

SOUND COMMUNICATIONS

Volume 37 Number 11

November 28, 1991

LAW SCHOOL SOUND

The City University of New York's law school auditorium had an intelligibility problem — and not a lot of bucks to fix it. After four false starts, Monte Bros. was called in to a job that couldn't be done; which they proceeded to do quickly and under budget.

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LINKING UNIVERSITIES

Spanning 400 miles, an electronic communications link in North Carolina joins eight universities, four medical schools and the Research Triangle Institute via three video channels. Last year, 3700 people participated in 33 videoconferences over the network — in addition to teleclasses and 190 other video programs.

22

IN THIS ISSUE

• Coax Speakers

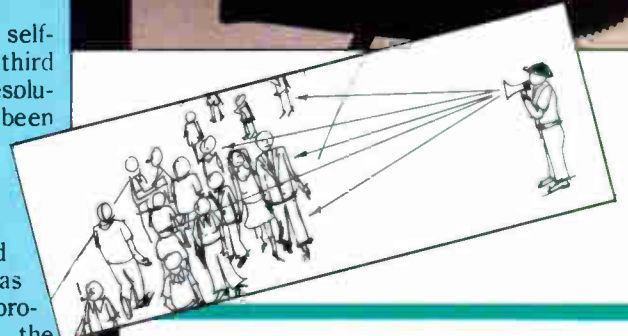
The world of direct radiator coaxial transducers is explored in the second part of our series on coax speakers. From a historical perspective and the current product scene, coaxes maintain their diversity and their usefulness. **60**

• Reviewing The Analyzers

The missing link between self-contained realtime one-third octave analyzers and high resolution analyzers may have been found. **54**

• Queen

Martin Luther King needed a sound system that could move quickly if there was trouble. Daniel Queen provided it. Technology of the nineties needs standards and Queen is in the forefront of providing them. **41**



MOVIE SOUND

There are many demands unique to movie theater installations. Acoustically fundamental differences between movie theaters and other venues make for requirements that you have to deal with. What are the equalization requirements? And can the contractor make money in this environment? Our series on Movie Theater Sound continues. **46**



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PERFORMANCE

THE PEAVEY PERFORMANCE SERIES™



The 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

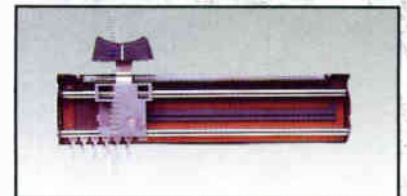
All ICs are individually socketed for ease of service as opposed to ICs that are soldered directly to the circuit board.

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

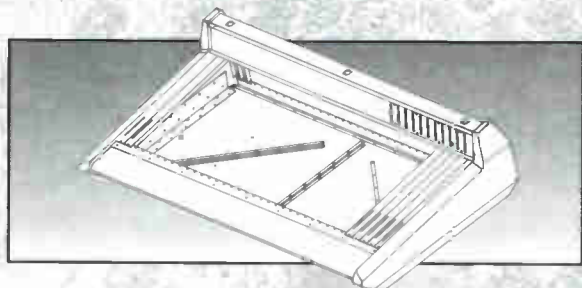
New electronically balanced input circuit offers 100 dB of common mode rejection, allowing the console to operate in most any environment without interference.



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.



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.



EXTERNAL POWER SUPPLY

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

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ARCHITECTURAL ACOUSTICS®

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SOUND
COMMUNICATIONS

Otari now has the products, and the pricing to make your next installation easier, faster and more profitable.



When you want your installations to *stay* installed, or when service contracts are a part of your business, Otari's legendary reliability makes our products an obvious choice.



With a selection of audio recorders from 2 to 32 tracks, a high performance cart machine, and a complete line of audio and video duplicators, you can choose *exactly* what's



right for the application, and for your budget. What's more, these new machines will satisfy your present clients and win new ones with their advanced features.

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transformerless balanced inputs/outputs, and gapless, seamless, punch-in, punch-out.

Before you begin your next installation, let us show you that Otari is *serious* about your business with our Sound Contractors Resale Program. Call Otari at 415-341-5900.

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LETTER FROM THE EDITOR

A Note of Sadness

These are the times we stop the presses — and wish for a happier reason.

Just at press time, Lottie Morgan died. Lottie's long career at Shure Brothers culminated in her position as Vice President of Sales. I'll leave her biography and eulogy to others who will speak later with more accuracy and more insight. For now, all we can say is that we send her family, friends, and colleagues at Shure our deepest sympathy.

Lottie Morgan was a voice of honesty in a business world that is too often governed by the pretentious. She was always down-to-earth and open and made business into a pleasure. The news of her death is sad news indeed.

The Company Behind the Magazine

I want to talk a bit this month about Testa Communications. Some of you are well acquainted with the total company; others know us only as Sound & Communications. Which is of course quite all right. But you may also be interested in some of the other endeavors of the company.

Testa Communications publishes Sound & Communications magazine, along with four other publications in the communications and entertainment field: Post magazine covers post production for audio, video and film. Producers Quarterly is a quarterly magazine for the creatives — producers in general.

DJ Times is directed toward the professional club and mobile DJ with articles related to both hardware and the music of the times. The Music & Sound Retailer is the news magazine for the retailer of MI and pro sound equipment.

In addition to the five magazines, Testa Communications produces television news shows at the major conventions related to its magazines. These includes CES-TV News, NAB-TV News, NAMM-TV News, NSCA-TV News, and AES-TV News/Crosstalk. These productions are professionally produced television news shows covering the respective conventions and are transmitted to convention hotel rooms in the respective city.

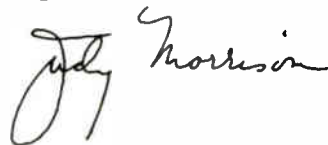
There are other things produced by this company — The Music & Sound Awards presented at each winter NAMM; The Music & Sound Buyers Guide published for consumers; and DJ Expo, a semi-annual convention for DJs.

I've told this story for a reason. There is a synergy to this company that many of our readers aren't aware of. There is an informed editorial attitude that takes into account trends and developments in related parts of the industry. There is a crossover that leads to better information for you, because our staff makes itself knowledgeable about a wide range of industry updates.

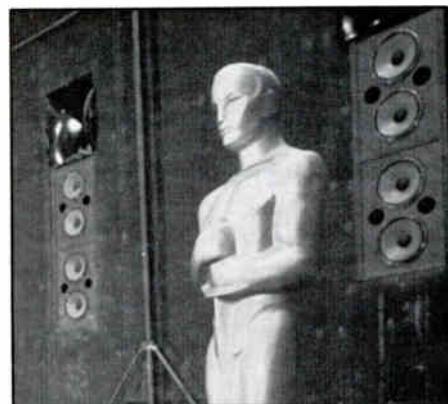
But right now you are of course reading Sound & Communications, and we presume that is for a reason. We know it's for a reason, because our circulation is audited and sent only to "qualified" readers, in other words, those who are actually working in the business.

Hoping all of you out there are keeping busy. Till next month...

Regards,



Judith Morrison
Editor in Chief



ADDENDUM

Goldwyn Theater photo on page 50 in the September 23, 1991 issue of Sound & Communications should have been labeled: Samuel Goldwyn Theater and Oscar© photo courtesy of A.M.P.A.S.®

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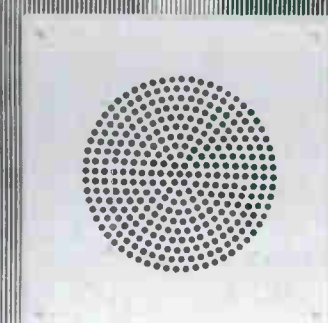
NEW QUAM BAFFLES BAFFLE VANDALS

These new Quam baffles frustrate vandals while they build and protect your profits. Because they protect your loudspeaker installations, you can use them effectively in prisons, subway stations, stadiums, parks — anywhere there's a good chance of bad behavior.

The security secret of these new vandal-proof baffles is the potent combination of high tensile strength 14 ga. carbon steel, plus a durable interior steel screen to give the speaker further protection, and security socket screws for mounting. The white powdered epoxy finish is virtually chip-proof and scratch-proof.

Round and square baffles are available with recessed speaker enclosures to fit all popular 8" loudspeakers. Full details are in Quam Tech Spec TS-44. You've been asking for baffles like these; now ask for your free copy of the literature.

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World Radio History

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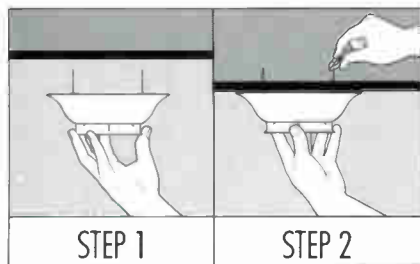


And almost as fast.

Simply push the twin metal mounting posts through any lift-out ceiling tile, then secure the QM-300 Series speaker in place with the Push-n-Lok[®] mounting system. The posts double as speaker leads, and special clips make wiring and installation one easy step.

What's more, you won't have to worry about panels sagging—thanks to the QM-300 Series' lightweight design. And when a system has to be taken out or moved, it's as easy as it was to install.

So put a ceiling on your installation time and costs. With the QM-300 Series speaker. For a complete listing of available sizes and features, ask your electronics distributor or contact GEMCO today.



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To install, simply puncture ceiling tiles with the mounting posts. Then secure in place and connect speaker leads with our Push-n-Lok[®] retaining clips. To remove, reverse procedure.



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NEWSLETTER

AES CONVENTION LINE-UP

The 92nd AES Convention will be held March 24—27 at the Austria Center in Vienna. The 93rd Convention is scheduled for October 1—4 at the Moscone Center in San Francisco. Future European venues will include Amsterdam and Berlin. The 1991 Convention in New York attracted over 15,600 attendees — more than any other convention in the Audio Engineering Society's history.

In other AES news, Society officers for 1992—1994 have been announced. Floyd Toole has been elected president of the AES for the upcoming year. Leonard Feldman has been named vice president for the Eastern Region. Bob Thurmond has been named vice president for the Central Region. Richard Burden is vice president of the Western Region. Neville Thiele is international vice president. Gerhard Steinke is vice president for Europe. Arthur Gruber continues as treasurer. Ron Streicher is secretary. Ken Pohlmann and Wieslaw Woszczyk have been named governors.

RAULAND-BORG VP SALES AND MARKETING

John H. Plaisier has been named vice president of sales and marketing for Rauland-Borg Corporation. Plaisier has been with the company since 1981, most recently as district sales manager in the southwestern United States.

HIGH DEFINITION FACILITY OPENS

Sony High Definition Facilities Inc. in Culver City, California has officially opened its doors to make High Definition technology readily available to west coast program producers. SHDF is an independent operating entity headed by William G. Connolly who also retains his position as president of Sony Advanced Systems Company. Dick West is SHDF's director, technical services and John Galt is director, production services.

EDS '92 PLANNED

The 1992 Electronic Distribution Show and Conference will be held May 4 through May 7 at the Las Vegas Hilton Hotel. Exhibits are open May 5 through May 7, with seminars taking place on Monday, May 4. This will be the last show as a hotel-based format. EDS '93 in Orlando will be a convention center event. According to EDS over 6,000 management, sales and marketing people attend EDS each year; over 30 companies exhibit. The show is sponsored by the Electronic Industries Association Components Group, the National Electronic Distributors Association, and the Electronics Representatives Association. EDS has been operating since 1937.

NEW APPOINTMENT AT JBL INTERNATIONAL

Mark Terry has been appointed to the newly created position of Executive Vice President, Marketing and Sales of JBL International. Terry joined JBL International within the last year, having held several senior management positions previously with New England Digital Corporation. Over the last year JBL has opened new distribution in Brazil, Egypt, Turkey, Venezuela, the Netherlands-Antilles, and Morocco, in addition to increasing its share of the European and Asian loudspeaker markets. According to the company, JBL is now the leading line of imported loudspeakers in Japan.

STUDER ACQUIRES DIGITEC

Studer Revox AG and Digitec S.A. have entered into a "far reaching and complementary alliance." Studer Revox AG, a subsidiary of the Motor Columbus Group of Switzerland, has completed the acquisition of a majority interest in Digitec S.A. of France. The Digitec organization has changed its name to Studer Digitec, and its products will be distributed in North America by Studer Revox America and Studer Revox Canada. The range of Digitec products includes digital mixing consoles, routing switchers, audio/visual systems, and digital communications equipment.

BRYSTON IN OLYMPICS

CBS has purchased 39 Bryston 2B-LP amplifiers for use during the 1992 Winter Olympics. Studio Consultants, Inc. handled the sale, Bryston's first to the CBS network.

NEWSLETTER

MIDWINTER MEETING OF ARO

The Association for Research in Otolaryngology will meet at the Tradewinds Hotel in St. Petersburg Beach, Florida February 2 through 6, 1992. This year's meeting will feature two major symposia: The Evolutionary Biology of Hearing; and Nerve Injury and Repair. Over 800 researchers in otolaryngology are expected to attend the meeting. ARO is located in Des Moines, Iowa.

MORE PORTABLE DAT'S

The Victor Company of Japan (JVC) has announced the release of a portable DAT recorder, the XD-P1 and optional accessories, in Japan this December. Options include a digital microphone. The company is targeting its DAT equipment at "sound enthusiasts, semi-professionals and professionals." According to the company the XD-P1 is the world's smallest DAT recorder, using "Contracted M Loading System, which contracts the head-to-cassette distance by pushing the small head drum into the tape shell."

ISDN CERTIFIED

DataBeam Corporation has announced that it has successfully completed certification testing of its CT document conferencing systems with the Hayes ISDN Systems Adapter. Using an ISDN network allows DataBeam users to exchange data at 64 Kbps, and allows transmission of both voice and data over the same circuit. The testing included the DataBeam CT 00 and CT 1000 conferencing products, as well as the Shure GR3000. The certification process was conducted using the AT&T ISDN BRI network.

BACKGROUND SYSTEMS WARRANTY

ECI Communications, Inc., the national audio/visual systems service organization, has introduced an extended warranty program which will extend the original equipment manufacturer's warranty for a specified period at a guaranteed annual fee. "The use of audio/visual systems for store-wide marketing is relatively new," said Robert Crozer, CEO of ECI. "We find ourselves in a unique position since most service companies lack size and direction to offer this type of program."

RING ON WEST COAST

Ring Communications Inc. has opened a west coast regional office at 403 East Arrow Highway, San Dimas, California. The west coast office provides support for Ring-Master Intercom users and communications contractors based in Washington, Oregon, Idaho, California, Nevada, Utah, Arizona, New Mexico and Hawaii. Michael A. Wilcock has joined Ring as west coast regional manager.

SMPTE CONFERENCE SCHEDULED

The 26th Annual Society of Motion Picture and Television Engineers Advanced Television and Electronic Imaging Conference will be held February 7 and 8, 1992 at the St. Francis Hotel in San Francisco. The theme is "Collision or Convergence: Digital Video/Audio, Computers and Telecommunications." Topics covered include data compression, mass storage, video/audio workstations, and fiberoptic and satellite transmission of digital bit streams.

ACME ELECTRIC APPROVED

The British Approvals Board for Telecommunications has awarded certification to Acme Electric Corporation for its power products manufacturing plant in Cuba, New York. The certification authorizes the Cuba plant to manufacture and ship power supply products directly for use in the United Kingdom with the BAPT symbol affixed.

SPARS CONFERENCE

The Society of Professional Audio Recording Services will host a weekend business conference in Los Angeles in association with UCLA Extension. Entitled "The Business of Operating a Recording Studio: Realities and Opportunities in the 90s," the conference is organized by Guy Costa, CEO of Quadim Corp. and former president of SPARS.

THE POWER OF SIX.

The MA 6 Flexible
Six-Channel Amplifier.

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Do you know what you're probably thinking. Why six channels?

Think about this for a minute. If almost every sound system out there uses more than two amplifier channels, wouldn't it make sense to put a bunch of channels in one box and save space, weight and cost?

We thought so. That's why we invented the MA 6.

Dollar-per-watt-per-pound-per-rack-space it's a killer. This one amp can drive an entire stereo 100/300 watt bi-amp speaker system. It can drive six passive monitor wedges with separate programs. Or two tri-amped side-fills. Or six separate background music zones. No matter how your sound system requirements change, the flexible MA 6 is an investment that never becomes obsolete.

If less weight, less space, less cost and greater flexibility sound good to you, then go with the power of six. The MA 6: 900 watts of innovation from Rane.



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Being born into a famous family is no free ride.

Standards are high.
Expectations are great.

So when Shure unveiled its L Series Wireless Microphones a few years ago, we knew they had to be better than good.

They were. In fact, the L Series has emerged as one of the most affordable, trouble-free lines in the business. One that includes nearly every kind of wireless – from hand-held to lavalier to instrument systems – with both diversity and non-diversity receivers.

The all-new, L11 body-pack transmitter is a prime example. With its compact surface mount construction, the L11 is the smallest unit in its class. Battery life is 40 to 50% greater. And its crystal clear output signal lets you operate more systems simultaneously than ever before.

Of course, the L11's reliability is a given. After all, we have a family reputation to uphold.

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POWER

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World Radio History

Software for IBM Compatibles

Dear Answerman,

Can you recommend IBM based software to do rack layouts, flow charts, speaker locations, etc. (mechanical drawing) to interface with AutoCAD?

Bill Evans
Technical Support Systems
Memphis, Tennessee

Dear Bill,

Actually, you can do flow charts, rack layouts, etc. using AutoCAD without any other program(s). You would need to prepare a "symbol library" for each EIA front panel height, speaker box size, etc., or if you intend to show details, for each specific product you intend to display in the drawing. It seems a shame that each sound contractor using these techniques would have to duplicate these efforts; someone should prepare and sell these libraries. VDP has done just this in AudCAD 386 (and also in the VidCAD version).

AudCAD 386 is a package of three programs; Cable DocHS, MasterLIST, and FlexiBLOCK. CableDOC HS is a cable documenting program which generates cable labels, calculates cable lengths, etc. MasterLIST is a database that records system names, rack locations and cost of information on each page of equipment placed in any drawing. FlexiBLOCK is a custom style block-making program for creating custom drawings.

VDP has quite a few other related programs, and even offers classes in the effective use of AutoCad and their programs. (VDP, 749 Carver Road, Las Cruces, NM 88005. (505) 524-8959.)

VDP's software is obviously for those into comprehensive documentation. For

the less committed, a growing number of manufacturers are providing both data and CAD file drawings for their products. In some cases this takes the form of directional data and drawings for using a particular sound system design program. More ambitious is Tannoy's CPA and KA Presentation CAD drawings package. It can generate speaker arrays, including hanging hardware. The drawings export to DXF format CAD programs such as AutoCAD. The program sells for \$100, although Tannoy also packages the program with Drafix CAD (an AutoCAD compatible drafting program) for \$600.

ANSWERMAN

The package includes the following: 100+ pre-drawn CAD drawings; 25+ pre-drawn speaker systems; Tannoy CPA product symbol library; Tannoy KA rigging/mounting bracket symbol library; hardware symbol library; database for cost of materials (and exports to Windows Excel, Dbase and ASCII text).

If your arrays are not of Tannoy speakers, you are out of luck with this package. JBL's first sound system design program, CADP, automatically generated array drawings. Last year we reviewed a revised high resolution version of the program which worked quite well, and an

AutoCAD DXF export module called Xlate is available. A number of manufacturers offer free data and drawing files for this program. The revised program was being distributed by Bruce Olson, the software developer (with JBL's blessing). You can reach Bruce at his new company: Olson Sound Design, phone 612-493- 5835.

