. The first step in the project has been to link via modem and dedicated telephone lines

all of the U.S. facilities to the corporate computers of Altec Lansing in Oklahoma and Electro-Voice in Michigan. Computers at each facility had to be altered and updated. Mark IV Audio is made up of Electro-Voice, Altec Lansing, University Sound, Gauss, Vega, Dynacord and Klark-Teknik, all essentially autonomous, independent companies owned by parent company Mark IV Industries. The companies, with more than 2,200 employees worldwide, are governed by a board made up of the presidents of each company and Mark IV Audio executives. Although each company remains independent, they share some common distribution channels, technology, and manufacturing facilities for some product lines.

### Truevision and Entropy Joint Product

Truevision, Inc. and Entropy Engineering have agreed to include an introductory copy of Video Titler with each Truevision VideoVGA videographics display card. Available immediately, the bundling agreement is automatic for all VideoVGA purchases. Priced at \$995, VideoVGA provides simultaneous output of a non-interlaced VGA signal and a recordable NTSC video signal, while Video Titler produces high quality titles and smooth transitions. Combined, the products can be used to add moving text and graphics to desktop presentations or video productions and then record the productions onto videotape. According to the companies, "Truevision and Entropy Engineering now provide a solution that turns common AT-compatible computers into powerful character generation workstations."

### Tektronix Introduces Video Out System

Tektronix has announced a video board system that provides studio quality video output in an array of digital and analog formats for Silicon Graphics workstations. The Avanzar Video System includes an integrated set of software tools designed to improve video quality and save time throughout the animation development process. The system is the first in a family of video systems from Tektronix's recently formed Video Products Operation. The 6U video board uses propriety signal processing technology from Tektronix's wholly owned Grass Valley Group.

### Moon Forms Company

Phil Moon, former marketing manager for Yamaha Corporation of America, has launched two new companies to serve the marketing needs of the music and professional audio businesses. Loft Marketing and Loft Market Research are operating out of Stanton, California. Loft Marketing is a network of independent advertising, public relations, design, marketing and training professionals. Loft Market Research conducts research including dealer and consumer surveys, focus groups and competitive analysis.

### Video Awards

The International Teleproduction Society presented Special Monitor Awards for Excellence in Engineering Achievement to Abekas Video Systems and Sony Corporation. Abekas won for the Abekas A84, a multi-layer component digital post production switcher with optional embedded digital disk cache recorders. Sony won for the Sony Serial Digital Interface Chip Set, five devices which provide capability for a simple interconnection system for equipment requiring digital video and audio inputs and outputs.

### REP NEWS



Left to right: Al Hershner, Bob Gilbert of Shure; Terry Richardson, Pro Tech principal; S.N. Shure; Pro Tech principal Richard Hansen and office manager Dalene Rudy; James Kogen and Lottie Morgan of Shure.

### Shure Honors Pro Tech

Shure Brothers has named Pro Tech Marketing Sales Representative of the Year. Pro Tech, based in Salt Lake City, covers Shure's Rocky Mountain territory. Pro Tech was granted the award for the second year in a row, based on superior sales performance, outstanding customer service, and consistent communication with the factory.

is a tribute not only to sales performance, but their commitment to high standards of professionalism and dedication to the audio industry," said Garry Templin, E-V national sales manager.

### Wilson Rep of the Year

Wilson Audio Sales, based in Nashville, has been named the 1991 Electro-Voice Rep Firm of the Year. It marks the third time Wilson Audio has won the award. Wilson Audio, owned by Wally Wilson, has branch offices in Sevierville, Tennessee, and Sheffield, Alabama. Serving Tennessee and other southern states, the firm has served as an E-V rep for nearly a decade. "This award is a reflection of the overall excellence of Wilson Audio. It

### Design Factors Appoints Straus

Geoff Keleher, president of Design Factors, has announced the appointment of Emory Straus as Director of Technical Services. Design Factors is the manufacturers rep firm covering southern California, southern Nevada and Hawaii. According to Keleher, "Emory comes with nearly 20 years experience encompassing almost every facet of our industry. He's a natural to interface with our consulting community as well as the pro audio people and contractors who have to deal with the cutting edge of our industry's technology on a daily basis."

## PRODUCTS

### Soundcraft Consoles; Shure Wireless



#### Mixer Amplifier

Peavey Electronics Architectural Acoustics Division has announced the A/A Series WMA 65 and WMA 150 wall-mountable mixer amplifiers with eight separate input channels. Each channel provides a level control and the master output section features audio compression and 9-band graphic EQ.

Circle 2 on Reader Response Card

#### Wireless Transmitter

Shure Brothers has announced the new L11 Body-Pack Wireless Transmitter, which features a surface-mount circuitry design, a low noise preamplifier stage for quiet operation, durable 1/4-wave trailing antenna, noiseless microphone mute switch, adjustable 40dB input sensitivity range control, and special shielding for increased protection from audio/RF interaction.

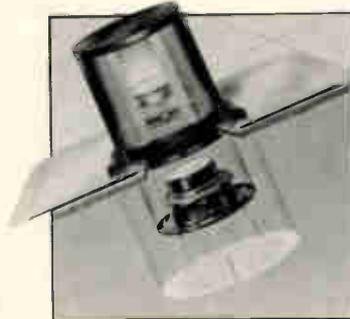
Circle 1 on Reader Response Card

#### Consoles and Mixers Galore

Soundcraft has introduced four new products. The Europa is a live reinforcement console with frame sizes ranging up to 40 inputs, each size standard with four band parametric EQ, integrated noise gate, eight VCA subgroups and eight mute groups. Sapphire is an in-line recording and post production console available in 20, 28, 36, or 44 sizes each with 6 stereo effect returns. Spirit incorporates two distinct lines: Spirit Studio for multitrack

recording and Spirit Live for sound reinforcement applications. The Delta Monitor is designed as a 12 bus stage monitor mixer with up to 400 inputs.

Circle 3 on Reader Response Card



#### Loudspeakers

Atlas/Soundolier has announced pre-assembled 6-inch diameter loudspeakers. The Strategy Series combines coaxial and full-range loudspeakers, acoustically matched enclosures, choice of line performers, four grilles with hardware-free appearance and accessories. The 50 watt coaxial model FAI36 includes a weather-resistant Kevlar reinforced polypropylene woofer, Norsorex rubber surround, and post-mounted dome tweeter with mylar diaphragm and ferrofluid-cooled voice coil. The 25 watt model FAI16 combines a formed paper cone, weather-protective polyether foam surround, and whizzer to produce a response range of 90Hz to 20kHz.

Circle 4 on Reader Response Card



#### Dual-Trace Scope

B&K Precision has introduced the Model 1443, a 40 MHz battery/dc/ac-powered dual-trace scope with cursors and readouts for voltage, time and frequency measurements. On-screen readouts for the vertical axis are CH1 and CH2 volts per division, DUAL, ADD, UNCAL, and INV. Readouts along the horizontal axis include Time/Div., UNCAL and X10 Mag.

Circle 5 on Reader Response Card

#### Programmable Equalizers

Oxmoor has introduced the DEQ-I and DEQ-II High Resolution Programmable Equalizers, which support the PA-22 communication interface. The DEQ-II may be programmed via front panel controls, a personal computer or a controller system through the PA-422 interface. Each model offers a parallel port to access any 1 of 8 equalization preset curves. The port also provides a tally for each preset curve, a system mute input, and DC power output for control logic or indicators.

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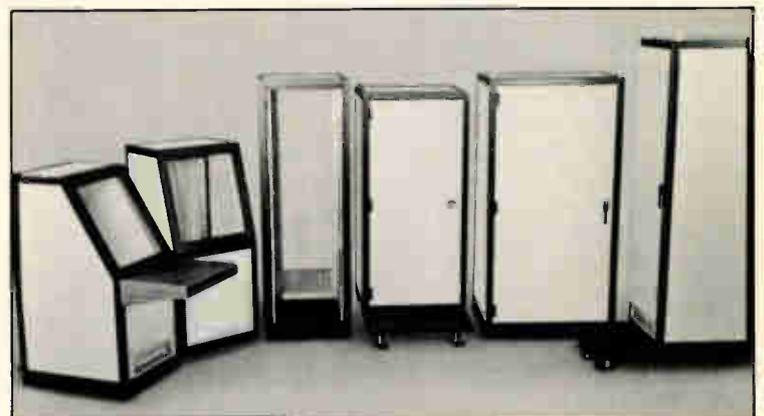
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Circle 284 on Reader Response Card



#### Enclosure Frame

Equipto Electronics has announced a frame on its Heavy Duty line of enclosures which offers a double ledge, double pane frame construction. Using the frame as

a starting point, the company's engineers will custom modify to meet the exact specifications of their customers.