At the AES, JBL announced that it was ready to release CADP2, its second generation software program. Steve Romeo, the CADP2 program director, tells me that it now supports DXF file export of AutoCAD architectural drawings of speaker arrays.

In the case of amplifiers and other rack mount equipment, both specifications and rack drawings are being offered by a number of manufacturers, one example being QSC. It is also quite possible that the manufacturer of the equipment you install in your racks already has these drawing files for internal use, but has not realized that his dealers/contractors could also use them. So try asking.

Equipto, a manufacturer of rack equipment, has a program that enables the contractor to specify the rack for quotation. Shielding, configuration, even P.O. #, shipping and delivery are accounted for. Finally, when you have finished figuring out what you want, you can look at, and print out the rack. Unfortunately, you cannot show what equipment goes into the rack, nor can you show combinations of racks. On the other hand, the program is free for the asking. (Equipto Electronics Corporation, 351 Woodlawn Ave., Aurora, IL 60506. (708) 897-5314.)

If you just want to prepare flow charts and simple rack drawings and not bother to export the results to AutoCAD, a pro-

THE RUGGEDNESS OF OUR CD PLAYERS ISN'T A RETROFIT.

From the get-go, we designed our Industrial Strength CD players to stand up to the kind of heavy-duty use that typical consumer CD players can't handle.

That's why every TASCAM CD player is rack-mountable. And why both the CD-301 and CD-401 feature balanced XLR and unbalanced RCA outputs for added flexibility.

The economy-minded CD-301 (\$549* including hardwired remote) offers the high reliability required for heavy-use applications, plus precision playback capability. The CD-301 also features a single-play function to automatically stop playback at the end of a song, allowing DJs to concentrate on voice-overs or to make a clean start for the next track. And a link function to permit hookup of multiple CD-301s for automatic back-and-forth sequential play.

The high-performance CD-401 (\$799*) incorporates TASCAM's award-winning ZD circuit to eliminate low level distortion and ensure sound quality that meets the most demanding standards. The CD-401's fader-start feature allows play to start automatically on fade-in and stop at the completion of a fade-out. The CD-401 is available with optional hardwired or wireless remote.

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



TASCAM®



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gram like Flow Charting II is the solution. Flow Charting II is fast, flexible, easy to learn, and cheap. (Patton & Patton Software Corporation, 81 Great Oaks Boulevard, San Jose, CA 95119. (408) 629-5379.)

While Bill is interested in IBM compatible software, Mac users have the option of Bose's Rackmaker software which allows fast and easy rack drawings and is also an aid to preparing your bill of materials. Bose also has SpeakerCAD, a speaker array drafting program which includes a comprehensive library of many different manufacturers speakers.

Dear Answerman,

I read Mike Klasco's interesting papers reviewing some software programs for room acoustics analysis, and I would like to obtain the copies of such programs for my non-profit research activity in the field of Architectural Acoustics. Please give me purchase information for all the software products that in your opinion are the most acoustically valuable.

Dr. Domenico Stanzial
National Research Council of Italy

Dear Dr. Stanzial,

Thanks for the kind words. We have sent you the new Sound & Communications Blue Book, which has a very comprehensive software directory. As to my opinion on which to buy, I would suggest you look over the back issues, as just about every program has been reviewed during the last three years. In the occasional column "CAD TOPICS," Mike Klasco plans to discuss the enhancements demonstrated in all the new releases at both the NSCA and the AES conventions. Important new versions such as Bose Modeler 4, AcoustaCAD 2.0, EASE 1.4, and CADP II have just been released, or are about to be released. Incidentally, Bose (and perhaps the other software publishers) have arrangements so that researchers and the educational community can receive programs at no charge as long as the software is not going to be used for commercial purposes. ■

CEDIA MEETS IN SAN FRANCISCO

By Gerald Kravetz

CEDIA's second annual Management Conference and Product Information Exchange was held from October 9th through the 13th at the Fairmont Hotel in San Francisco.

CEDIA is an acronym for Custom Electronic Design & Installation Association. The association's second conference attracted nearly twice the attendance of the previous year. Badges were issued to 999 registered attendees, of which 528 were Design-Installers.

This attendance may indicate growing interest in the custom installation segment of the home entertainment market. Some projections actually put this market at 1 billion dollars per year, and there are those who anticipate strong future growth.

Seventy-seven manufacturers exhibited their products at booths in the hotel's grand ballroom. These were, for the most part, static displays. Included were monitor TVs, projection TVs, front and rear projection screen systems, speaker systems (primarily for home theater applications), electronics for home theater applications such as surround sound processors, amplifiers, preamps, tuners, and newly licensed THX systems.

Also shown were line-doubling processors, home entertainment remote control systems, multi-room products, switch-

ing equipment, custom installation products, wire and connection products, satellite television components, home automation systems, surge protectors, and remote control systems.

THE ASSOCIATION'S SECOND CONFERENCE ATTRACTED NEARLY TWICE THE ATTENDANCE OF LAST YEAR.

"Active" demonstrations were given by 19 exhibitors at various locations in the Fairmont and Mark Hopkins Hotel across the street. These active demonstrations included several rooms set up for home theater sound applications: Triad showing in-wall THX speakers; Audio Design

"ACTIVE" DEMONSTRATIONS WERE GIVEN BY 19 EXHIBITORS AT VARIOUS LOCATIONS.

Associates showing Dolby Pro-Logic and THX systems, B & W speakers, N.H.T., Polk, and others.

Front projection demonstrations were given by Harman Video showing their Series II Model 8 projector; Runco showing their I.D. TV projection system and new aspect format ratio controller (wide screen), as well their standard CinemaPro projector in both front and rear projection configurations; VidiKron showing their current model projector. Both Harman and

Vidikron indicated that new data grade projection models were coming out shortly. Faroudja Laboratories demonstrated a new model line doubler and detail enhancer (using a Sony 1270Q projector, 31.5 kHz VGA scanning rate processing a NTSC signal), producing a near film-like quality. FROX demonstrated its system which included a media processing unit, video processing unit, 100 disc CD changer, and theater surround sound system (data grade projector required). Rear and front projection screen demonstrations were given by Stewart Filmscreen and Uni-Screen.

In addition to the exhibition floor and demonstration room displays, seminars, lectures, and certification testing took place. Courses included business operations, home theater, home automation, A/V technology, media rooms, custom installation, cabinet design, and systems integration. Sound & Communications magazine sponsored a seminar on advanced acoustical testing for residential environments. Classes and examinations were also given for Video Technician Certificates, and Installer Certificates. Additional sessions covered satellites, business opportunities, advanced use for computers, designing and building custom rear screen systems, video technology and home theater acoustics. (All sessions were taped and recorded by CEDIA.)

A cocktail party and sit-down dinner with live entertainment by Dr. John took place Saturday night and was sponsored by the exhibiting manufacturers. The conference ended Sunday morning with a seminar on HDTV followed by a CEDIA membership meeting.

In summary, the conference, which

Starting in the January 1992 issue, Sound & Communications will begin field use evaluations of video projectors, image and sound field processors.

lasted five days, was comprehensive, containing an interesting blend of courses for varied aspects of the industry. Equipment demonstrations by manufacturers, while somewhat on the light side (compared to certain other industry shows), was to the point as it is applicable to this industry. With the attendance of nearly 1000, equip-

ment manufacturers may take notice and participate to a greater extent next year.

As at most shows using hotel suites for demonstration rooms, the demos prove useful to exhibit operating features of equipment. It is not easy, however, to optimize an installation under these conditions. At this particular show it was difficult to

demonstrate the full potential of many projection and sound systems set up for home theater, THX, or otherwise, due to the nature of the rooms and the constant flow of crowds.

Much terminology was used at this conference related to "Home Theater." But consideration should be given as to



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CONSIDERATION SHOULD BE GIVEN AS TO WHETHER OR NOT SUCH AN EMPHASIS ON THE HOME THEATER IS WARRANTED.

whether or not such an emphasis on the home theater is warranted. Custom design and installation should focus on home theater, but should also focus on the home multimedia or entertainment rooms. This may be the greater of the markets still warranting custom design and installation, and may possibly create greater participation by manufacturers at future shows. Home theater is interesting, but obviously not everyone can have or want a theater

CUSTOM DESIGN AND INSTALLATION SHOULD ALSO FOCUS ON THE HOME MULTIMEDIA OR ENTERTAINMENT ROOMS.

at home; it should not be held out as the ultimate. In effect, designing multipurpose media rooms may prove to be a greater design challenge because of varying parameters.

"CEDIA" class products; high performance video, surround sound, and multi-room controllers are of interest to many commercial sound installers. Actually, judging from the number of commercial sound installers at the CEDIA convention, the market is itself of keen interest to our readers. ■

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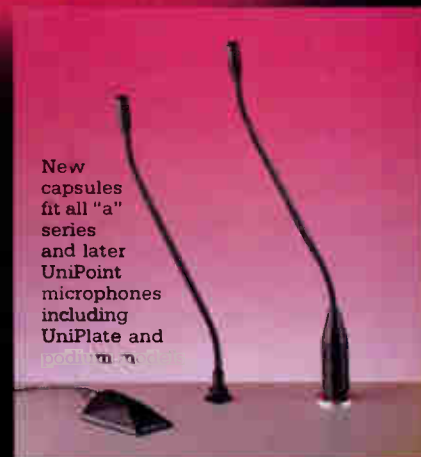


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World Radio History

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World Radio History

INVENTION IS THE MOTHER OF NECESSITY

By Wes Alderson

You say we have that adage backward? Not really. To take another look back at the Industrial Revolution, there was indeed a slogan, “Necessity is the Mother of Invention.”

In the last century, and well into the 1950s, there were unfilled needs in the American public. People needed better washing machines, people needed faster commercial airplanes. These needs motivated scientists, engineers, and inventors to *invent*. In other words, the necessity led to the invention.

But in the 1960s technology began to outrun the common man's needs. Devices were invented that most people did not even understand, let alone need! This has certainly been the case in our own sound and audio-visual industry. We discussed the fact that this state of affairs has produced a need for education in an earlier article entitled, “The Better Mouse Trap.” [Sound & Communications; December 21, 1990]

Now we must face up to an even bigger need. We will face that need by using Residential Audio Visual as an example. For years home hi-fi and home video enthusiasts would simply go to a store...a

box house...and pick up a stereo receiver, a VCR, and other components. Then they took them home and “hooked ‘em up” in about 20 minutes, laced with a few cuss words.

During the last few years, the 20 minutes required to “hook ‘em up” has multiplied and so have the cuss words. The concept of the home theater has developed. Now, the inventions, the great new sophisticated products in audio visual, have become so complex that the vast majority of “regular people” are unable to understand them, let alone assemble and integrate them.

IN THE 1960s TECHNOLOGY BEGAN TO OUTRUN THE COMMON MAN'S NEEDS.

These new products/inventions have evolved to the point where it requires a specialist to install them in the home. Some retailers have created an in-house specialist who comes out to one's home to do the installation. The need for the specialist is there — no doubt about it! He must not only understand audio but also video, and he must be able to master the switching/routing/matrixing field as well as microprocessor based control systems.

But suppose the specialist falls and breaks his leg in the home? Will he sue? What are the insurance consequences? Does he have a contractor's license? If he does not, what are the consequences?

So the issue is not as simple as it first seemed. Invention has indeed mothered a necessity — the necessity is a need for audio-visual contractors who are trained in the techniques of residential installations. These specialized contractors are not the commercial systems contractors, (at least not usually) and they are not the box house retailers. They are a new breed of contractor. And they are what CEDIA is all about!

Every type of specialty contractor needs a national association where he can mingle with fellow contractors, manufacturers, educate himself, and improve his capabilities. CEDIA is that national association. CEDIA consists of contractors, manufacturers, and representatives in the audio-visual trade whose specialty is residential design and installation.

So it is true that the new products and inventions in our industry produced a need. Invention is indeed the mother of necessity...and that need is being met by CEDIA and its members.

The annual CEDIA Expo — the convention — was held October 9 through 13 in the Fairmont Hotel in San Francisco. It was a big hit for our industry! Seminars and workshops on new products and new design techniques were conducted. Manufacturers displayed state-of-the-art new products.

We are sorry if you missed it. You should be sorry if you missed it too! If you are a contractor, manufacturer, consultant, or representative in the custom installation industry you should join CEDIA now, so you will not be left out of next year's Expo.

For more information, contact CEDIA at 1-800-CEDIA30. ■

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

State-Wide School Communications

*CONCERT Audio/Video Network Provides Advanced
Telecommunications for North Carolina*

BY KAREN ANTELL and JOE GRAY
MCNC Center for Communications

MCNC (formerly the Microelectronics Center of North Carolina) was established by the state of North Carolina in 1980 to serve as a medium for technological growth in the microelectronics field. In 1989, MCNC's mission expanded to new areas with the addition of a Center for Communications and the North Carolina Supercomputing Center.

In 1983, MCNC began to operate the CONCERT video and network. (CONCERT stands for Communications for North Carolina Research, Education, and Technology). Prototype operations began between Duke University in Durham and the University of North Carolina at Chapel Hill (UNC-CH). By 1985, CONCERT had linked MCNC, three additional universities — North Carolina A&T University (NC A&T) in Greensboro; North Carolina State University (NC State) in Raleigh; and the University of North Carolina at Charlotte (UNC-C) — and the Research Triangle Institute. This original network spanned an area about 150 miles across.

In 1983, a prototype two-way interactive teleclass was offered over the fledgling network. In the spring of 1985, the first official CONCERT teleclass was taught. Led by Dr. Richard Fair, the graduate-level



A CONCERT videoconference room at MCNC's Center for Microelectronics.

electrical engineering course was taught simultaneously at Duke University and the University of North Carolina at Chapel Hill. This was the first of many CONCERT teleclasses that provide valuable resources for North Carolina students. Because some technological fields are very specialized, not every university is likely to have

resident professors with expertise in every field, and through two-way audio/video, students have access to a much wider range of expertise within their fields of study. They can choose to work with professors from all across the state, rather than only those at their home universities. Spanning over 400 miles, the

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MCNC Center for Communications Vice President Alan Blatecky at CONCERT Network Control.



A CONCERT teleclassroom at North Carolina State University.

CONCERT audio/video network now connects eight of North Carolina's major universities and their graduate centers (East Carolina University (ECU) in Greenville, the University of North Carolina at Asheville, and Winston-Salem State University (WSSU) have been added), its four medical schools (Duke, ECU, UNC-CH, and the Bowman Gray School of Medicine (BGSM) at Wake Forest Univer-

sity), and the Research Triangle Institute. These sites generally have at least one teleclassroom and one videoconference room; many sites have multiple facilities to take advantage of all three of CONCERT's channels. Besides teleclasses, the CONCERT audio/video network provides a way for researchers at distant sites to collaborate regularly with one another. Many collaborative projects that

took place over CONCERT would have been extremely difficult logistically or even impossible without the network. Among these are the development of engineering research centers at Duke and NCSU, collaboration on the Mars Mission Program by researchers at NC A&T and NCSU, and collaborative work on quantum groups and atomistic modeling.

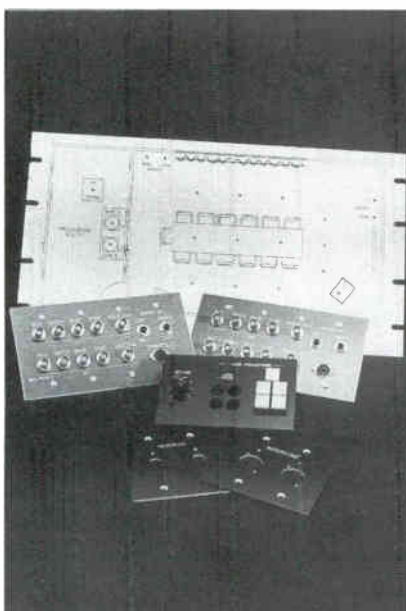
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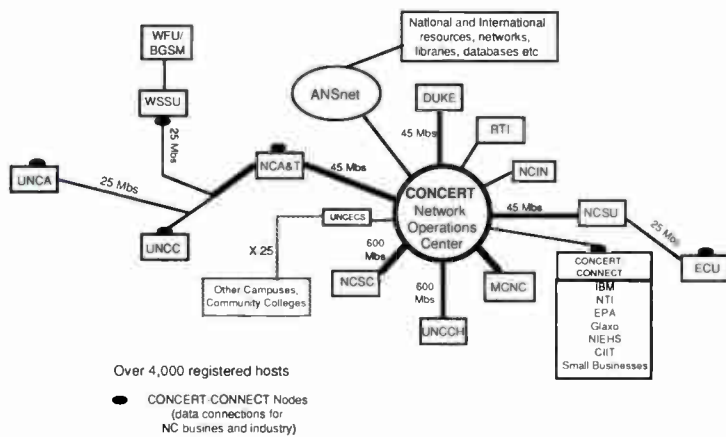
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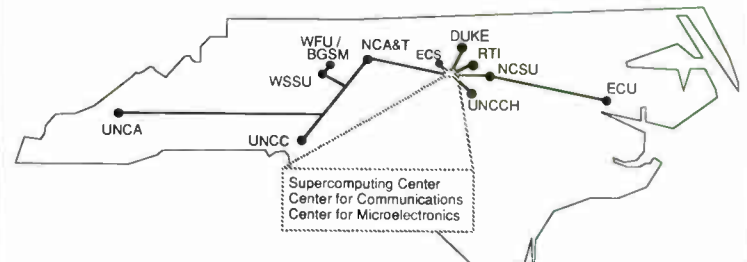
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CONCERT Data Network



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Virtual Proximity

conducted over CONCERT, with a total of 4,035 students. In the spring semester of 1991, 10 courses were offered, totalling 189 participants. The number of videoconferences and organized video programs has increased steadily as well. During the fiscal year 1990, 333 videoconferences were attended by 3,764 participants. 6,057 people participated in 190 other video programs. Initial figures for 1991 indicate a continued increase in the number of programs and participants.

Moreover, a wide variety of seminars

and lectures are offered over CONCERT each semester. These programs are open to the public, and many of them serve the public school system as well as students and instructors at the university level. Among these programs are a series of supercomputing seminars for high school teachers and students, summer lectures attended by high school students in the North Carolina Summer Ventures in Science and Math program, evening workshops for parents and teachers of college-bound minority students, and

discussion meetings for people with disabilities and their advocates. CONCERT enables groups from all across the state to meet without having to travel hundreds of miles. Feedback from users, both new and experienced, has been overwhelmingly positive.

CONCERT was planned by MCNC and a variety of working groups that researched the equipment and other requirements for a two-way audio/video network and advised on its implementation. Although some of the facilities were built

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from scratch using brand-new equipment, many universities remodeled existing rooms and equipment to incorporate them into the CONCERT system. For instance, NCSU already had a teleclassroom for students who took (one-way) teleclasses by videotape. Some of the equipment in the existing classroom — cameras, video-

cassette recorders, etc. — was incorporated into the two-way CONCERT system. Because of the variety of facilities and equipment among the various sites, some challenges have arisen due to the lack of complete standardization. For example, the acoustics of the rooms vary widely due to differences in their sizes and

layouts, and microphones must be adjusted carefully to ensure quality audio transmission to and from each site.

The main mode of transmission is via microwave from the tower in Research Triangle Park near MCNC to the tower nearest the remote site. From the tower to the site, the signals are transmitted either by broadband, baseband, or fiber optic cable, depending on the site (MCNC is connected to its tower by fiber optic cable). The video signals are carried analog the entire way, but the audio signals are converted from analog to digital to be carried over the CONCERT data network to the remote sites.

At the remote sites, they are converted back to analog before they are heard.