Circle 7 on Reader Response Card

# Have your cake...

You can have it both ways with System One.

Most audio test sets fall into one of two categories...

There are the specialty testers, like tape recorder test sets, video/audio monitors or pricey short interval test systems. Then there are conventional general purpose audio testers, which can do basic testing but lack the capability to fill today's specialized testing needs.

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World Radio History  
Circle 224 on Reader Response Card



### Loudspeakers

JBL's MR series is their newest line of sound reinforcement loudspeaker systems. They are designed for performing musicians, DJs and other audio applications. There are ten different models, ranging from the MR-838 18 inch three-way system to the MR802 12 inch two-way stage monitor system.

Circle 8 on Reader Response Card

### Fire Alarm Subsystem

Notifier has introduced the VAM2020 Series Audio Subsystem, which functions as a part of the AM2020 Fire Alarm Control Panel. These controls provide the fire fighter with a fully featured, manually controlled audio evacuation system for use in emergency situations.

Circle 9 on Reader Response Card



### Infrared Control Tie-In

FSR, Inc. has introduced the Tapemate, which can tie any infrared-controlled deck into a control system. An infrared trainer that will readily learn the code of the tape deck's remote transmitter is built in. The audio is handled by boosting and transformer-coupling the output.

Circle 10 on Reader Response Card



### Added Bass

OAP has introduced the LF-118, a single transducer version of their TR-218. The LF-118 is used when additional bass response is needed. Its applications include sound reinforcement, music playback systems, and monitoring of the low frequencies of musical instruments.

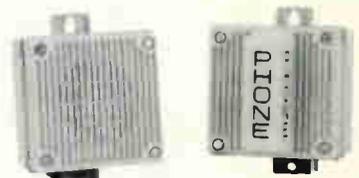
Circle 13 on Reader Response Card



### Video Distribution Amplifiers

Burle Industries has introduced the TC8231 Single Channel and the TC8234 Four Channel Video Distribution Amplifiers with the added capability of providing a relay contact closure output in the event of loss of composite video signal. This video loss indicator feature can be used to alert an operator if the video signal is lost on the input line.

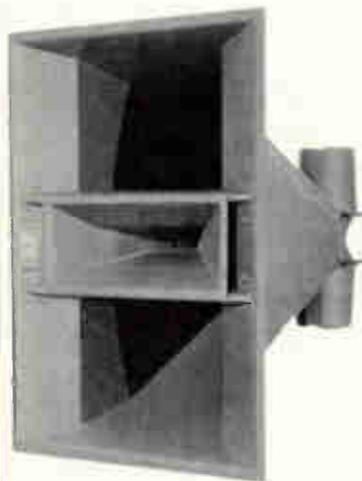
Circle 11 on Reader Response Card



### High-Output Horns

Wheelock has introduced Tellhorns that feature a loud (105 to 110 dB) sound output and a choice of two audible sounds (horn and warble). The Tellhorns are for use in noisy locations or large areas.

Circle 14 on Reader Response Card



### Horn-and-Driver System

Electro-Voice has introduced the MH6040 wide-range horn-and-driver system combining constant directivity and Manifold Technology. The MH6040 is designed to cover a frequency range of 100-4,000 Hz with a 60 degree x 40 degree coverage pattern and is equipped with two E-V DL10XWP drivers mounted in a manifold configuration.

Circle 12 on Reader Response Card

### Wireless Microphone Systems

Clarity has introduced a new line VHF Wireless Microphone Systems. Each system consists of a receiver operating in the VHF band between 170-217 megahertz and a choice of three transmitters: Hand-held, Lavalier Bodypack, and Instrument Bodypack.

Circle 15 on Reader Response Card



## "Notes on Product Check."

### Clubs and Discos

Our Product Check editors went to find out how the nightclub and disco market is faring. Here is what some of your colleagues brought to our attention.

### The Economy

"People are tired of being poor; they'd rather be poor and spending money."

"Even in a recession entertainment is always a priority."

"When people are down and out they will still find a way to entertain themselves."

"In bad times people still go out and raise hell."

### The Regions:

One view from Denver is that major clubs are struggling; they generally have a six-month life span. There's more growth with "underground" clubs, two to four-hundred person capacity; theirs is a deliberate market niche. For a moderate-sized club, it's still a tough market.

St. Louis is "pretty conservative" with a new disco opening up once every two years. Although it's generally a laid-back town, the past half year has seen this smaller market open up.

In Michigan it was reported that contracting business was slow the past six

months, owing to a combination of factors; a new governor and the dip in automotive industry sales (the lowest in a decade).

Minneapolis's club market has been slow for almost a year now, with most of the growth primarily in hospitality (social clubs) being built on themes; sports bars, karaoke and limited dance space.

Things are picking up in Oklahoma where even the church market had slowed down.

While other parts of the country are starting to experience recovery (most notably parts of California and New England), Las Vegas is currently hitting a lag.

One contractor in Los Angeles who deals primarily with showrooms and discos in hotels and larger venues, sees a slowdown in lending by the more conservative banks to clubs and casinos.

In SW Fla., there is very little sign of any recession "... business is booming."

From the Pacific NW — As the economy improves in the East, the West is starting to feel the recession and lag behind.

And the report from Ohio is that people try to save money and turn to "band-aids" (re-conditioning) or go to music stores, "... they're buying cheaper stuff and sacrificing quality."

Liz Krumenacker

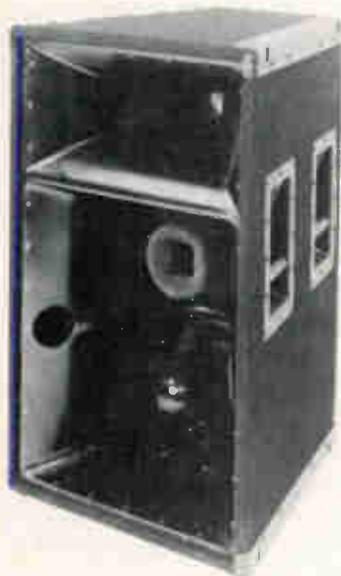
See page 78 for "Product Check."



### Rack Assemblies

Zero Stantron's Enclosures Division has introduced a line of steel vertical rack assemblies specifically designed for Panasonic and Sony high speed professional recorders. The new Duplicator Rack Series is available in two standard configurations and will hold either 16 or 24 recorders. Both rack assemblies include eight sliding shelves, two plug molds and one pair of adaptor rails.

Circle 16 on Reader Response Card



### Signal-Aligned Loudspeaker

Community Light & Sound has introduced the RS660 loudspeaker. Each of the RS660's drivers is mechanically signal-aligned with the aid of a fiberglass molding. At the low end in the three-way system, twin 10-inch ferrofluid cooled woofers handle signals up to 650 Hz. Midrange frequencies are routed to a two-inch M200 compression driver. Above 3 kHz signals are directed to the high end transducer.

Circle 17 on Reader Response Card

### Ferrofluids

Ferrofluidics Corporation has introduced two new ferrofluids. APG 027 for woofers is designed to eliminate the splash and thermal restrictions in woofer applications. APG 017 for full range speakers is designed to provide heat transfer and the damping of the resonance peak.

Circle 18 on Reader Response Card



### Microphone

Crown has introduced the CM-230 tri-dundant microphone which is equipped with three matched supercardioid microphone. The CM-230's microphone capsules work in conjunction with an interface equipped with three transformer-isolated outputs. The typical frequency response of the CM-230 ranges from 80 Hz to 15,000 Hz.

Circle 19 on Reader Response Card



### Distribution Amplifier

ESE has introduced the ES-237 high resolution (120 MHz) distribution amplifier. This 1 x 4 amp can be used for many video requirements, including graphics, medical imaging, HDTV and composite video. It provides a loop-thru input and four isolated outputs, all of which are BNC connectors.

Circle 20 on Reader Response Card

## Have you seen the "STEALTH" Baffle?

Probably not! The new "Stealth" baffle from Fourjay is so inconspicuous you may never notice it. The 11" round, flush mount baffle has 25% less surface area than competitive units and the "Stealth's" low profile and specially textured, non-glare coating blend perfectly with ceiling materials.

The "Stealth's" design and construction meet U.L. 1480 ceiling baffle requirements. You can choose either phillips head speaker mounting screws or pre-set studs with push-on nuts which slash installation time. Also available with factory assembled speakers and transformers, the "Stealth" baffle is fully compatible with all Fourjay 8" mounting systems including the Plenum Connection.

So if you would like to see the baffle that escapes observation, just give us a call. We'll be glad to show you what you've been missing.