When conference or teleclass participants speak, the acoustic signal is picked up by Shure Automatic Microphone System (AMS) microphones and sent to a Shure AMS mixer. The AMS mixer output is sent to a compressor limiter, which maintains the audio level within certain limits. From there the audio signal goes to a production mixer and then to a router, which directs the signal to one of the two CONCERT channels. The signal then is transmitted to the radio room and is digitized and transmitted via the high-speed CONCERT digital network. At network control, the process is reversed and the audio signal is sent to the channel banks at the various sites.

MCNC provided the main switching and transmission equipment, including the microwave towers, but each remote site took responsibility for providing the space, the necessary room renovations, installation, and the operations personnel. Each site was designed to be operated by just one person, with cameras that are moved by remote control. Each site also is responsible for general day-to-day maintenance, but MCNC, as owner of the system, takes care of major repairs, upgrades, and maintenance of the microwave transmission equipment.

There are three main components of the audio equipment used by the CONCERT video network: the Shure AMS, a Logitek audio board custom-designed to control

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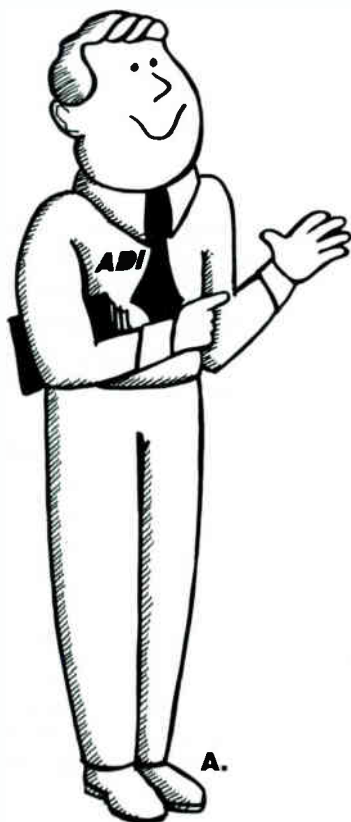
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problems with feedback, and a Hedco routing switch operated on custom-designed software.

Shure AMS audio equipment was selected for the microphones, the microphone mixer, and the voice-activated video-switching interface (AMS 880). Each teleclassroom is equipped with 24 AMS 22 table microphones that allow up to 48 people to participate actively at each site. Each conference room can accommodate up to six interactive participants with six AMS 28 lavalier microphones. The Shure AMS was chosen in part for unique directional gating action: it activates microphones only for sounds originating within a 120 degree acceptance window. The AMS 8000 provides the main pre-mixer system, while the logic output of the AMS 880 supplies the voice-activated video switching control that focuses the

cameras on the person speaking. This feature means that the video cameras operate automatically. Operations staff members usually are needed only to monitor the program. This feature also makes video communication seem more natural by allowing the participants always to look directly at the person speaking, just as they would in an in-person meeting.

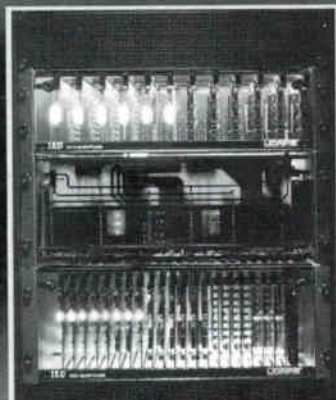
The audio side of the CONCERT network presented a challenge to the system's designers. At first, they tried to operate the audio using a traditional 24 x 8 production board. Because of the two-way interactive format of the network, it was important for each site to be able to hear the audio coming from every other site. However, to control feedback problems, operations personnel had to make sure that no site received its own audio signals. This resulted in 192 switching

possibilities for each program — too many for the operations staff to scan easily. To reduce the complexity of this task, and to solve the feedback problem more easily, CONCERT staff members contracted Logitek to develop a custom audio board with 24 inputs and 24 outputs. Each input is related to a corresponding output such that, when assigned to one of four program buses, no incoming audio is allowed to be directed to its corresponding output. This action, called "mix minus," is done automatically for all 24 outputs. This greatly simplified the network audio configuration.

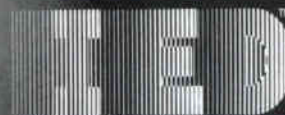
CONCERT's first main switching system was a Hedco 48 x 48 intermediate routing switch operated by an IBM PS/2 using software custom-designed by Hedco. In the summer of 1991, a new Hedco probe 128 x 128 switch was installed to meet

(continued on page 74)

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Sound Justice

The C.U.N.Y. Law School Gavels in the Modern Classroom

BY STEPHEN MINOZZI and ROBERT PELEPAKO

The C.U.N.Y. Law School at Queens College in Queens, New York installation was a particularly interesting and challenging one for Monte Bros. In the following article, the major questions that have been asked of us and the major problems that we encountered are discussed.

How did you get the bid?

The sound system was a public installation and was an open bidding process, with sealed bids.

Monte Bros. was the lowest bidder.

What equipment was used and why?

Audio-Technica AT-859 microphones were used at all the table locations, because of the fixed shaft, slim-line structure and the ability of this supercardioid microphone to perform at close range (approximately two inches) without distorting and/or popping the capsule.

The Audio-Technica AT-859 microphone also had a unique barrel design that allowed for a security mounting technique that would still enable the microphone to be professionally removed for repair and servicing.

An Aphex 612 expander gate was assigned to each of the thirty-one conference tables because of the unique ability to adjust the filters to accommodate close range speech (approximately two inches from the microphone).

The filters were adjusted to accommodate the vocal range and to ignore any ambient noise that may be present in the

Stephen Minozzi and Robert Pelepako are directors of Monte Bros. Inc. in Dobbs Ferry, New York.



Audio-Technica AT-859 mics were used at all the table locations.

room.

The ability to individually adjust the threshold, attack, hold and release settings of each Aphex 612 gate, in relation to that particular table's proximity to a Titan series speaker significantly reduced the possibility of acoustic feedback during speech.

An Aphex VCA-150 voltage controller was assigned to each conference table (one side of the stereo VCA-150 per table) with an on-off mute button on each table, and reciprocal controls at the professor's console; audio-visual room console and master control room, which also enables the professor's console; audio-visual room console and master control room console to "mute" and/or control the overall

volume of all table microphones, without affecting the volume or performance of the eight wireless microphones, which could be individually controlled from all three master VCA control panels.

An Aphex 303 Compeller was used to control the performance of the Biamp D-60-EQ amplifier that powered the two Gemini series speakers in the front of the auditorium, to establish compensating directional dynamics.

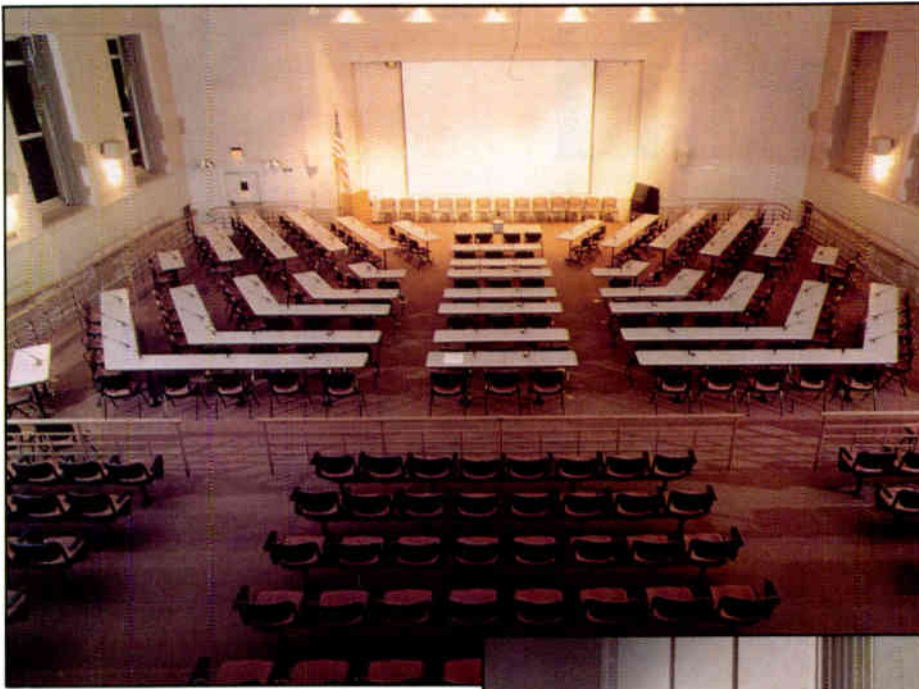
Aphex Master VCA control panels were located in the professor's console, audio-visual console and master control room.

The red and green lights on each switch indicate the active status of that particular table and each respective switch on each master control panel. The on-off switch on each table is functionally reciprocal.

Two Aphex DA-120 distribution amplifiers were used to distribute independent audio signals to the Crown PS-400 amplifiers that powered the Titan series speaker systems on the side walls; the Biamp D-60-EQ amplifier that powered the Gemini series speaker systems on the front wall of the auditorium; the Shure 210 amplifiers that powered the monitor speakers in the A/V room and the main control room, and the balanced audio feed to the A/V room and the professor's console.

A Biamp Advantage EX mixer with simplex power on all inputs was assigned to each of the thirty-one conference tables to accommodate from one to six microphones per individual table.

The main output of each Advantage EX table mixer was assigned to an input of one



The CUNY Law School at Queens College.

of four Advantage EX master mixers that were linked to a Biamp Advantage One master mixer that also accommodated the eight wireless microphones, and produced a collective audio signal for the entire sound system.

A Biamp Advantage AG gate module was assigned to each of the thirty-one conference tables, in order to provide passive gates for each individual table microphone.

While the Aphex 612 gate was used to control the collective performance of all the microphones at any particular conference table, which could have from one to six microphones, the Advantage AG gate was assigned to each individual microphone at each conference table.

The Advantage AG gate will lower its volume by approximately 3 dB every time two gates on a particular unit are activated, which prevents tables with up to six active microphones from creating acoustic feedback during applause or conversational speech from students before class, that may open all the gates of all the microphones because of an intense or unusual increase in the volume of ambient noise in the room.

Each side of two Crown PS-400 amplifiers was used to power two Titan Series speakers at each side of the auditorium, in four zones from front to rear, to compensate for the increased height of the speakers from the floor as they approached the front of the auditorium.

Two Gemini series speakers were in-



The professor's console. Note control panel in shape of classroom.

stalled on the front wall of the auditorium, were powered with a Biamp D-60-EQ amplifier and regulated with an Aphex 303 Compeller to compensate for the ambience caused by the increased ceiling height in the front of the auditorium, but not to confuse the listener in the front section of the auditorium. We call this concept "Compensating Directional Dynamics.

The Gemini speakers, assisted by the Aphex 303 compeller, also enabled the professors to clearly understand a soft voice participating from any table microphone.

Eight Titan Series low "Q" speakers are installed in four zones along the side walls of the auditorium.

Each zone includes one Titan speaker mounted on the left and right side of the auditorium, is powered by one side of a Crown PS-400 amplifier.

The low "Q" and low sound pressure level capability of the Titan series speaker system provides subjective reference monitoring to all participants in the use of this sound system.

A White 4650 one-third octave graphic equalizer was used to normalize the performance of the Titan series speakers in the auditorium.

Five Soundolier 800-77 consoles on wheels, were used for all the electronics in the main control room, to enable easy access for repairs and service and increased ventilation.

Two Lectrosonics multi-channel, diversity, wireless systems enabled the simultaneous use of four Lectrosonics M-185 wireless transmitters with Lectrosonics M-119 lavalier microphones, and four Lectrosonics H-185 wireless transmitters, with Audio-Technica AT-859 microphones (handheld or on stands) anywhere in the auditorium.

The wireless microphones enabled additional dialogue participation from the rear seating area behind the conference tables, whenever necessary.

The diversity antennas and opti-blend features of these Lectrosonics wireless microphones eliminated the possibility of reflective dropout.

The compatibility of the Lectrosonics M-119 lavalier microphones and the Audio-Technica AT-859 microphones on the Lectrosonics H-185 wireless transmitters with the Titan series speaker system eliminated the possibility of acoustic feedback when used in the direct vicinity of any of the Titan series speakers.

How long did it take to install?

Installation began on December 3, 1990 and was completed by January 15, 1991.

The initial stages of this installation were inhibited by a daily class schedule from Monday to Friday, and most of the initial installation involved late evening hours.

The balance of the installation (assembling the electronics and fine tuning)

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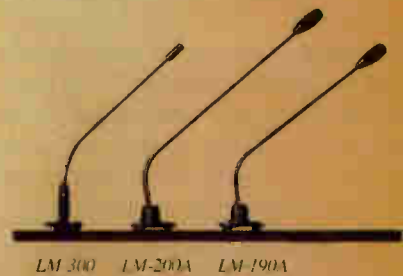
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Equipment racks used at the installation.

was accomplished during the winter recess in January 1991.

Did you keep within the budgetary constraints?

Yes. Because of updated technology and equipment it was possible to reduce the labor costs and apply the monies to additional amenities.

What testing equipment did you use to test the rooms?

The initial testing of the auditorium involved the installation of four Titan series speakers along one side of the room, tuned with a White model 140 sound analyzer and a Gold Line TS1RMX1 sine wave generator and frequency counter.

An Audio-Technica AT859/O omnidirectional test microphone was used to measure a pink noise voicing from the White model 140 sound analyzer, and a White model 4650 graphic equalizer was used to normalize the Titan speakers to an acoustically flat frequency response from 200 Hz to 5 kHz, with a 12 dB roll off at the high and low ends.

An Audio-Technica AT859 supercardioid microphone was used to test the ability of the microphone, electronics, equalization, amplification and speaker combination to clearly and accurately replicate the spoken word in all areas of this auditorium to the satisfaction of the attending representatives of C.U.N.Y. and the architect.

The tuning of the completed installation was accomplished with the use of a White model 140 one-third octave sound analyzer in simultaneous operation with a White model 200 one-sixth octave sound

They Thought it Couldn't

BY GREGORY KOSTER

The CUNY Law School Auditorium is the school's sole large-class instructional facility. Required first- and second-year courses and popular third-year electives use this room continuously throughout the week. It is also used for special assemblies and programs on an occasional basis.

The room was originally built as a junior high school auditorium. It was rectangular in shape with a high, smooth plaster ceiling; a sloped concrete floor; plaster walls; and theater seating. Since there were almost no diffusive surfaces and very few absorptive areas, the room had a pronounced echo.

Renovation of the room for the law school's instructional needs included a new, stepped plaster ceiling and a new, stepped concrete floor with industrial carpeting (increasing the problem of hard, parallel surfaces but also trying to mitigate it); walling off the stage for a new blackboard and adding some sound absorbing panels on the walls (again both increasing and mitigating the problem); and tables to accommodate the class size of 160 students and up to six teachers/panelists. The renovations reduced the echo slightly, but it still made it difficult to hear.

The renovations also included a new HVAC system which, despite a request for a sound attenuation design, produced a severe rushing noise directly above the podium area which added to the difficulty in hearing. "Listener fatigue" was very noticeable.

Recognizing the room's problems and its importance to the instructional program, the Law School had requested an auditorium sound system in the building renovation plans. The program needs included: the ability to hear at all locations throughout the room; the ability of students to be heard while asking or responding to questions; the ability of students to have spontaneous dialogues with each other; the ability to break the class down into small groups without having their discussions picked up by the

sound system; security considerations, especially for the student microphones.

The system designed by the architect's consultant would have replaced the junior high school's proscenium speakers that might have mitigated the echo problem, but it completely failed to address the necessity for students to be able to hear each other and it wasn't clear whether faculty would be able to move around under the speakers without causing feedback. Budget problems on the building project forced us to delete that system, but we didn't feel that it met our needs anyway.

A low-cost sound system was installed as a temporary measure at the time the building opened. This system, with one speaker on each side of the proscenium and cardioid microphones on the podium and speakers' table, was a disaster. The high-SPL speakers excited the room echo and the microphones amplified the HVAC noise along with the teacher's voice. That system also failed to address the need to hear students and for faculty to be mobile.

The third attempt involved a sound consultant who works with touring theater companies. We felt that this experience was relevant, since his designs must include amplification of a large number of actors moving the entire stage and must achieve good sound levels as well as clarity throughout the audience section. The variety of halls encountered by a touring company also gave him insight into the kinds of acoustical and noise problems our project involved. He proposed a system that seemed likely to meet our needs, but when we bid it out the cost proved to be five times the budget. (His experience did not include bidding in the public sector.) One of the bidders even took the trouble to write a letter detailing why he felt that the project, despite its high cost, wouldn't work.

The fourth attempt, at the beginning of the current auditorium rehabilitation project, involved the architect's first sound consultant. When we explained the necessity to have microphone coverage for 160 students throughout the room, his first reaction was that it couldn't be done.

Gregory Koster is Director of the Law Library and Associate Professor of Law for CUNY Law School at Queens College.

Be Done

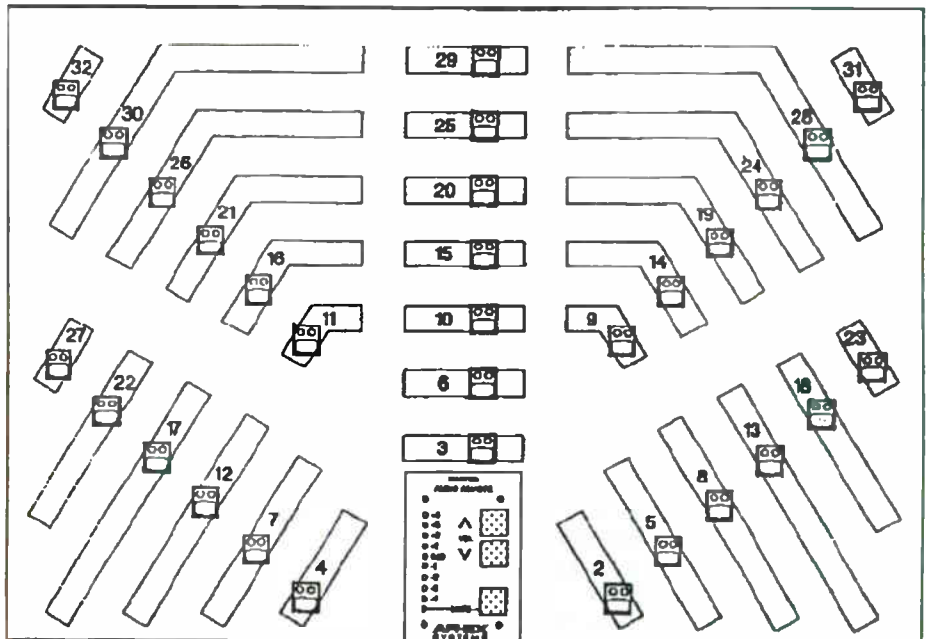
Pressed further, he finally suggested that the only way to avoid feedback would be to use ham radio push-to-talk microphones. We rejected that approach as unworkable with our students, and as unlikely to produce the required clarity of sound.

Finally, the architect engaged Monte Bros. who designed a system with gates that allow over 90 microphones, located throughout the room, to be live at all times without causing any feedback. The microphones are installed on the student desks with a custom mounting system that allows each microphone to swivel between two students but makes it impossible to remove the microphone or tamper with the wiring. The system also includes eight low-SPL speaker clusters, spaced along both side walls, which provide uniform sound levels throughout the room without exciting the echo.

The project was to include additional sound absorbing panels on the walls, but the sound system is so effective that these were deleted as unnecessary (for a significant cost saving). The HVAC noise, which is still noticeable in the room no longer interferes with listening. "listener fatigue" is no longer a problem at all.