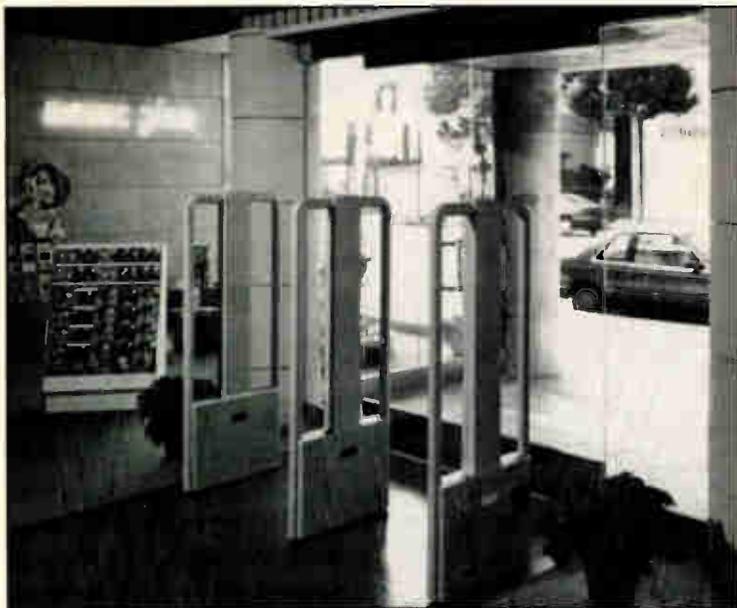
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Circle 253 on Reader Response Card



### Security Tags

3M has introduced the Shoplifting Control Program which is designed to prevent theft at record stores. The QuadraTag is a combination of a security tag and a price tag, which is difficult to remove without damaging the packaging. The QuadraTag security markers are read by the new Model 3300 Detection System.

*Circle 21 on Reader Response Card*

### Ceiling Microphone

The CM-3 from TSI is a general purpose, boundary-type microphone. Its single-gang wallplate mounting is designed for installation into a one-gang utility box or a switchbox. Its uses include teleconferencing systems, security systems, and conference room monitoring. It has a sensitivity of 5.5 mV/94 spl.

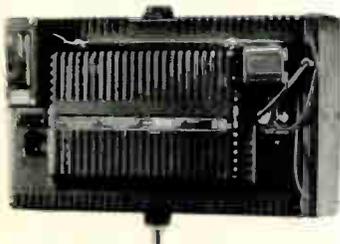
*Circle 22 on Reader Response Card*

### Infrared Listening System

Sennheiser has announced a system of infrared listening equipment for use in theaters, cinemas, auditoriums, houses of worship and other large public facilities.

The S-7 system consists of a transmitter, model SI 460, and the model SZ1 1219 high power emitter. These components send monaural audio signals via infrared beam to listeners wearing wireless headsets. Also introduced is the AudioLink PLS-100, a new headset designed for use with the S-7.

*Circle 23 on Reader Response Card*



### Microphone Preamp

Australian-based Avalon Design has introduced the M2 microphone preamplifier. The M2 uses the Avalon 2022 hybrid-cell. This incorporates two fully discrete, high voltage, symmetrical pure class A signal amplifiers. The twin amplifiers share the total gain requirement.

*Circle 24 on Reader Response Card*



### Fibeoptic Transmission

Math Associates has announced two new RS-232 related fiberoptic transmission systems. The first is the XRD-7040, a small plug-in link that will transmit full duplex RS-232 compatible signals as well as two additional full duplex handshake signals.

The second system consists of the XRD-7080 and XRD-7082, a family of RS-232 Multiplexers. The XRD-7080 will transmit eight full duplex data channels and eight companion handshake channels or 16 full duplex data channels without the handshake signals on a pair of optical fibers. The XRD-7082 is the same, but with a capacity of 16 data channels with handshake signals or 32 without them.

*Circle 25 on Reader Response Card*



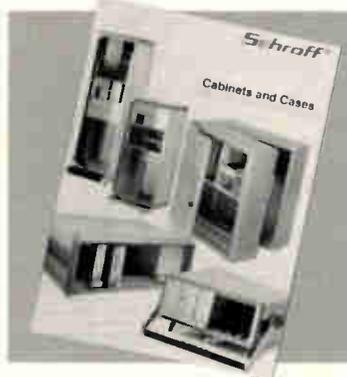
## LITERATURE

### Pearson's Report; Schroff Cases

#### Fiberoptic Connectors

Pearson Technologies has introduced a report called "How to Specify and Choose Fiber Optic Connectors." The report consists of 12 sections and five appendices. The first section is a basic introduction to the terminology of connectors. The second section describes the three methods for determination of optical performance. The third through twelfth sections are overviews by: application, general type, number of fibers, materials of construction, methods of installation, type of fiber, materials of fiber, optical performance, mechanical and environmental performance, and manufacturer.