This system meets all of our program needs: Even sound levels throughout the room make it easy to hear everywhere, there is no feedback and voices are crystal clear; Faculty mobility is facility is facilitated by the provision of six pairs of wireless microphones (one lavalier and one handheld on each of six frequencies allows freedom of choice); Students are totally uninhibited about using the system, since all they have to do is lean toward a microphone and start talking (to activate the gate on that mic); Small group conversations are never broadcast because they take place outside the gates' tight parameter; There has been no theft or other security problems.

We couldn't be more pleased. Class discussions now take place freely and spontaneously, and everybody can hear everything that is said. The only thing we can't hear is "it couldn't be done."



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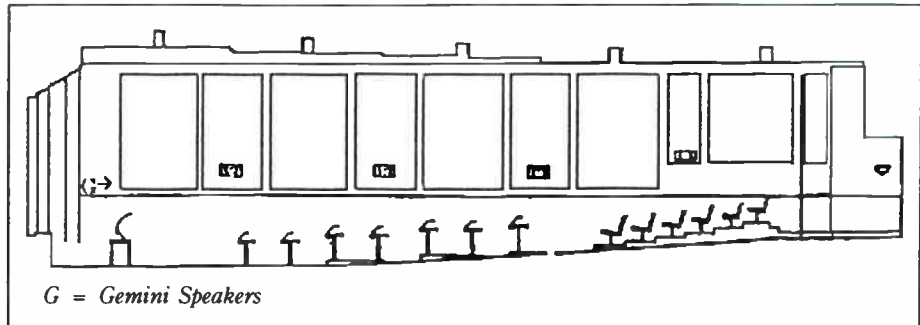
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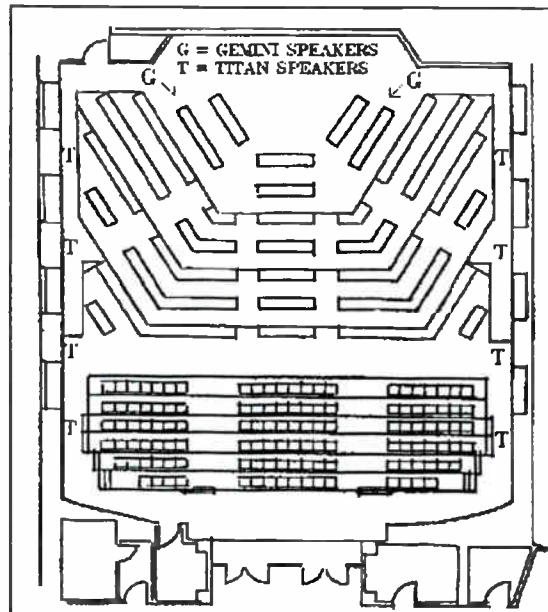
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C.U.N.Y. Side Elevation.



C.U.N.Y. Floor Plan.

analyzer, a Gold Line TS1RMX1 sine wave generator and frequency counter and two Audio-Technica AT-859/O test microphones: one for the model 140 and one for the model 200 sound analyzers.

A BSS AR-130 was used to establish gain continuity between all 86 conference table microphones.

What specific, unique problems did you encounter in the installation?

CABLE INSTALLATION

A second reinforced concrete floor was poured over the existing concrete floor of the auditorium during an earlier renova-

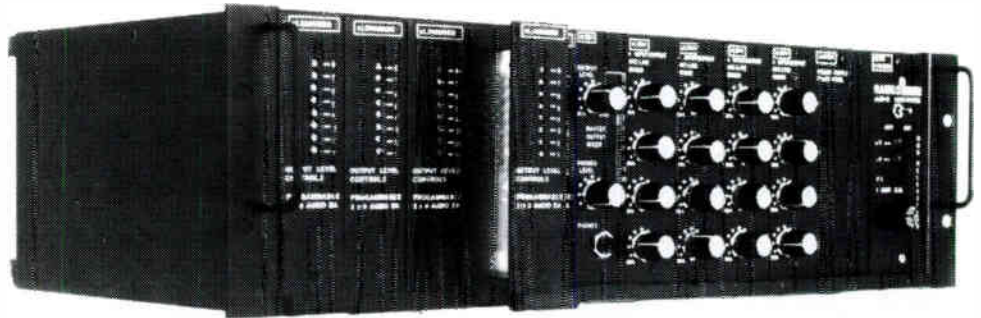
tion. The installation of all necessary speaker, microphone and vca cable involved drilling over forty 3/4-inch holes through the two-foot-thick reinforced concrete floor.

All microphone and speaker cable was installed via the crawl space under the concrete floor, through the concrete floor, inside the hollow steel table leg and over to each microphone location via a cosmetic conduit to eliminate the visibility of any type of cable.

Each of the thirty-one conference tables were color coded into five groups, and had a nine pair multi-cable and a vca cable

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home run directly from the table to the corresponding Advantage EX mixer in the main control room, that was redundantly labeled with color coded identification tags that also indicated the table/mixer number.

SECURITY

Black steel boxes, approximately 6 inches x 6 inches x 3 inches were custom made by Whirlwind Music to insure security and cosmetically hide the swivel and shock mount support features of the microphones that were mounted on the conference tables.

Security screws were used to fasten the black box to the wooden microphone support platform under the table in order to prevent the possible theft of the entire microphone and support system.

The microphones were installed with epoxy and security screws which would

result in the destruction of the microphone if theft was attempted without the neces-

sary tools, time and experience.

CUNY Law School Equipment List

- Audio-Technica AT-859 microphones (86 table mics)
- Aphex 612 expander Gates
- Aphex VCA-150 Voltage Control Attenuator
- Aphex 303 compeller/oral exciter
- Aphex "Master" VCA control panels (Custom)
- Aphex distribution amplifiers
- Biamp Advantage mixers
- Biamp Advantage gates
- Crown PS-400 amplifiers
- Gemini Series speaker systems
- Lectrosonics VHF; "Diversity" wireless microphones
- Soundolier 800-77 consoles
- Soundolier 1047 consoles
- Soundolier 300-28 console
- Titan Series speaker systems
- White 4650 equalizer

ELECTRONICS

The installation of all the necessary electronics, equalization, audio processing and amplification into five Soundolier 800-77 consoles in the master control room required hours of planning in order to assign the related electronics to specific racks, with logical wire pathways to enable proper service and repair, and to simply be able to track a pathway in order to identify any mechanical problem.

Computer graphics along with the master block diagram were used to simulate the amount of available console rack space, the required rack space for each individual piece of equipment and the necessary ventilation.

These graphic illustrations became our road map for the entire installation. ■

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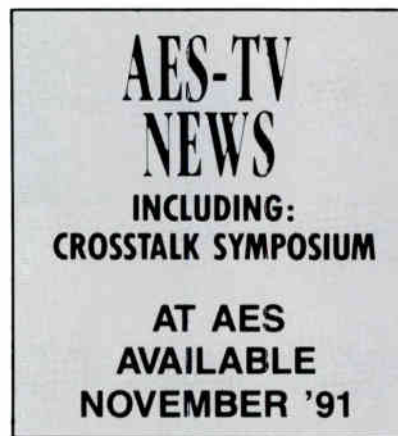
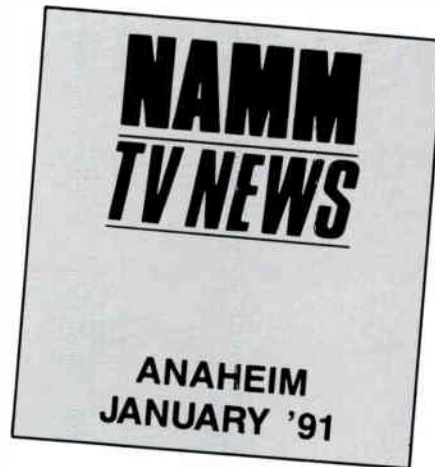
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DANIEL QUEEN: FROM SOUND FOR MLK TO STANDARDS FOR THE DIGITAL AGE

By Pamela Michael

I suspect that Daniel Queen's ears are bionically enhanced; perhaps he's redesigned them. Mere mortals' ears just wouldn't do for a man so caught up in the realm of sound.

From his prodigious body of audio/acoustical work, and his lifelong love of music, to the urban melody of a Manhattan he seems to take in in great gulps, dashing from his home at the historic Hotel Chelsea to his office across the street, he seems a thoughtful, fully-realized, Renaissance man, writing plays and poetry in his spare (!) time; all this plus a social conscience and a commitment to public service.

Sound & Communications: Were you a tinkerer as a kid?

Queen: Oh yes, I used to fix the neighbors' clocks, phonographs, anything that came along. My sister got the piano lessons, I fixed the piano. We lived next door to a dump filled with old radios and vacuum tubes and things of that sort — things that fascinated me. This was between the ages of three and six or so. I've always thought that had an influence on me — I wanted to make those things work, plus I learned a lot about vacuum tubes and how they were constructed.

Sound & Communications: You say your sister got the piano lessons; did you have an interest in music as well?

Queen: Yes. I think my interest in



Daniel Queen

physics probably predated it. I began studying science on my own in the third grade. There wasn't much music in the house, but I started discovering it outside. While in high school I used to leave Friday in the late morning to join the "rush" line at Symphony Hall to hear the Boston Symphony. Then I would grab a bite to eat and go to hear jazz at the Savoy and the High Hat down the street.

Sound & Communications: You ended up getting your degree in physics at the University of Chicago.

Queen: Yes, I had a chance to go to MIT, but I wanted to be able to study many more things than just science and I felt the academic atmosphere in Chicago was much more open. Also, I had grown up in Boston and relished the idea of going to school away from home. After University of Chicago, I ran out of money to go any further, and I started getting jobs in some

of the tape recorder companies in Chicago that were in the beginning of the tape recorder age — Webcor, Revere Camera, Magnacord, Pentron.

Sound & Communications: That was a fairly new field then, tape recorders . . .

Queen: Yeah, as a matter of fact when I listened to jazz in Boston, we used wire recorders.

Sound & Communications: I guess most of the advanced technology in tape recorders came out of the Second World War.

Queen: The tape recorder development actually started before the War. In this country, most of the work was done after the War, when people like Marv Camras and Jack Mullin took some of the German developments and made them into something that was produceable. I worked on some of the first home tape recorders, as well as professional models. At the time I worked on Revere's Wollensak T-1500.

Sound & Communications: A pretty famous piece of equipment. How much did it weigh?

Queen: About 25 pounds.

Sound & Communications: A portable, huh?

Queen: Oh, yes. It was a pretty high quality recorder, though. A lot of professionals used it. 3M kept it in production for about 25 years.

Sound & Communications: What led you from tape recorder research and production into your particular niche?

Queen: Most of that time, my direction was very much toward the transducer end of the products — loudspeakers, microphones — that sort of thing. I think after

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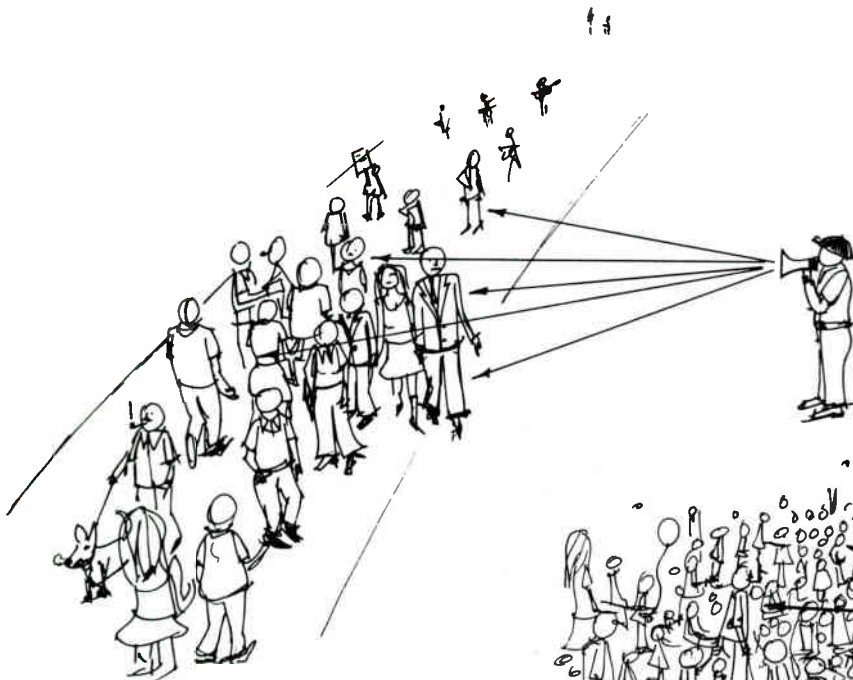
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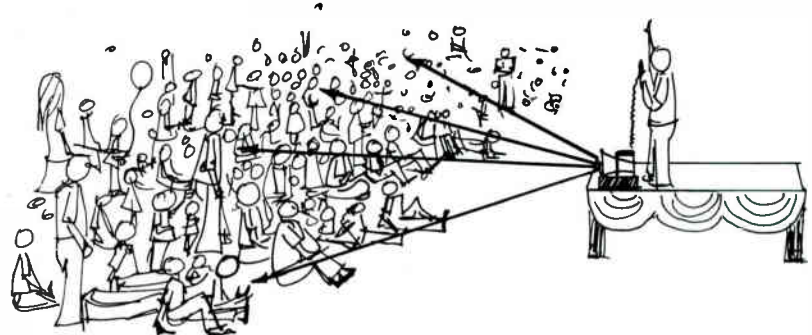
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World Radio History



In the February 1974 issue of *Sound & Communications*, Daniel Queen contributed with an article entitled "Portable Sound Systems." Three types of portable sound systems are reprinted below. At left, the speaker is hailing a small group. Below, the speaker is addressing an outdoor group. Far below, the speaker is addressing a group in a meeting room with a low ceiling.



Revere Camera I went to work for Perma Power. They were a company that made picture-tube brighteners and garage door openers, but they had gotten hold of an idea for a portable sound system, and they hired me to develop it. I guess because I had worked on a 25 pound portable tape recorder they thought I could develop a 25 pound portable sound system.

Sound & Communications: And did you?

Queen: Yes, we came out with an entire line of battery operated sound systems. At that time it was a very new idea. In fact, that line is still in production.

Sound & Communications: What year was this?

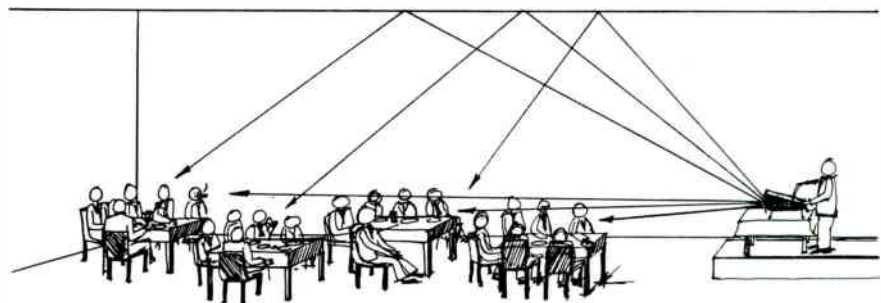
Queen: 1964.

Sound & Communications: Around the time of many anti-war and civil rights demonstrations — big users of portable sound equipment.

Queen: Yes. As a matter of fact, at the time I was chief engineer for Perma Power we were approached by a representative of the Student Nonviolent Coordinating Committee (SNCC) about needing some sort of portable sound system. We had been working on a few things along that line — a portable, high-powered megaphone system — so I put together a prototype and we sent it down to SNCC to try out. It worked well, so we put it into production and it was used extensively during the sixties, and is still used today, still in production.

Sound & Communications: What's the model number on that?

Queen: The Perma Power S-610. I also



designed the portable sound system used by Martin Luther King when he first came to Chicago to highlight housing discrimination issues. He toured different parts of the city and spoke from the back of a pickup truck. I set up a system on the truck, so that wherever he went he had sound. I think I used some Perma Power amps. The speakers were some sort of reentrant horns, probably University or Electro-Voice. It wasn't a highly sophisticated system; however, it did have pretty good gain before howlback. Its main attribute was that it was highly portable. It could be taken down quickly and moved in case there was trouble. In fact, that was a characteristic of a number of systems we used during that period in Chicago. One of the most portable (and most interesting) was the system we used across the street from the Conrad Hilton Hotel during the Democratic National Convention. That consisted of power megaphones held on the heads of people, all tied together in an array.

Sound & Communications: And you stayed in Chicago until 1984. Then in 1970 you went out on your own.

Queen: Yes. In '84 I moved to New York.

Sound & Communications: What prompted the move to New York?

Queen: Well, basically, I'm an Easterner. I was in sort of exile in Chicago. And my family was in New England, and I wanted to spend some time with my father. New York offers lots of theater, music, jazz.

Sound & Communications: Describe some of the pitfalls, joys, considerations of setting up your own business.

Queen: It's really not that dramatic. I already had lots of connections; at the time I left, I was the Director of Engineering at Perma Power, I was active in the AES, had been elected a Fellow. I guess I knew a lot of people in the industry, so the transition was very smooth. I kept Perma Power as a client, and branched off to others.

Sound & Communications: What advice would you give to those considering

becoming consultants?

Queen: Make sure you have lots of clients lined up before you start.

Sound & Communications: I know you're very active in the AES. How long have you been a member?

Queen: I believe I joined AES around 1960.

Sound & Communications: How do you see the role of such professional organizations changing?

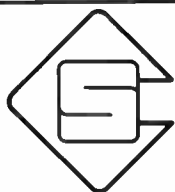
Queen: Take the Audio Engineering Society, for example, I'm Chairman of the Technical Council and also Standards Manager. That activity has been increasing geometrically. We started out in the early '50s with the first standardized recording curve for disc records from which the current RIAA eventually evolved. Audio engineers at the time realized that something had to be stan-

dardized; there was just too much proliferation of different curves. So, they got together and did it. But after that task was finished, the AES dropped away from standardization. At various times people tried to start it up again, but with the major change that took place with digital technology the interest increased, so AES reestablished its standards committee around 1980. It took as its first tasks some of the preliminary standards that were necessary for digital engineering, digital audio. In doing so, because the mechanism came back on stage, all these other tasks that had been waiting in the wings suddenly found a home. And things went along slowly, but finally, in the last two years, many different subcommittees and working groups have been established. We now have — sometimes it's hard to keep count — 28 different working groups function-

ing, and we have 34 writing projects right now.

Sound & Communications: Can you enumerate some of the issues these groups are dealing with?

Queen: We described the way to make plane wave tubes for measuring compression drivers. That had always been black magic for years and years. We provided means for specifying loudspeakers in professional audio systems — monitors and sound reinforcement and so forth. If you look on the specification sheets for professional loudspeakers you see AES specifications, now. We developed a digital interface, properly called the AES/EBU interface, which is standard in all professional equipment. That became the basis for the consumer interface, as well. We specified the preferred sampling frequencies for digital audio. Other things the



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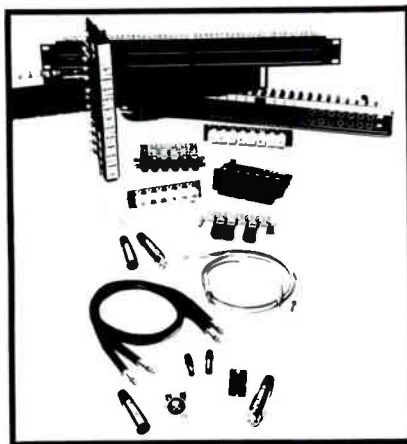
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Standards Committee has completed are a multichannel version of the interface, synchronization for studio applications and a pin-2-high standard for the polarity of the XLR connector.

Sound & Communications: Hooray!

Queen: We have issued a standard for a sound system digital control bus, enabling a sound system to be run by computer. We are issuing a standard on digital measurements and on various other things regarding loudspeakers. We're working on a document regarding listening tests for loudspeakers — some of the leading researchers in the world are drafting that.

Sound & Communications: You're also head of the Technical Council. What do they do?

Queen: The Technical Council essentially tries to keep the technical level of the AES activities as high and current as possible by obtaining invited papers, setting up special sessions years in advance of presentations and obtaining special articles for the Journal. This year, for example, there was a special session at the AES convention on music sound levels and another on auralization.

Sound & Communications: Is the AES involved in any of the legislation around digital technology?

Queen: No, we're a professional organization. We don't get directly involved in things like that, though we provide material when it's requested and our standards are looked at by legislators. Are you talking about such things as copy codes?

Sound & Communications: Yes.

Queen: No, that's more the aegis of the industry organizations, like the EIA. The EIA produces standards mainly for consumer products and those related to what their members build. They're more of a manufacturer's organization. We also, incidentally, are in the process of becoming the de facto working group for the International Electrotechnical Commission. Since the AES is an international organization, we're being accepted more and more in the world as the originators of standards for professional audio.

Sound & Communications: Other than



Daniel Queen is presented with an AES fellowship by Leo Beranek.

your immediate field, what are your other interests or hobbies?

Queen: I dabble in playwriting and publish a little poetry — try to help out with community problems. I get a little into progressive politics, a habit I picked up in Chicago in my younger days.

Sound & Communications: Let me ask you a tangential question, if I may. I'm a new board member of the Nature Sounds Society, which is an organization of naturalists, nature recordists and audio professionals, mainly. We're working on a paper on "quiet places" to present to Congress on the issue of quietude. There's a piece of federal legislation pending that will identify quietude as one of the components of wilderness to be preserved, along with trees and plants and animals, free flowing rivers.

Congress is looking at this and they're going to adjust airplane overflight patterns, rules for logging and recreational use, things of that sort, and other noise making activities in National Parks and Wilderness. Of course, quiet is a very relative term — a lot depends on how you measure it, what your base line is. At the moment the NSS is putting together a position paper addressing this issue of measurement. We want to make sure that the measuring scale and techniques really reflect true quietude. Would the AES have any interest in this topic?

Queen: AES would definitely want to be involved in this issue, particularly when

you set standards on how you would record.

Sound & Communications: It's an issue that's new and hard to educate people about. Most people don't think about quiet very much, most people don't get very much of it. It's not as immediately apparent a problem as toxic waste or air pollution. Studies are showing profound effects on humans and animals from "noise pollution," however.

Queen: When I was a kid it was kind of fun to hear a plane go overhead, partly because it was so unusual, even though we lived less than ten miles from the Boston Airport.

Sound & Communications: Are airplane overflights — environmental noise — things that have to be taken into greater account in installations these days? We have a much higher level of ambient noise in urban areas.

Queen: No question about it. I once designed a radio station, WFMT, a classical music station that was built over a railroad yard, right next to Lake Michigan where there was a major highway, and of course, lots of overflights. The only space they could rent was in an air-rights building over the railroad yard. It presented quite a challenge because they wanted a performance studio that would imitate a good chamber music hall, but was much smaller and would allow the engineer to still get a good recording and good broadcast. They wanted all of their studios to sound

basically the same, even though they wanted full choice over what speakers to use.

Sound & Communications: How did you accomplish that?

Queen: Mainly by dictating the speaker location and working to control early reflections in the room in a uniform way, a way in which all the speakers would have approximately the same ratio of early to late sound. Of course, the entire station had to be well isolated from its surroundings. You have to take urban ambience into account whenever you put a facility, concert hall or recording studio, or what have you in an urban environment — which is where they have to be to be cost effective. They're going to be very much affected. Carnegie Hall suffers a great deal from its location, from subway sound. It just wasn't thought about when it was

built, so even though we have a hall that's good acoustically, we also have a hall with noise problems.

Sound & Communications: How do you get most of your clients?

Queen: I don't know. I've tried advertising occasionally, but usually I get a lot of calls from people who can't afford me. I write a lot of papers. I teach college from time to time. But the schools just don't have the resources to provide support to teachers and students, to really create programs and procure materials. For one class I had to virtually write my own textbook. The students were highly motivated, however. It was a graduate course and the skill and interest level was high.

Sound & Communications: What qualities do you look for in hiring?

Queen: I hire mostly part-timers, contract personnel, in the main. I guess I look

for an interest in audio and some smarts; an understanding of what the project is and an interest in doing something different. It's a little hard in New York. Chicago was different. Chicago (at that time, at least) was a highly industrial town and there were more people there who had studied engineering and were creative people. I've been lucky in New York to find a couple of people who are really good, but it's not been easy.

Sound & Communications: So you work alone, basically.

Queen: Basically.

Sound & Communications: Do you also do all your own bookkeeping, and office support work?

Queen: I have part-timers working on that, but basically I handle it. I have it mostly computerized so it's easy for part-

(continued on page 74)

SOUNDSPHERE LOUDSPEAKER HITS HOME RUN IN CINCINNATI ...

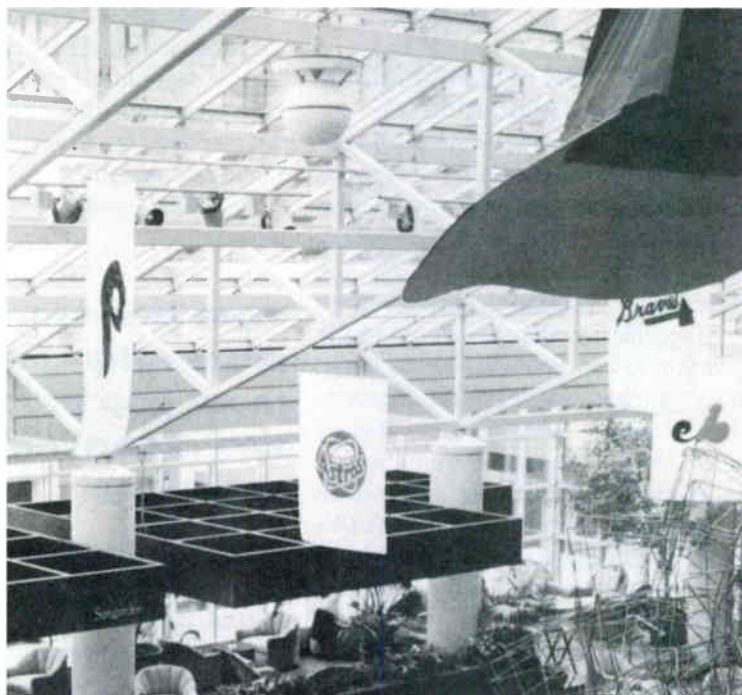
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Movie Theater Sound Systems — Part II

Special Requirements, Special Environments

BY DAN SWEENEY

In the preceding article in this series, we considered the size of the movie theater pro sound market, the recording formats, and the general layout of stereo sound systems in movie theaters. In this segment, we'll discuss the peculiarities of theater acoustics, and then examine the market environment confronting the independent sound contractor.

THE LISTENING ENVIRONMENT: Room Acoustics

Movie theaters have always been considered unique acoustical environments by those sound professionals who've chosen to work in them. They are fundamentally unlike most venues designed for the presentation of artistic performances; more specifically, they're almost totally dissimilar to concert halls, discos, night clubs, churches, and legitimate theaters.

Let's briefly examine how they're unique because motion picture theater peculiarities place particular demands on the contractor attempting a sound installation — demands that must be understood fully by anyone contemplating a theater installation.

First of all, movie theaters are stereo — actually multi-channel, to be precise. True, some sound reinforcement systems are multichannel also, but a movie theater is designed for pre-recorded, precisely mixed and panpotted stereo, not live sound subjected to some arbitrary mic'ing and

mixing pattern. Accordingly, playback requirements for movie stereo are very precise as well. A movie theater installation may use the same kind of speakers as a sound reinforcement system, but the coverage patterns, equalization, and mounting will be quite different, as will the acoustics of the room itself.

Second, movie theater sound systems must provide excellent voice intelligibility, and yet reproduce music agreeably. They have to combine the attributes of a public address system and a musical sound reinforcement system.

Now let's examine these differences in detail.

They use stereo very differently than do most pop producers and recording engineers.

Motion picture stereo recordings are made in basically the same way as recordings of popular music; that is, they're multi-track mixdowns, painstakingly engineered and assembled in the studio. In no sense are feature film sound tracks live events, and in many cases much of the dialogue is synched in later. Nevertheless, movie sound tracks are governed by a fundamentally different aesthetic from

most pop recordings. The recording engineers working in film strive for a very distinct kind of sound presentation, and they use stereo very differently than do most pop producers and recording engineers.

Whereas record producers, for the most part, strive for stereo image stability with instruments and voices precisely positioned across the front of the sound stage, movie sound engineers try to pan the sound to follow the action on screen. If for instance, an automobile is crossing the screen from left to right, the motor noise will be panned across the front three speakers to follow the image. Images can also be panned in depth between the center speaker and the surrounds, and, in the case of the split surrounds used in six channel formats, complete 360 degree pans are possible. In order for such pans to sound at all convincing, levels and equalization for the front speakers must be very precisely matched.

The only place where image stability is really stressed is in dialogue, which is ordinarily reproduced in mono out of the center channel. Otherwise things tend to be happening intermittently, first in one speaker position, then another.

Movie sound tracks also differ from commercial music recordings generally in that they stress dynamics instead of striving for hot mix at uniformly high level.

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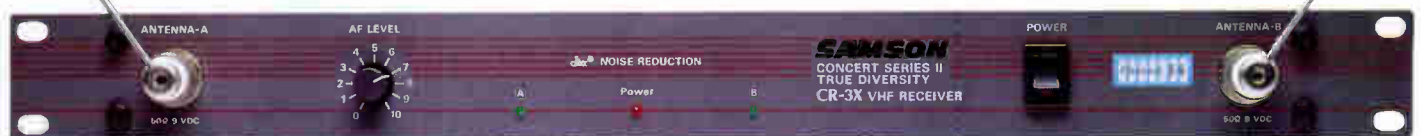
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The Tivoli Theatre in Downers Grove, Illinois. The sound system contains an HPS-4000 sound system.

excellent voice intelligibility, and the desirability of strong localization toward the screen for dialogue, as well as crisp articulation of transients reproduced in the stereo left and right speakers, high performance movie theaters are designed to have low RT60s and generally fairly dead acoustics. Many movie theaters have extensive sound absorptive treatments both behind the screen and on the side and back walls. Indeed, John Eargle in his *Handbook of Sound System Design* cautions that a well designed movie theater interior should be sufficiently absorptive to eliminate the need for performing diffuse field calculations.

High performance movie theaters are designed to have low RT60s.

Finally, movie sound tracks tend to have a lot more very low frequency information than is commonly the case in live musical performances. Lucasfilm's THX specs call for response down to 25 Hz, and such low frequency capabilities are necessary for the accurate reproduction of many current film soundtracks, especially those made for big budget spectacles. All this is of more than academic interest, because if the loudspeaker system is up to reproducing such low frequency information at the levels intended, then the installer must be prepared to cope with predictable acoustical isolation problems. Since so many contemporary theaters are multiplexes,

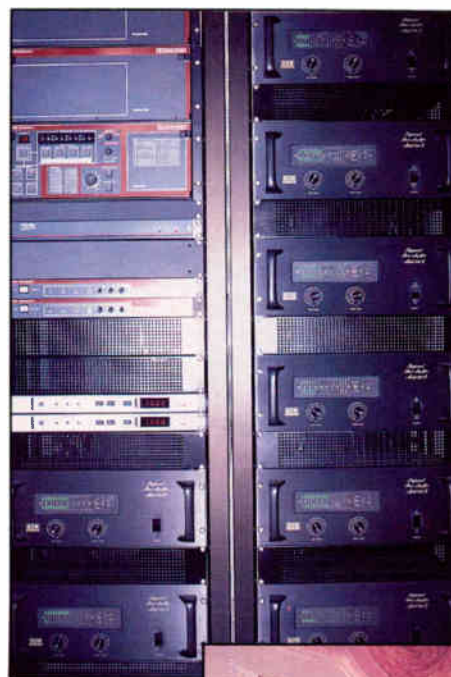
the presence of a powerful subwoofer system in one or more of the theaters in a complex may cause spillover problems in adjacent rooms. Subwoofers can also cause unseemly rattles in the baffles of the primary loudspeakers, and special care must be taken to make certain that all loudspeaker mountings are stable and secure.

Subwoofers can also cause unseemly rattles.

Acoustic isolation is also important in regard to environmental noise, and the shell of the theater must provide wideband noise attenuation. Internal sources of noise such as plumbing and climate control machinery must also be assessed for acoustical output, and if such output is excessive, then appropriate noise suppression measures must be taken.

Equalization

Motion picture theaters have very specific equalization requirements, and third octave equalizers are built right into the Dolby processors. Presentday motion



The equipment rack for a large 70 mm Showscan theater.



An SR-70 surround speaker installed at the Tivoli.

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Under construction, this shows the seven-foot-long folded horn design from Klipsch.



This shows the behind the screen HPS-4000 speaker compliment for a Showscan installation.

picture audio tracks are equalized for playback on systems exhibiting what is known as the ISO X equalization curve, described in ISO Bulletin 2969. The standard calls for the system to be flat from 100 Hz to 2 kHz, and to roll off at 3 dB per octave thereafter up to 12.5 kHz, beyond which the curve is undefined. It should be noted that the X curve properly applies only to modern sound tracks with noise reduction. In the period prior to 1980 when "Academy mono" prints without noise

reduction prevailed, the so-called "Academy curve" was standard (it is still the standard for monophonic reproduction sans noise reduction). This curve is considerably steeper and calls for an 8 dB droop by 6.3 kHz.

Both curves are based upon the simple observation that top octave response is normally attenuated anyway within the bounds of a large, dead listening space. Loudspeakers with a flat axial response in the near field should conform to these

curves pretty closely in the far field, though of course, varying room acoustics from theater to theater will call for judicious equalization. The equalizer provided with the Dolby Processor is intended to correct for such room anomalies.

Many of the speakers used in theaters today require additional equalization beyond that provided by the Dolby third octave equalizer. Most of the newer, better equipped theaters use constant directivity horns which trade off uniform wideband

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axial response for uniform coverage in the horizontal plane. These must be specially equalized for extended flat axial response, and equalization networks are built into some of the amplifiers intended to be mated with such speakers. Klipsch speakers form a significant exception here, using exponential and conical horns that don't require special equalization.

One aspect of theater acoustics that imposes special limitations of sound system performance and might not be obvious to the uninitiated is the presence of the screen itself. Normally the loudspeakers are placed behind the screen and must fire through it.

The screens used in commercial movie theaters are constructed of heavy woven plastic fibers, and the weave is sufficiently loose to result in a multitude of small perforations, so that the screen is translucent rather than perfectly opaque. The fibers themselves are variously reflective and

The fabric of the screen interacts with the signal.

absorptive, and the perforations are provided to allow for the passage of sound waves.

The fabric of the screen interacts with the signal in a very complex manner, producing diffractive, reflective, and absorptive effects. The screen affects not only frequency response, and behavior in the time domain, but it also affects the coverage patterns of the loudspeakers, and so anyone contemplating a theater installation should carefully study manufacturer application notes relating to the performance of a given model of loudspeaker in the presence of a screen. A number of technical papers have been published on the subject in the *Society of Motion Picture and Television Engineers (SMPTE) Journal*, and recent research has been conducted at Lucasfilm on the subject, resulting in some rather unusual installation strategies for addressing the problem.

Screen interaction is too complex a topic to discuss in any detail here, but anyone attempting a theater installation should familiarize himself with the technical findings in this area.

VIRGIN TERRITORY: Business Opportunities

As recently as 15 years ago, there was virtually no demand for a professional level of sound installation in the theater setting. Most theaters had but a single speaker — most commonly an Altec A4 — driven by a single channel of amplification rated at less than 30 watts.

The popularization of Dolby stereo through such vehicles as *Star Wars*, *ET*, *Close Encounters of the Third Kind*, and similar high concept spectacles created numerous opportunities for independent sound professionals to penetrate the previously closed exhibitions market. At the dawn of Dolby stereo, almost no one in the business of installing movie theater equipment had significant experience in setting up stereo sound systems, but seminars by Dolby and the major suppliers of theater sound equipment such as JBL and Electro-Voice gradually raised the level of expertise among theater suppliers, so that today the opportunities for independents are limited once again.

"Most of my work today is in special venues," relates John Mosley, a long time audio professional in the film industry whose work with stereo extends back to the fifties, and includes the invention of the Quintasound system in the early seventies. "Theater supply companies are doing most of the installations in ordinary theaters."

"Independents can't make money anymore," explains Tony Francis, President of Theatre Products International of Northridge, California and one of the earliest purveyors of high performance Dolby installations. "It's turned into a cost plus ten percent business. We do mostly special screening rooms and private theaters."

"I don't know anyone else doing what I'm doing and making money," says John Allen, President of HPS 4000 in Newton

THE THX SYSTEM

THX is essentially a licensing program developed by Lucasfilm. THX involves only the B chain of a movie theater sound system. The A chain would normally utilize a Dolby Processor and the appropriate pickup.

The THX program specifies detailed standards for almost every aspect of sound system performance and installation practices. THX is not a turnkey system insofar as Lucasfilm itself provides nothing but the electronic crossover used in the installation, but program requirements do cover equipment selection, and only a relatively small number of loudspeakers and amplifiers are certified for THX system use. All THX systems are biamplified, and all use constant directivity horns for high frequencies and direct radiator woofers in vented boxes for bass and lower midrange. Subwoofers are optional for theaters showing only 35mm optical prints, but mandatory for 70mm houses. Stringent requirements for ambient sound pressure levels, acoustical isolation, and reverberation time are stipulated in the THX applications manual.

All THX systems must meet a multitude of performance requirements, and systems must be periodically re-evaluated to retain THX certification. Initial installation involves heavy consultation on the part of Lucasfilm staff.

The THX program has generally been aimed at the major chains, and the actual installation is apt to be done by the same captive theater supply outfits who do the routine stuff. In other words, THX does not represent a special boon for the independent, though Lucasfilm is willing to work through independents.

THX has rivals in terms of high dollar, high performance sound systems. John Allen's HPS systems are direct competitors marketed against THX, and AMC has developed its own triamplified coaxial horn system for use with its special torus screen. Bose also markets a special biamplified stereo sound system for movie theaters. But where THX is unique is in the depth of its support. THX application notes and installation instructions are remarkably complete and they are backed up by strong technical support services. You don't need a lot of prior knowledge to install a THX system. All you need is the money to pay the licensing and consulting fees. — D.S.

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Center, Massachusetts. "Captive theater supply companies now do almost all of the sound systems today."

The theater supply companies mentioned by Allen and Mosley include such firms as Malco, Abbott Theater Supply, Wil-kin, Western Theatrical Equipment, and Crest Sales, among others. A number of these companies are actually captive — owned by large theater chains such as Cineplex and Mann, though many such companies also do installations for independent theaters.

Theatrical supply companies are in no sense sound specialists. Rather, they pro-

vide everything from seating to popcorn machines. It is difficult to generalize about the level of sound installation services offered by such vendors. Some theater supply companies employ highly skilled audio professionals, but seldom do they or their clients emphasize the quality of the sound installation. That's because motion picture exhibitors have been traditionally reluctant to spend even modest sums of money to improve picture or sound quality. Barely functional is often good enough.