*Circle 26 on Reader Response Card*



#### Electronic Enclosures

Schroff Inc. has released a new Cabinet and Case Catalog featuring its standard electronic enclosures that can be shipped assembled from stock. The 44-page brochure contains information regarding construction, physical dimensions, and ordering information.

*Circle 27 on Reader Response Card*

#### Remote Maintenance Solution

An integrated DS1 remote maintenance solution is described in a new data sheet from Wiltron Company. The High Capacity Test Unit, Model 9967 has test capabilities that include T1 span fault location and two monitoring capabilities, scanning or advanced full-time performance monitoring.

*Circle 28 on Reader Response Card*

#### Modular Structures

A brochure from Bally Engineered Structures describes the company's pre-engineered modular structures. The structures protect equipment in varied applications providing control of the indoor environment.

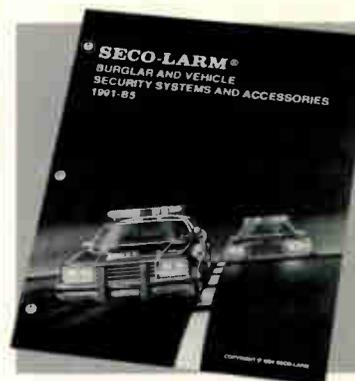
*Circle 29 on Reader Response Card*



#### Electronic Test Instruments

Bel Merit Corp. has released a catalog detailing their line of electronic test instruments including: digital and analog multimeters, function generators, frequency counters, ac/dc power supplies.

*Circle 30 on Reader Response Card*



#### Security Systems

Seco-Larm has released their fourth quarter '91 catalog which contains information on their line of commercial, residential and vehicle security systems and accessories. Entries include product descriptions and photographs as well as some connection diagrams and comparison charts.

*Circle 31 on Reader Response Card*

#### Data Storage

A new series of books devoted to the data storage industry have been announced by ASME Press. The inaugural volume, Advances In Information Storage, Volume I, includes 22 articles from engineers and research scientists. Topics covered include: surface finishing, friction, lubrication, heat transfer, belt tracking, and vibration and wear.

*Circle 32 on Reader Response Card*

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### Engineering

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*Growth in our engineering and design areas has opportunities for detail-oriented self-starters. Positions for Engineers require knowledge of manufacturing materials and processes in product lines related to work area. Minimal travel is required for all openings.*

**Design Engineer** - We seek a professional with 5+ years experience who works well with minimal supervision. A BSEE/BSME or equivalent experience in cone speaker driver design and background in design software are required. System design experience is desirable.

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# PRODUCT CHECK: CLUBS AND DISCOS

Products used most frequently in clubs and disco installations . . .

## ... NOW IN PROGRESS

**PRODUCTS**

- Speakers
- Subwoofers
- Power Amps
- Audio Tape Players
- Microphones
- Portable Consoles
- Racks
- CD Players
- Video
- Signal Processors
- Mixers
- Lights
- Power Conditioning
- Phonograph Cartridges

### FIRST PLACE

JBL  
ELECTRO-VOICE  
CROWN  
NAKAMICHI  
SHURE  
YAMAHA  
ATLAS/SOUNDOLIER  
TECHNICS  
SONY  
RANE  
NUMARK  
AMERICAN D.J.  
FURMAN  
STANTON

### SECOND PLACE

ELECTRO-VOICE  
JBL  
QSC  
TECHNICS  
ELECTRO-VOICE  
NUMARK  
CALZONE  
NUMARK  
ZENITH  
YAMAHA  
YAMAHA  
ETA  
TRIPP LITE  
SHURE

### THIRD PLACE

EAW  
EAW  
ALTEC LANSING  
SONY  
AUDIO-TECHNICA  
TOA  
PREMIER/STAR CASE\*  
YAMAHA  
MITSUBISHI/PANASONIC\*  
FURMAN  
UREI  
TRACOMAN  
ONE POWER (JUICE GOOSE)  
TECHNICS/AUDIO-TECHNICA\*