Where opportunities exist are in flagship theaters, special screening rooms, and special venues such as amusement and theme parks, museums, industrial exhibitions, etc. — anywhere that quality of presentation assumes special importance.

Firms with a concentration in high performance motion picture sound are not common, and their founders and personnel reflect extremely diverse professional experience.

"Independents can't make money anymore."

John Allen of HPS 4000 has a background in sound reinforcement gained in classical music performances. He is also an authorized retailer of Klipsch professional and consumer products and has designed a number of unusual high output systems based on Klipsch professional speakers. Allen's systems approach predates THX (of which more below) by several years. Allen is almost unique among independent theater sound specialists in that he does not install projectors. His services are limited to sound system design and sound installation and maintenance. Allen is also unusual in that he specializes in flagship theaters owned by major chains and special venues.

Clyde McKinney, a partner in the Bay Area based Electro-Sound Corporation, does projection rooms as well as sound systems, and works primarily on special venues as well as on troubleshooting

The HPS-4000

HPS-4000 is not really an installation program, but rather an entrepreneurial enterprise established by one man, sound contractor John F. Allen, who foresaw the future back in the late seventies when he launched the company. Allen had been doing sound reinforcement, mostly in classical music venues at the time, and he'd always favored Klipsch loudspeakers. Allen correctly perceived that the new Dolby formats of the time placed tremendous demands on existing sound reinforcement systems, and he felt that high efficiency, fully horn loaded systems might be the answer. He persuaded Klipsch to develop new three and four way systems specifically for movie theater applications, and he proceeded to develop applications software for speaker placement in the theater.

Allen, by his own account, has done over 150 rooms in the U.S. and many more world wide. Customers include many major chains as well as Showscan Corporation, which uses an HPS system to showcase its 60-frames-per-second 70mm color film format.

Allen's systems depart from the norm in modern high performance installation in that they lack subwoofers and are passively crossed-over, but Allen is holding his own in the face of stiff THX competition. — D.S.

assignments for commercial theaters. McKinney is one of the most respected independents in the business. His background is in broadcast engineering.

Tony Francis of Theatre Products International is an optical engineer by training, and his firm does everything — lighting, projection, screen installation and seating, as well as sound. Francis once did significant business with commercial theaters, but today he concentrates on special venues and private theaters.

Barely functional is often good enough.

At present the special venue or private theater appears to represent the best opportunity for the independent, and some kind of arrangement with a theater design group is probably essential. "One stop shopping is the way it's done in this business," relates Clyde McKinney of Electro-Sound. Special theater installations do not constitute a steady business like putting background systems in shopping malls, but they typically involve large amounts of expensive hardware and lots of highly skilled labor. Typically the individuals or companies who commission

The number of stereo houses is going to increase.

special theaters have deep pockets.

What of the future, specifically within the larger commercial theater market?

The exhibitions industry is over-extended at present. After a building spurt in the mid eighties, relatively few new theaters are under construction. What sound contracting business will emerge will be in the area of retrofits — more than likely, stereo conversions.

Certainly the number of stereo houses is going to increase. No one can predict how fast. The possibility exists that one or more of the extended dynamic range formats — namely Dolby SR, CDS, and Dolby digital — will relegate mono to obsolescence, and will create an insatiable

demand for high performance B chains, but the historical reluctance of the exhibitions industry to spend money is also a factor to be considered.

Perhaps a stronger inducement to the exhibitors than the mere presence of improved moviesound formats will be the emergence of high definition consumer

television, and the mass marketing of "home theater." Stereo first gained acceptance in the theaters only after broadcast television had already robbed the movie industry of millions of regular viewers. Home theater could pose a new challenge, and renew pressure for an enhanced viewing and listening experience. ■



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

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The Lost Analyzer Is Found, Part One

Sound Technology RTA-4000 One-Third Octave Spectrum Analyzer

BY MIKE KLASCO

About 10 years ago the innovative engineers at dbx began to show their idea of a “next generation” $\frac{1}{3}$ octave analyzer. Aside from realtime $\frac{1}{3}$ octave analysis, it offered automatic RT60 measurement, and operation as a time averaging sound pressure level meter. Other capabilities included phantom powered mic inputs, two pink noise generators, RS-232 serial outputs for control of other equipment, printer output for a Epson compatible computer. The RTA-1 was exhibited for many years, and a number of exciting features were promised, including the ability to use the music as the test signal, and to use the RTA-1 to control the equalizers automatically. At the time this was very high tech, and more than a little ahead of its time.

Perhaps, during the 1980s, you may have seen literature, or played with the dbx RTA-1 at a trade show. Just as the unit finally got into production, dbx was split up and sold off by their parent company. AKG bought the dbx name and signal processing line, but decided to pass on the RTA-1. dbx's IC stuff (VCAs, digital converter technology, etc.) was resurrected as a new startup company. The RTA-1 was a casualty of corporate transition and fell between the cracks. About two years ago I borrowed an RTA-1 from a friend and lived with it for a while. At the time it



Sound Technology's RTA-4000.

seemed like a real tragedy that the energy spent to develop this unit was being lost.

All is not lost. Recently I have been using the RTA-1's direct descendant. About a year ago, Sound Technology quietly bought the inventory and other assets of the RTA-1. The product has been refined and updated and re-introduced as the Sound Technology RTA-4000. The appearance is identical to the RTA-1, although closer inspection indicates that everything has been gone over with a fine tooth comb.

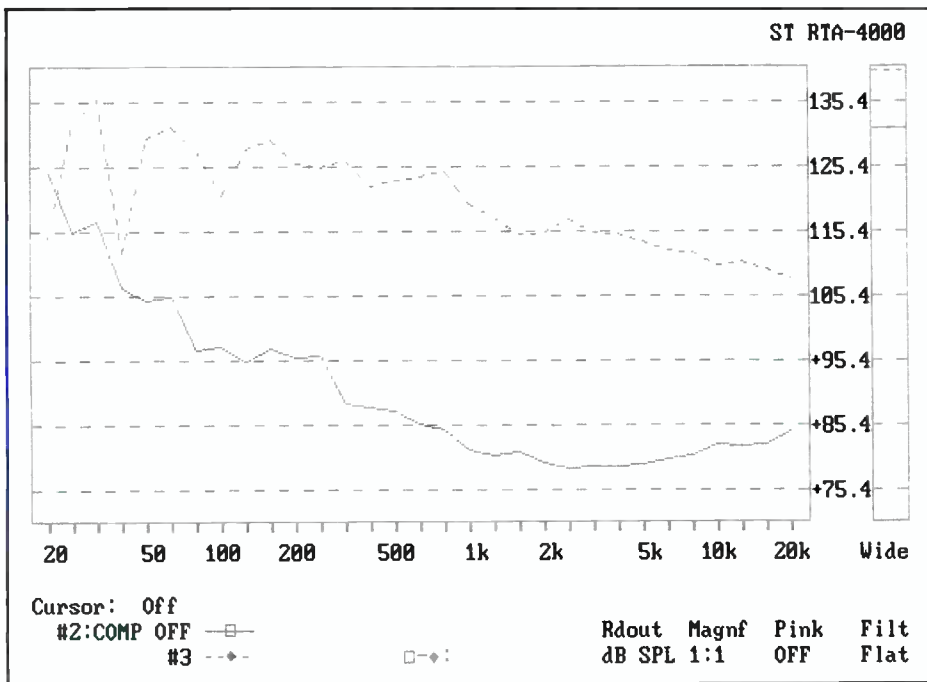
The RTA-1 was exhibited for many years, and a number of exciting features were promised.

The RTA-4000 sells for \$6,700, or \$5,950 without the reverberation measurement option.

I have commented that the typical $\frac{1}{3}$ octave analyzer (like the Audio Control Industrial reviewed in a recent issue) really is not enough to fully characterize a serious job. Yet the MLSSA, SYSid, and TEF acoustic analysis systems require a level of knowledge of both instrumentation and acoustics that is beyond far too many field technicians.

The Sound Technology 4000 is the missing link between self-contained real time $\frac{1}{3}$ octave analyzers and sophisticated high resolution analyzers. The RTA-4000 front panel simply consists of a half dozen buttons next to a CRT display, another four buttons on the upper right hand side of the front panel, and a joy stick below these buttons next to the mic inputs. A power switch is located in the lower left hand corner of the panel.

Pushing the power switch on turns on the unit, displays which version you have and then brings up the opening menu on the high resolution nine-inch (diagonal) amber CRT screen. Just to the right of each menu item on the screen is a button on the front panel. Menu selection is by a row of keys along side of the built-in video monitor, just like an ATM (Automatic Teller Machine). The concept of interactive video monitor and the row of operational choices is a great idea and the implementation works extremely well in the



When graphs have been stored on memory and retrieved, they reappear in line rather than bargraph form. In this display, two plots from memory have been superimposed on each other.

RTA-4000. Still, as a banking machine it worked poorly, as I was unable to get it to spit out any cash during my testing.

INPUTS AND OUTPUTS

Audio

On the rear of the chassis are four line level inputs using XLR connectors. On the front panel are two balanced XLR connectors with individual 48 volt phantom power. Two separate pink noise generators are connected to XLR connectors on the rear of the chassis.

Video

An EGA type color monitor output is provided on the output. The RTA-4000 supports color EGA (about 650 x 350 pixels) operation if you have an external color monitor. Even though the video adaptor is plugged into the motherboard's buss, it cannot be simply exchanged for a VGA (or super VGA) adaptor as the internal monochrome monitor is also interfaced with the EGA board.

Printer

Printouts contain space for notes and a custom banner on top. The RTA-4000 can print any screen display at any time. The printer output is configured as a standard parallel printer port and accepts a standard printer cable. Any Epson compatible printer will work, but as the RTA-4000 does not support floppy disk operation, you cannot directly use a print utility, which would allow color screen printouts. There is a way around this, which involves

transferring data through the RTA-4000's serial port to another computer, and we will discuss this later in this review.

Operation

When the unit has finished powering up, the main menu is displayed. The six Main Menu items are RTA mode, RRC mode, Memory mode, RT60 mode, System options, and pink noise output.

Pressing any menu item brings up the options within that menu and each of the six buttons now has new functions (just like the ATM machine at the bank). When you want to return to the previous menu, you press the button "BACK," located just to the right of the six buttons. Operation is completely intuitive; in fact, while I used the machine for a few months about two years ago, I had never seen the operation manual. But if you do get into trouble, you need only press the help button on the front panel, which is right above the mic inputs. Clear explanations for whatever operations you were doing will appear on the screen. This is called "contextual help" as the help info specially relates to the present operation you are in the process of screwing up. The built-in help is a very good idea as manuals rarely are there when you need them, and finding the right page in an emergency can be stressful. With the RTA-4000, all you have to do is have good aim with your finger, and hit the "HELP" button!

The functions of the six buttons on the side of the monitor change with the main menu selection, and the bottom of the screen indicates the system's status, such

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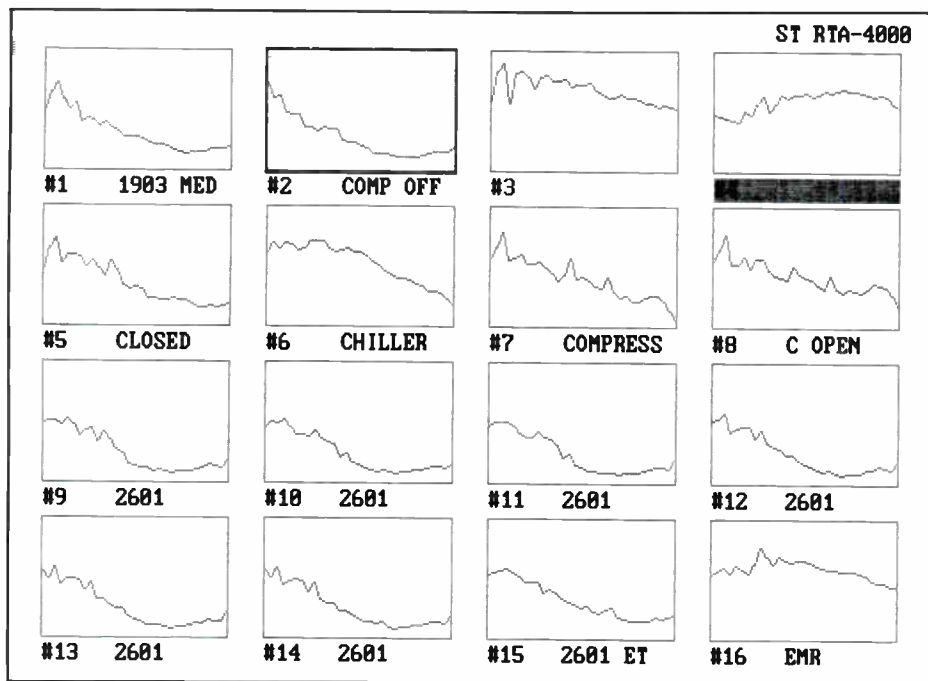
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The operator can look into the 16 memory locations simultaneously and select what data is to be shown on the main screen.

as which inputs, gain, mode, and other options are selected.

Real Time Analyzer Mode

Before you enter the RTA mode, you will normally select the System Options from the Main Menu. These include mic calibration procedures (more on this later), selection of A, C, or flat filter characteristics, and so on.

Pressing RTA results in a real time $\frac{1}{3}$ octave bar graph of the selected input. 70 dB of dynamic range is displayed. The top buttons next to the screen become the input selectors for the two mic inputs or the two line inputs. Either channel can be seen, or both channels can be summed together. If you try measuring a split stereo cluster with a single noise source, you will encounter comb filter effects. The RTA-4000 provides two pink noise outputs that are uncorrelated so that phase cancellation effects will not take place during split cluster measurements.

Below the input selectors are the gain adjustment buttons.

The $\frac{1}{3}$ octave filters are IEC/ANSI Class III filters 1976 SI.II standard (type 2B 6th order with the newer, but less familiar 1986 standard), on 31 ISO centers, 20-20,000 Hz. Class III filters are the highest grade (compared to Class II used, for example, in the more modestly priced Audio Control analyzer).

To the right of the $\frac{1}{3}$ octave bar graph is the wide-band SPL meter. The cursor is controlled by the joystick, and readouts of the data appear in the status section.

Averaging

On the CRT, "Average" is located adjacent to one of the buttons. Pressing the Average button cycles between off, fast, slow, and forever. Off displays single samples; fast keeps a running average of the previous five samples, slow gathers the previous 30 samples, forever accumulates data and averages it for as long the RTA-4000 is in this mode.

Peak Hold

In the first position, the maximum in each band is held for five seconds, then decays slowly unless pushed upward by the signal. The next mode in the cycle (by pushing the button again) is a 10 second hold. The third is "forever" in which the max levels are frozen on the screen. The next mode disables the peak hold function.

Storing Curves

Up to 16 curves can be stored in the RTA 4000's solid state memory. Battery backup protects the curves even when the unit is unplugged.

The appearance is identical to the RTA-1, although closer inspection indicates that everything has been gone over with a fine tooth comb.

Displaying Stored Curves

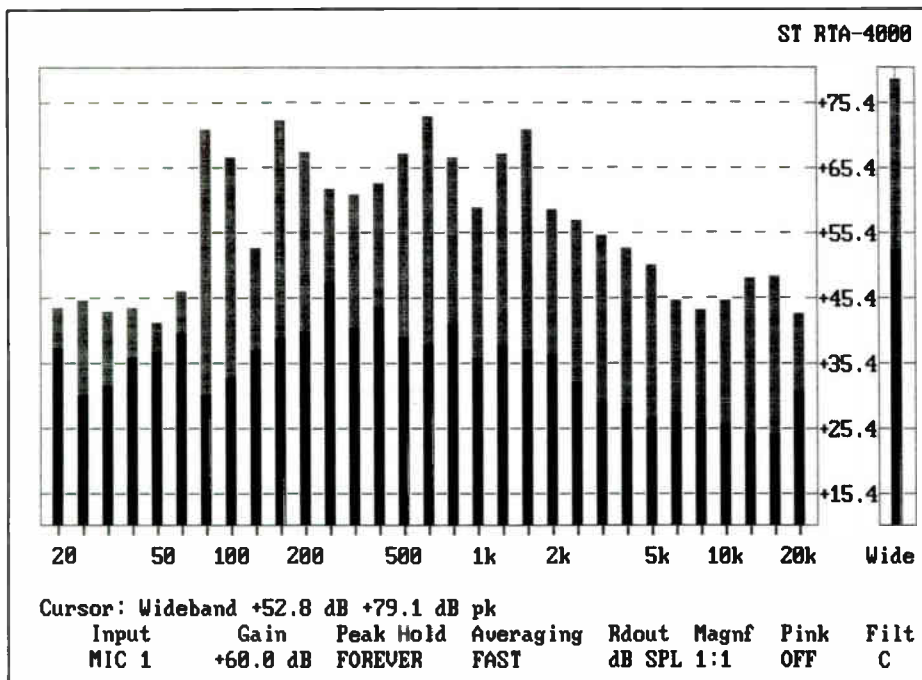
All 16 curves can be displayed simultaneously (an external 14-inch color EGA monitor would be the preferred approach for this). Any of the 16 screens in memory can be selected and displayed by itself on the screen, or in conjunction with the data currently on the screen.

RT60 Mode

Before you design or install a sound system, determination of the reverberation time is a powerful factor in selection of the

ST RTA-4000					
Calibrated Microphones:					
Mic#	Label	Sensitivity (Linear)	Sensitivity (Log)	Input Used:	Ext.Pre Corr. Gain(dB) (dB)
#1	AC10	26.9 mV/Pa	-31.4 dB(Pa)	MIC 1	125.4
#2		mV/Pa	dB(Pa)		0.0
#3		mV/Pa	dB(Pa)		0.0
#4		mV/Pa	dB(Pa)		0.0
#5		mV/Pa	dB(Pa)		0.0
#6		mV/Pa	dB(Pa)		0.0
#7		mV/Pa	dB(Pa)		0.0
#8		mV/Pa	dB(Pa)		0.0
#9		mV/Pa	dB(Pa)		0.0
#10		mV/Pa	dB(Pa)		0.0

Microphone Calibration — Up to 10 microphone calibration settings can be stored in the RTA-4000 memory.



In this display both the peak and average levels are shown together. Note that the vertical dB scale is in absolute SPL.

type and location of the speakers. While reverberation time can be predicted, there is a lot of room for error. Actual measurement of reverberation time improves the confidence factor of your RT60 predictions.

The operation of the RT60 mode is automatic. Unlike many RT60 test systems

which require some interaction with the system user, the operator is required only to find the "Make-Measurement" button. I am used to systems which acquire the room's decay time full band, and then derive the octave decay times through post processing. The RTA-4000 works differ-

ently, automatically repeating the test for each 1/3 octave band.

The result of the RT60 test is displayed as a 3-D spectral decay waterfall display, although the results of each band can be viewed by itself.

As a banking machine it worked poorly, as I was unable to get it to spit out any cash during my testing.

Normally, RT60 measurements consist of full octave bands, centered between 125 Hz to 8 kHz, rather than 1/3 octave bands.

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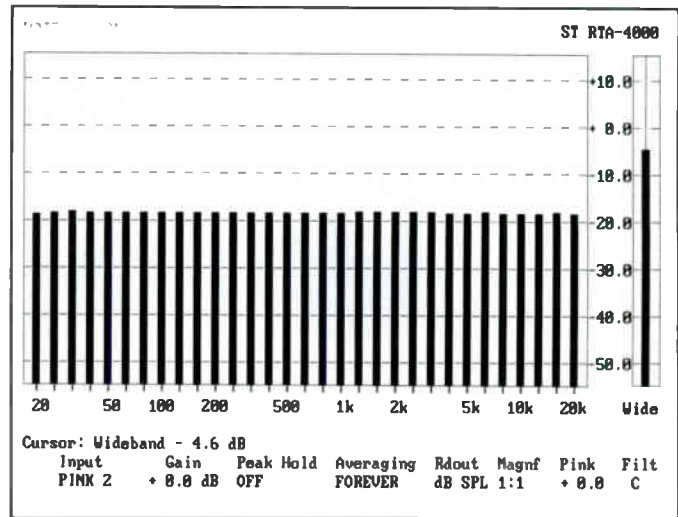
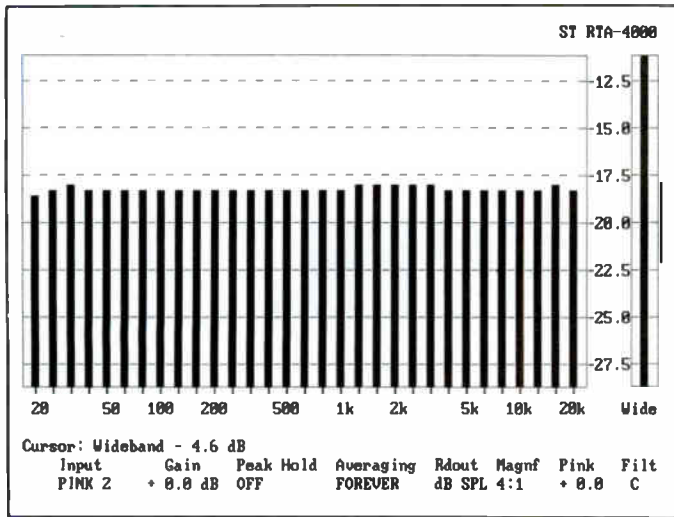
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Realtime analysis 1/3 octave display. Status of settings are along the bottom of the screen. The vertical bar on the far right is the wide-band level (set for C-weighting). At left, the dynamic range is set for high resolution at 15 dB full scale while at right the resolution is set for high dynamic range with 60 dB full scale.

Mic Calibration

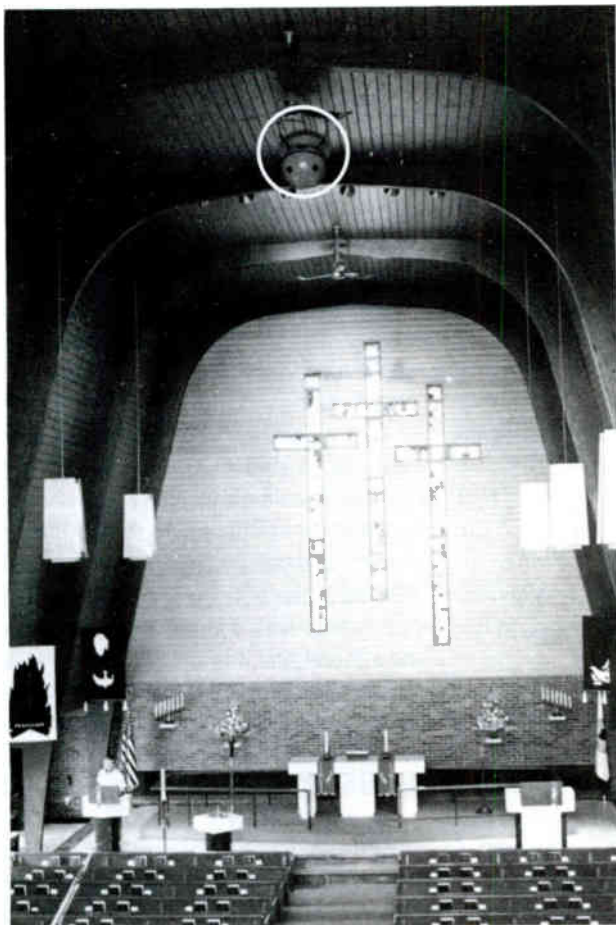
The gain of the RTA-4000's two front panel mic inputs is adjustable from +20 to +70 dB. Either input can be calibrated and assigned to a specific mic, and any line level input can be calibrated and assigned to its associated preamplifier. Once this is done, the RTA 4000's scales and cursor will give readings in dB SPL, taking into

account the mic sensitivity, the gain setting within the analyzer.

Mic calibration can be implemented using published specifications (up to 10 mics can be remembered by the RTA-4000) or mic calibration can be by external calibrator.

The mic calibration procedures given in the manual are clear and comprehensive.

In the next part to this article, we will discuss the RRC Mode, in which music is used as the test signal. This enables analysis and response correction during live performances. We will also take a look at transferring data from the RTA-4000 to other computers, construction, and provide our overall conclusions on the product. ■



"...excellent voice clarity and beautiful music reproduction."

Pastor Don F. Thomas

The Prince of Peace Lutheran Church, Ida, MI, has used a Sand colored Soundsphere #2212-1 loudspeaker for a few years. Pastor Don F. Thomas has been delighted with the improvements. He stated "there is no comparison between the former system and what we have now. The single Soundsphere loudspeaker produces excellent voice clarity and beautiful music reproduction. It also achieves very even sound distribution in my church. With it, we now do a lot more speaking by church members with wireless mikes from various areas of the church with good results. Even special programs done with children are now clearly heard in the church."

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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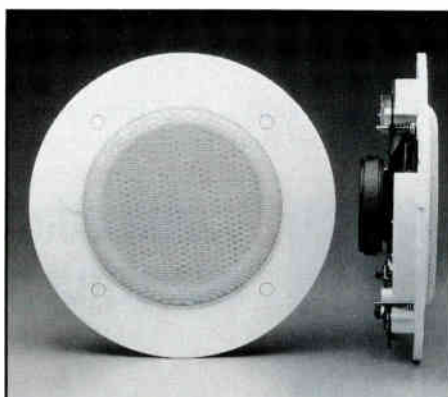
Coaxial Loudspeakers, Part Two

Direct Radiator Designs for Today

BY PAMELA MICHAEL and MIKE KLASCO

Our continuing look at coaxial speakers takes us to the world of direct radiator coaxial transducers. With the advent of stereo, by the 1960s, there was a great effort on the part of speaker designers to get one speaker to cover the entire frequency range. Coaxial configuration is a logical response to this need. Quite a few coaxial design approaches grew out of this need, with a concomitant number of applications. By making a two-way speaker into a single unit, designers gained the additional benefit of reducing some of the interactive effects by putting everything into a point source, thus improving time alignment, frequency response and stereo imaging.

Locating the tweeter in front of the woofer brings the two transducers into closer alignment, but the tweeter may obstruct and interfere with the woofer's response, especially near the crossover frequency. Yet a look at a number of speaker designs from the past show that the use of objects in front of the cone can actually improve uniformity of response. For example, 30 years ago the British Lowther wide range speaker used a bulb-shaped extension of the pole piece to act as a phase equalizer (similar to phase plugs in high frequency compression drivers). This idea was brought a step further through a joint effort by EAW and the British firm ATC with a 10-inch speaker which had a large phase equalizer that



The OWI 330X.

occupied almost the entire area of the cone.

This mid-bass driver was normally horn loaded. Even today, a number of the audiophile transducer manufacturers offer direct radiator woofers and midranges with phase equalizers. Audax and Focal are two that come to mind. So this "obstruction" (the tweeter) in front of the woofer can be optimally designed so as to have reduced interference, or even a positive effect on the woofer's response.

One early effort to control and minimize shadowing effects was Dukane's Spectra Phase. The Dukane 5A403 Spectra-Phase consists of a 3-inch cone tweeter and an 8-inch woofer. The special design of the 5A403 eliminates the cancellation at crossover frequencies. This cancellation is caused by the spacing between the woofer

cone plane and the tweeter cone plane. A phasing ring is incorporated (essentially a circular baffle around the tweeter's periphery) that eliminates this problem, resulting in a speaker with smooth response, especially in the 2 kHz midrange band which is critical for intelligibility. The 5A403 is still in the Dukane line, and today many of the direct radiator coaxial designs use similar construction.

JBL's "Composite" speaker, one of the company's claims to fame in the '60s, was another early effort to combine a woofer and a direct radiator cone tweeter. JBL's current line contains both coaxials with a dome tweeter mounted in front of the woofer and coaxials with a compression driver mounted behind the woofer with the sound exiting through a horn in front of the woofer. [See *Sound & Communications*, September 1991.]

Altec Lansing also offers several direct radiator coaxial speakers, which they call Duplex, coaxial. The 920-8B is an updated version of the 920, and is a 12-inch ceiling and in-wall with a dome tweeter. In ceiling applications it is suggested for ceilings below 28 feet. For ceiling applications over 28 feet, Altec recommends the 617-8A, a Duplex 12-inch with a narrower dispersion pattern. Altec also has an 8-inch ceiling coax, the 409E.

The E-V PRO-12B is a ceiling speaker with a dome tweeter and high power handling capability intended to fill the void

between low cost eight-inch speakers which are suitable only for short throws, and more expensive 15-inch speakers previously required for long throws from 40-foot ceilings. Maximum sound pressure in the direct field of 95 to 100 dB can be reached, and E-V's Super-Dome uses a foam aperture lens which improves uniformity of coverage. The Musicaster all-weather voice and music speaker system uses a variation of the PRO-12B and is also marketed as a University product.

E-V has a beefed up variation of the PRO-12B in their FM-12C floor monitor speaker system. This is a medium/high efficiency constant directivity stage vocal monitor. The unique black plastic molded enclosure can be oriented at various angles to the floor. Low profile is critical for anything that goes on the stage, and the coaxial transducer is the key element of the



The JBL 8140.

FM-12C's compact shape. The CM12-2 is a similar product to the FM-12C, but with a more conventional wood grain vinyl enclosure and beige grille cloth.

E-V's PRO-8A is a full-range reproducer designed for better than generic quality performance in distributed sound systems. The PRO-8A is the result of an engineering effort to develop a relatively inexpensive speaker that had accurate, highly intelligible and musical sound. The woofer's

voice coil was increased to 1.5-inch diameter; this improved power handling and provides a structurally more stable cone. A related benefit of the larger voice coil is the larger pole piece of the woofer, which has a piezo tweeter mounted to it. This speaker has excellent time alignment results, and shadowing effects are minimized. The woofer's voice coil is protected from contaminants by a large, acoustically transparent dust cap, which covers both

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the tweeter and the woofer's magnetic gap. The PRO-8A is available with both low power transformer PRO-8AT5 and high power transformer PRO-8AT30 versions.

An ingenious coax design for ceiling applications was introduced by JBL a few years earlier. This is the 8140H in JBL's Industrial Series which features Co-Motional coaxial design. The 8140H uses a piezo tweeter, but it is mounted directly to the woofer cone. This approach sealed the woofer's voice coil gap directly which also was another solution to eliminating shadowing effects between woofer and tweeter.

The Fostex RM Series coaxes embed the tweeter (a ribbon, in this case) in the pole piece of the 8-inch woofer. The RM Series features Fostex's patented Regulated Phase Technology, a system in which a flat, thin diaphragm is driven with

absolute phase uniformity in true piston motion. A very fine aluminum coil is etched directly onto the surface of an extremely thin polyester film diaphragm. This assembly is then suspended in a powerful magnetic field formed by a pair of cobalt magnets. The RM Series includes the RM-800 with a 6 1/2-inch woofer (100 watt RMS), the RM-900, an 8-inch woofer (110 watts RMS), and the RM-1000, with a 12-inch woofer (120 watts RMS). Fostex has concentrated its marketing efforts on the RM Series as near-field monitors.

JBL's 2100 professional coax series includes the 2142H, 2152H and 2155H. The 2142H has a 12-inch woofer and a direct radiating titanium dome tweeter. The rear housing of the 2142H includes biamp terminals and a quick access network cover for modification or servicing. The 2152H and



Altec Lansing's 920-8B.

2155H are, respectively, a 12- and a 15-inch woofer with titanium diaphragm horn loaded compression drivers (which were covered in the first part of this article).

Frazier has a number of unique horn-within-a-horn designs which we will cover in Part Three of this article, but the company's bread and butter foreground speakers all feature the CAT (Coincident Aligned Transducer) principle. CAT is essentially Frazier's implementation of the coaxial technique. Frazier's CAT 33, 35, and 38 all are enclosure variations of their 8-inch woofer with a coaxially-mounted direct radiating dome tweeter.

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A number of the audiophile transducer manufacturers offer direct radiator woofers and midranges with phase equalizers.

The undesirability of having the highs coming from one source and the lows from another is difficult to deny. Coaxial systems offer obvious advantages of point-source, time-coherent placement of components, but for demanding high level sound reinforcement and monitoring applications, they have often lacked adequate output capacity, particularly in the midrange. In recent years, however, much progress has been made in the analytical understanding of loudspeakers. Historically, coaxial speakers have not been high output devices: Woofers tend to be direct radiators, so there's only so much you can get out of them. New materials, stronger magnets and other refinements are giving improved results, however. Coaxial loud-

Circle 268 on Reader Response Card

speakers of today are more capable of higher output and less distortion than ever before. Which isn't to say that newer is necessarily better.

Each season seems to bring a new approach to coax design and application, or a new material, new shape, new trademarked technology. Sometimes, the new, improved turns out to be the old, re-named; but sometimes, new means new, and represents real advancement. Such is the case with Tannoy's new ICT magnetic technology. Tannoy's ICT speakers feature a new approach to the construction of loudspeaker drive units and systems, Induction Coupled Technology (ICT). With ICT, a full frequency range signal is applied to the voice coil of a relatively conventional mid/bass driver. At higher frequencies the output drops off due to the mass of the

With the advent of stereo, by the 1960s, there was a great effort on the part of speaker designers to get one speaker to cover the entire frequency range.

cone and inductance of the voice coil. Unlike the typical coaxial speaker, a separate magnetic system and voice coil is not used for the high frequency transducer, but instead, a skirted metal dome is located where the dust cap would normally be positioned. The "skirt" on the metal dome fits into the voice coil gap (along with the woofer's bobbin and voice coil). The "skirt" is inductively coupled to the signal in the voice coil. The treble used in the ICT tweeter is already in there in the mid/bass drive unit. The tweeter dome can be thought of as two part construction, with the dome acting as the radiating surface. In this unusual design, the skirt is like a single shorted coil which acts as a secondary winding to the primary coil itself. The ICT driver is designed around

this simple transformer effect. The voice coil is the primary and the skirt is the secondary, which results in a natural cross-over network. The use of electro-magnetic inductive coupling in transducers is not uncommon in phono cartridges, microphones, and even analog panel meters, but is unusual in loudspeakers.

In the 1960s, mechanical (non-electrical) crossover techniques were occasionally used in speakers, typified by the University 312. This was a "Diffraxial" which had two magnetic systems, one for the woofer, and a separate high frequency compression driver/horn. The midrange was handled by a secondary cone which was similar to a "whizzer" cone except that the end of the whizzer folded over to meet the woofer cone. It was mechanically decoupled from the woofer cone by a paper compliance that had a series of

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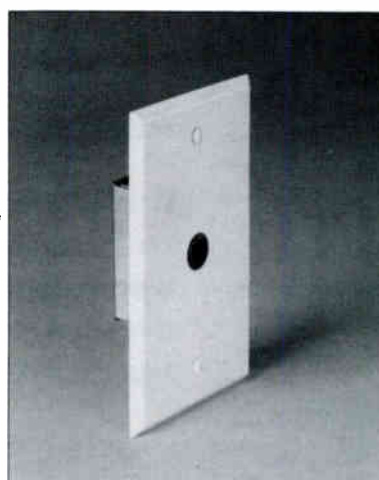
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holes.

Innovative and integrated design techniques combining the woofer and high frequency elements have been used before at Tannoy. Tannoy's "Dual-Concentric" coaxials in the 1960s used an Alnico magnetic system with both the compression driver and woofer sharing the steel magnetic system. Another extended range (but not coaxial) transducer, the JBL LE8T, an 8-inch speaker, used a common voice coil for the woofer and the high frequency dome. The woofer cone was coupled with a softer glue to the bobbin and coil, while the metal dome was directly fixed to the bobbin with a hard glue. Other mechanical coupling and decoupling techniques were used to create a mechanical crossover so the low end was radiated from the woofer and the top end from the metal dome. But the Tannoy ICT transducer goes beyond being just an extended range speaker, as the metal dome is loaded by a phase plug which is followed by a wave guide extension. The initial Contractor Series ICT offering from Tannoy is the CPA5, which is a 5-inch diameter driver in a compact magnetically shielded cabinet. Other products to follow will be a 6.5-inch version, and raw drivers for mid-priced distributed sound systems.

Another innovative coaxial transducer is the Thindy from OWI. The Thindy is commonly used in distributed sound systems. The woofer consists of a flat plastic diaphragm with horizontal ridges. Behind each ridge is a voice coil winding with all the windings connected together (actually the wire is continuous). Within each winding is a bar magnet and top plate, with all the bar magnets sharing a common back plate. The entire woofer assembly is quite shallow, less than 1 inch thick. In front of the woofer is a ribbon tweeter. The entire assembly is not only thin, but water resistant.

As impressive as many of the coaxial speakers on the market are, in terms of sound quality, application or value, the average sound contractor will probably have more call for "bread and butter," economical coaxials. Quite a few companies

offer dependable, affordable models — Atlas/Soundolier, MG, Misco, and Speco, to name just a few. Atlas/Soundolier's Strategy Series 6-inch model, the FA136, front loads into specially designed enclosures and offers a choice of system components including transformers, acoustic enclosures, a tile bridge, plaster ring, and hardware-free grilles. The FA136, which has several patents pending, is suitable for ceiling or wall installation. Other economi-

Coaxial loudspeakers of today are more capable of higher output and less distortion than ever before.

cal coaxials in the Atlas/Soundolier line include the C803, an 8-inch with 16 watts; the CP802, a high compliance 8-inch coaxial with 16 watts; the CF883, an 8-inch high compliance offering 30 watts; and the C123, another 12-inch high compliance with heavier magnets.

Atlas/Soundolier also markets a 12-inch professional quality coax at a very competitive price, model C12A. This 12-inch, 65 watt speaker has a unique transformer mounting for distributed applications. Best

Each season seems to bring a new approach to coax design and application.

results are obtained by using at least a 3 cubic feet enclosure for this model.

Misco (Minneapolis Speaker Company) has several coaxials — one of them, the JC80WP, is an 8-inch waterproof that uses a curvilinear cone made of vinyl-impregnated cloth. The JC80WP extended range coaxial is available with pre-mounted 8 watt, 25 or 70.7 volt transformers, and is suitable for swimming pool, sauna,

locker room and bathroom areas, or outside on patio or lounge areas. Like the JC80 80WP, Misco models JC80PA and JC80F (both 8-inch) feature steel baskets and solid aluminum voice coils. The voice coils are set into Misco's patented "Sealed-Linear" magnet circuit.

MG has two 8-inch coaxials in their full range Pro Series, Model 810CX with a 10-ounce magnet and Model 820CX with a 20-ounce magnet. Both speakers are available with pre-mounted transformers. Speco offers three eight-inch "bread and butter" coax models, both air-suspended, the G8-CA-10C with a paper cone, and the G8-10-CPP, a waterproof version, with a polypropylene cone. Both are rated at 25 watts. They also offer a 40 watt 8-inch. These speakers come bulk packed, or individually boxed.