\* indicates tie

## ... IN LAST SIX MONTHS

**PRODUCTS**

- Speakers
- Subwoofers
- Power Amps
- Audio Tape Players
- Microphones
- Portable Consoles
- Racks
- CD Players
- Video
- Signal Processors
- Mixers
- Lights
- Power Conditioning
- Phonograph Cartridges

### FIRST PLACE

ELECTRO-VOICE  
JBL  
CROWN  
NAKAMICHI  
SHURE  
NUMARK  
ATLAS/SOUNDOLIER  
NUMARK  
SONY/PANASONIC\*  
RANE  
NUMARK  
AMERICAN D.J.  
FURMAN/TRIPP LITE\*  
STANTON

### SECOND PLACE

JBL  
ELECTRO-VOICE  
QSC  
TASCAM  
ELECTRO-VOICE  
SOUNDCRAFT  
CALZONE  
TECHNICS  
MITSUBISHI  
YAMAHA  
RANE  
ETA  
ONE POWER (JUICE GOOSE)  
SHURE

### THIRD PLACE

BOSE/SOUNDOLIER\*  
EAW/BOSE\*  
CREST  
TECHNICS  
AUDIO-TECHNICA  
RANE/YAMAHA\*  
H.O.M.E.  
SONY  
SHARP  
DBX/FURMAN\*  
BIAMP  
NESS  
LEVITON/B.E.S.T.\*  
TECHNICS/AUDIO-TECHNICA\*

\* indicates tie

See page 72 for "Notes on Product Check."

## 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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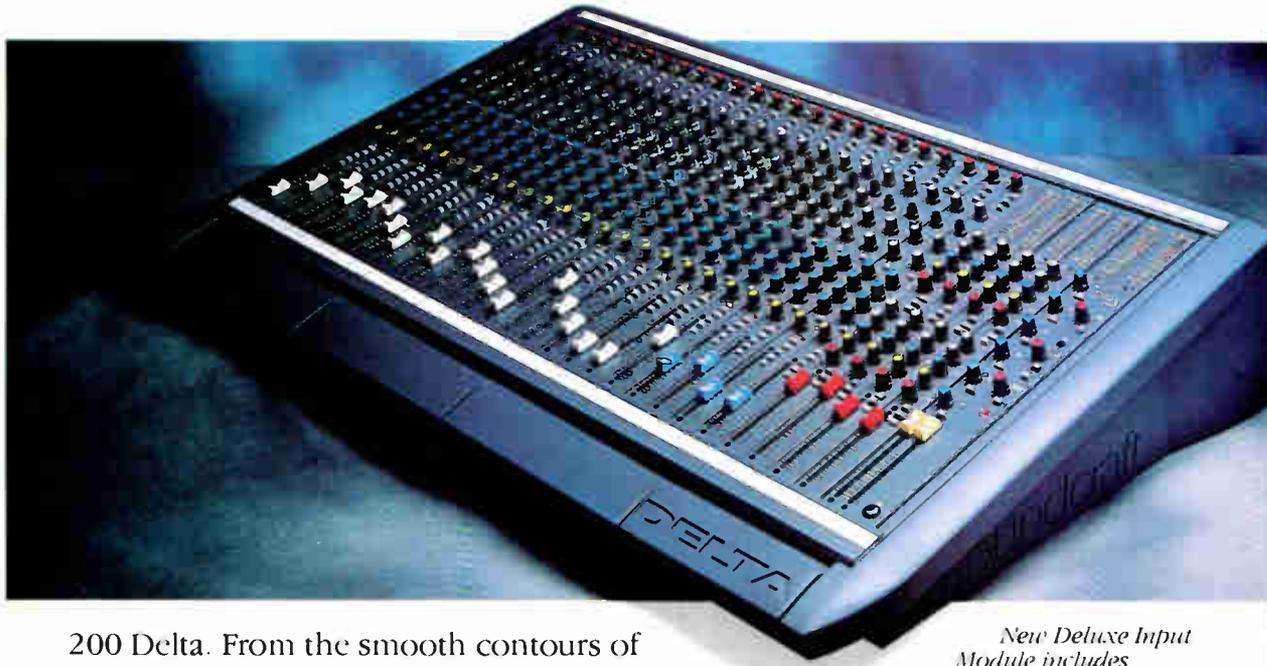


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