Quam-Nichols' line includes two dual piezo coaxials. The 8C10CO, an 8-inch ceiling mount speaker that has been used for years in hotel ballrooms and similar installations, is designed for speech intelligibility. The 8C10FECCO is a high compliance 8-inch designed for foreground music where a wider frequency range is required. Both models are air suspension designs and have foam surround. Quam-Nichols also markets several 12-inch coaxials, the 12C10CO (30 watts RMS) and the 12C20CO (75 watts RMS), the difference being in the magnet weight of each — 10 ounces in the 12C10CO, and 20 ounces in the 12C20CO.

International Components Corporation (International C) also markets an 8-inch coax, Model S8000C10, which comes bulk packed and is rated at 15 watts. The Lowell Model CT830 (20 watts RMS) is a full range eight-inch coax designed for paging and background music applications. For applications in distributed sound systems, the CT830 may be supplemented with a variety of factory mounted and wired 25-, 70.7- or 100-volt transformers to match fire requirements and client needs.

In the next installment of our continuing saga, we'll delve into the realm of horn-within-a-horn coaxials and various other strange beasts. ■

NEWS FROM AROUND THE INDUSTRY

Acentech Purchased; Maryland Sound Forms New Division

Acentech Purchased by Employees

Senior management of Acentech Incorporated has purchased a majority interest in the firm from Bolt Beranek and Newman Inc. Acentech is the consulting firm specializing in architectural acoustics; sound system, audiovisual and video system design; noise and vibration control; and environmental and engineering acoustics. Joseph McConnell, president and chief executive officer of Acentech, commented, "This change in ownership will enable us to be even more responsive to the needs of our clients, while maintaining the high standards of technical work they have come to rely on." Acentech and BBN will "continue to team on projects of mutual interest." The consultants at Acentech have

been providing acoustics consulting services since 1948, when the founders of BBN were asked to provide architectural acoustics consulting services for the United Nations General Assembly Hall. This core group, renamed Acentech Incorporated in 1988, has consulted on more than 15,000 projects. The company has offices in Boston and Los Angeles.

New Maryland Division

Robert Goldstein, president of Maryland Sound Industries, Inc., and Laurence Estrin, president of Best Audio, have created the Special Events and Broadcast Division of Maryland Sound. Estrin serves as the general manager of the Division. The new department operates out of MSI's North Hollywood, California office. Best Audio has transferred all

of its RTS and Clearcom Communications rental inventory to Intercom Specialties in Los Angeles. The principals of the company are Keith Hall and David Brand. Estrin also announced that Best Audio will transfer a substantial portion of its television and production related audio inventory to Best Audio—East, headed by Peter Erskine and Lou Shapiro.

Sound for AES

Scharff Weisberg, Inc. provided technical facilities for 200 hours of meeting support including on-site sound, video and data projection equipment, communications systems and crew for the AES 91st convention in October. Scharff's vice president Josh Weisberg, noted, "The AES has exceptionally high standards when it comes to specifying audio equipment

for its sessions. For example, each meeting room had two high end Apogee sound systems; one for voice and another for audio playback. Several meeting rooms were equipped with multiple cameras coordinated by a portable video control room and large screen computer and video display technology was used for major presentations.

Creative Acoustics Chosen

Bally's Park Place Casino in Atlantic City has used the Creative Acoustics Chrome Deco 7 ceiling speakers in its glass enclosed Skywalk People Mover, a 160 foot passageway with a chrome Alcan ceiling. Deco 7's were also chosen by NBC for its newly renovated corporate teleconferencing area in Rockefeller Plaza.

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Protech Equipment in Thailand

Protech Audio Corporation has provided microphone and line level audio distribution systems for the Queen Sirikit National Conference Center in Bangkok, Thailand. Jacek Figwer Associates, Inc. of Concord, Massachusetts, who designed the electro-acoustic installations for the center, used the Protech Audio Integra III System to provide multiple audio signal distribution functions throughout the facility. The Center includes a divisible Plenary Hall for 4,000 people, and a number of smaller meeting and conference rooms, all equipped with sound reinforcement, conference and simultaneous interpretation systems, as well as systems for reporters, sound recording, broadcast and TV. The National Conference Center was constructed in 18 months, and was ready to host the annual meeting of the World Bank Group and the International Monetary Fund in October.

Anniversary for Pioneer Laser

Pioneer Laser Entertainment has celebrated its third anniversary in the U.S., having sold its first Laser Karaoke video singalong system three years ago. Commercial Laser Karaoke systems manufactured by the company are currently in over 2,500 entertainment establishments in the U.S., including bars, restaurants and hotels. PLE has expanded its library of song titles to 1,064. Pioneer Laser Entertainment is a subsidiary of Pioneer Electronic Corporation. In addition to its Laser Karaoke product line for consumer and commercial use, PLE manufactures and markets a line of CD Laser-Juke Boxes. New features on the company's Laser Karaoke combination players include digital sound processors allowing consumers to select listening environments (Hall, Stage, Arena) and vocal effects (Pops, Jazz, Ballad, Chorus). The Pops mode emphasizes the high frequencies. Jazz uses long echoes. Ballad has

short delay times. And Chorus adds high vocal sound of one-eighth pitch and one-quarter pitch to the original vocals.

CRC Installs Tower System

CRC Audio/Video Contractors of Citrus Heights, California has completed the installation of the audio/video and telephone system for a 28,000 square foot Tower Records store in Chicago. The installation consists of five different systems or sound environments (pop CD, jazz, films and shows, classics and video). The total system features 210 Bose 102 speakers and 14 Bose Acoustic Wave Cannons, 56 Sony SSM-2010 video monitors, 17 Crown CT Series amplifiers (totaling 10,000 watts) and 18 Peavey programmable equalizers. The system also includes various source equipment from Sony and Pioneer with B&K preamps. The installation also includes a Merlin II with 50 telephone sets. CRC says the installation was completed in two weeks with a crew of four men, excluding the prewire cable which was installed by a local contractor.

Increasing Business in Ballrooms

FSR, Inc. reports increasing business in the installation of their ML-112A and ML-132 audio combining systems. "Contractors are busy installing our system in hotels, colleges and restaurants," reports Janice Sandri, vice president of FSR. "Norcon Electronics installed two systems for the Sheraton Crown Plaza in New York City; Aatronics, Inc. installed two systems at Boise State University; Landry Sound Construction installed a ten-room system in New Orleans; and Sound/Com of Berea, Ohio, just installed a 12-room system for Marriott." Smaller three and four-room JL-112A systems have also been installed by City Animation, Thalner Electronics, Simplex Time Recorder, SESCO, Thompson Electronics Company, and Linde's Electronics. According to FSR, although



International Tapetronics 140 x 180 system.

new hotel construction may be at a halt, sound system renovations are steady business.

Maxell Expands Broadcast Sales Division

"Expanding its growing presence in the broadcast market," Maxell Corporation of America has appointed Anthony Petruziello to eastern regional manager for the company's Broadcast Sales division. He replaces John Selvaggio who has been promoted to national sales manager. Petruziello was previously senior broadcast tape specialist at Ampex. Maxell says its professional/industrial division has experienced double digit growth in sales over the last year. Additionally, the company has formed an alliance with BTS to "pursue a variety of technological and marketing goals in North and South America." The joint effort began with a cross promotion whereby Maxell provided a free case of videotape with each order of BTS Betacam SP videotape recorders.

Ice House Sound

The Ice House, a comedy club in Pasadena, which was established in 1961, has been renovated to include a second venue, "The Annex," a showroom for "blues lovers." The entire club's sound uses Panasonic Ramsa equipment, including speakers, graphic equalizers, mixing boards and amplifiers. The Ramsa installation was completed by Nelson Sound of Covina, California. The main showroom holds 200 people, but the furthest seat is only 25 feet from the stage. The Annex holds 80.

Switcher System for Theme Park

International Tapetronics Corporation has provided several large audio switcher systems to Electrosonic, Ltd. of London for "use in a major European theme park." One system is configured to deliver 140 input signals to 180 output destinations; a second system is configured for 64 inputs and 128 outputs. The company's audio switcher is designed to provide the capacity for automated or manual manipulation of multi-event "salvos," multiple remote control and control interfacing options, modular expansion to 512 input x 512 output four plane system, plus on-board memory redundancy and protection. The company says the switcher is used in music and message routing and emergency notification use in theme parks.

San Jose Adds Bag End

San Jose State University's Department of Music, which offers a major in electro-acoustics, has added a fourth recording studio, including Bag End speakers. "It's an eight-track, completely digital studio," said Allen Strange, director of the studios for the university. "It's for our new studio that we acquired a pair of Bag End's TA15 loudspeaker systems." San Jose State's other three studios include a 16-track studio with digital capabilities, an 8-track voice-over, sound effects generation studio, and an 8-track MIDI teaching studio. Strange said the music department has a set of four Bag End loudspeaker systems in one studio and sets of pairs in the remaining studios.

REP NEWS DSA To Ramsa

Doug Swan Associates has joined the Panasonic/Ramsa team of representatives, responsible for the state of Florida. DSA was established in Melbourne, Florida by Doug Swan in 1988 as an independent manufacturer's representative for the MI, pro audio, and sound contractor industries. The DSA team consists of Swan, John Chase, and Dana Sadowski.

New Reps for Sonance

Sonance has announced several rep

changes. T & A Marketing in Chesterfield, Missouri covers Nebraska, Iowa, Kansas, Missouri and southern Illinois. Dixon Smart, Joe Schaffer and Randy Gacke handle the account. Mel Foster Technical Sales in Edina, Minnesota has been named the Sonance rep in the Dakotas, Minnesota and western Wisconsin. The company has been in business since 1924. David Voelke, Bob Schmid and Mark Mitchell handle the account. Performance Plus Marketing in suburban Denver has added Stan Beil to its firm. Beil covers metropolitan Denver, western

Colorado, Utah and southeastern Idaho.

Bag End Builds Rep Network

Bag End Loudspeaker Systems has reached agreement with Quad-Tech Marketing Associates of Shawnee Mission, Kansas to act as Bag End representatives in Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Missouri, Kansas and southern Illinois. John Vitale, sales manager of Bag End, said, "With the addition of Quad-Tech, Bag End continues to build not only the most extensive network of representatives in the company's history, but also the highest quality rep network we've ever enjoyed."

Reps for Neutrik

Neutrik USA, Inc. has added two

companies to its representative network. Hartman & Associates of West Chicago, Illinois represents Neutrik in North and South Dakota, Minnesota, Wisconsin, northern Illinois, Indiana, Kentucky, Michigan and Ohio. Hart-Mann Associates of Long Valley, New Jersey represents the company in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey and West Virginia.

Corby Adds Rep

Jerry Rooks of Security Solutions has been named sales representative for Corby Industries, Inc. Prior to joining Corby, Rooks was employed by Napco. His area of responsibilities for Corby include sales and technical support for all the company's product lines. He is currently representing the company in Florida and the Caribbean.

"Notes on Product Check."

Corporate Presentation Rooms/Boardrooms

Hard work, diversification, flexibility and penny-pinching are some of the catchwords issuing forth from contractors doing corporate installations these days. Our researchers are being told in no uncertain terms, that these are indeed tough times, and that the going depends on an innovative breed of contractor to get through the worst.

One contractor from California whose business was brisk in August, reports "... it all shut down in the past couple of months. We never experienced what the East Coast went through. Now the recession has caught up with us."

Yet in spite of the down side of the economy, another contractor from the same area tells us the recession has been something of a "boon" to their business. Both corporate and state agencies are merging and have to "... satisfy more than one need." As a result they have to "call into multi-user systems."

Product Check's editors are hearing that people are still "penny-conscious." Projects are taking longer to complete because of "a great deal of paper work." There is more justification needed and more committees are involved in the process. People are spending in small amounts more frequently. The climate has become slower and tighter with more competitiveness. And in installations where the end-user is actually seeing the product, "... they'll go for big names and

big ticket items."

It seems as if the sun still shines on the South where "The economy hasn't died," and the tourist industry is credited for keeping the economic level up. Despite this, some Florida contractors report a "slacking off" on the number of corporate projects awarded this year compared to last.

A slight resurgence is being felt in the Northeast, where a floodgate of corporations who have held off as long as they could are back requesting quotes. "They've waited until the absolute last minute before giving the go-ahead."

And now a few words from the contractors we spoke to:

"You have to be eclectic enough to work on various jobs."

"There's virtually no margin for error in the corporate marketplace ..."

"If a project was worthwhile, it was done."

"There's no profit in labor ... we lose money in service jobs."

"It's pretty much dog eat dog right now ..."

"This year wasn't bad at all, because we work so hard."

"Our margins have gone down because of competition."

"The time between submission and approval has doubled."

"If it wasn't for all the work I bid last year and am completing now, there isn't a heck of a lot out there."

— Liz Krumenacker

See page 78 for "Product Check."

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A New High for High On Kalamazoo

Yes, there really is a Kalamazoo — and for the past nine years this southwest Michigan community has played host to what has become one of America's premiere air shows, *High On Kalamazoo*. This year the growth of the show, as well as the sponsors' desire to provide the best in entertainment value, led to a demand for improvement in audio quality.

When Crookston Audio of Delton, Michigan, ultimately the successful bidder, received the bid specifications, it was evident that this was not going to be a typical commercial sound project. The length of the spectator area was over 2,000 feet long while the depth of the area averaged 1,000 feet. The specifications called for an average sound level of 90 dB within this large area and a frequency range response of 50 Hz to 15 kHz \pm 5 dB. While such numbers are not intimidating under normal concert situations, there were restrictions placed on the layout which added to the challenge. Besides a limitation on speaker tower height, dictated by the FAA, the show managers were concerned with viewing obstructions and wished to eliminate any cables in the audience area, which eliminated delay towers as an option.

Crookston Audio had been testing a new 3-way system design for about a year when this project came along,

and it quickly became the logical choice for this show. The design was a collaborative effort which included assistance from Community Light and Sound, Gauss and Crookston's engineering department. The design criteria for the enclosure were simple — to pack as much power-handling capacity into as small a package as possible. The design was based on the use of Community's M-4 mid-range assembly and their smaller format horn, the SH series. To keep pace with the M-4, a Community VB 664 bass flare, a dual 15-inch cross-fire design, was loaded with Gauss 4580 15-inch low frequency drivers. In the center of the cabinet, a PC 464 2-inch entry horn was loaded using a 2 x 1 adapter coupled to a Gauss 2080 1-inch driver. The power handling capacity of these products made their use essential. The porting in the bass flare was found to be incorrect for this use. These were blocked off and porting was provided on either side of the high frequency horn, tuning the 8-cubic-foot enclosure to 45 Hz.

The net result is an enclosure measuring 62 inches H x 25 inches W x 24 inches D and weighing a hefty 246 pounds. It has a 1 W, 1 M sensitivity of 111 dB and is capable of handling 2,200 watts of program power. Crossover points are at 315 Hz and 1.6 kHz with a frequency range of 40 Hz to 15 kHz \pm 5 dB. To complete the design, all elements are physically time-aligned for



coherent sound.

For the air show, eight cabinets were used. Four each were placed on hydraulic work platforms allowing them to be flown at 25 feet during the shows and lowered at night to conform to FAA requirements. The towers were placed 350 feet apart directed outward. Between the towers a scaffold 15 feet in height was erected where two Community M-4 coaxial assemblies were provided with Gauss high sections for near-field articulation.

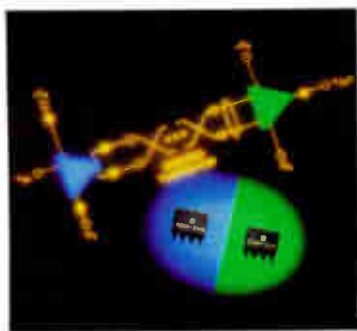
Each tower was mixed off a separate subgroup of an Allen & Heath SC 424 console. Equalization and leveling were accomplished with Furman products. A simple monitor mix consisting of Bose 102s was provided for the commentator. All power amplifiers and crossovers were Carver products.



During the show, Crookston Audio received many compliments on the exceptionally fine system performance. The narrator, Frank Kingston Smith, acknowledged dean of air show commentators, summed up that performance when he started proceedings the second day by telling a large audience how nice it was to awaken to the sound of air show music in his hotel room — over a mile and a half from the airport! At the time, the system was being used only at half power.

Tannoy for Editing Suite

Tannoy's System 12 DMT studio reference monitors have been installed in Videomix's new digital editing suite. Videomix is a 10,000 square foot audio for video facility in Manhattan, whose new digital editing suite features the Sonic Solutions eight track Sound for Picture system, the System 12 DMT monitors, each accompanied by a Tannoy C150 subwoofer and Hothouse Professional Audio M500 amplifiers.



Analog Devices SSM-2141 and SSM-2142 differential line driver/receiver ICs.

Line Driver System

The SSM-2142 from Analog Devices is an integrated line driver system for audio, telecommunications and industrial application. The monolithic device replace transformer-based solutions. Housed in a single 8-pin miniDIP, the SSM-2142 provides complementary differential outputs from a single ended source.

Math Associates Moves

Math Associates, Inc. has moved into

its new parent company's 65,000 square foot facility at 5500 New Horizons Blvd., Amityville, New York 11701. The new Math facility houses administrative and marketing offices as well a research and development and manufacturing. General Microwave Corporation, a designer of microwave and electronic test equipment and components, acquired Math Associates in August. Math Associates manufactures fiber optic data transmission systems.

New Products, New Technologies, New Ideas



Sometimes things come together perfectly. Seller meets buyer. Teacher meets learner. Pioneers open doors to new worlds, and whole industries follow.

Sometimes, one event serves an entire industry so well that it just keeps getting better, year after year.

INFOCOMM '91 set new records:

- All available exhibitor space sold out as exhibit sales soared up 12.7% from 1990 leaving a substantial waiting list of companies anxious to take part.
- Attendance rose 15.3% and seminar attendance doubled!
- There were more special events . . . more conferences . . . more meetings of affiliated organizations than ever before.

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Circle 214 on Reader Response Card

World Radio History

PRODUCTS

Mackie's Mixer; Panasonic Goes DSP

Twelve-Channel Mixer

Mackie Designs has debuted its MicroSeries 1202 12-channel mic/line mixer. The 1202 occupies less than one square foot of space and offers 20 inputs. The MicroSeries 1202 employs the same electronics and construction as the CR-1604 16-channel mixer.

Specs claimed for the 1202 include a signal to noise ratio of 90 dB, 108 dB dynamic range and distortion below 0.025 percent across the audio spectrum.

Circle 1 on Reader Response Card



DSP Cameras

The Closed Circuit Video Division of Panasonic Communications & Systems Company has introduced two series' of digital signal processing cameras. The WV-CL350 and the WV-CL320 lines are DSP cameras that have features such as programmable back light compensation and a built-in Alphanumeric character generator.

Circle 2 on Reader Response Card



Remote Control

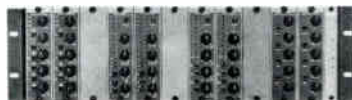
AMX Corporation has introduced its AXCENT remote control system for small to medium-sized busi-



nesses. It offers control of audio/visual and environmental equipment found in boardrooms, teleconference rooms, media rooms and training centers.

AXCENT, housed in a single-height rack frame, integrates M68000 processing, memory and nine different control options on a single circuit board.

Circle 3 on Reader Response Card



Modular Processing

Aphex Systems has introduced its modular processing system. The modular system series 9000 is designed to allow multi-channel processing and is format compatible with the dbx 900 system, allowing use of racks already in use. All modules offer the same servo-balanced inputs and outputs of Aphex standalone models.

Circle 4 on Reader Response Card

Upgraded SAORI

TOA Electronics, Inc. has introduced upgrades to its SAORI digital sound processor. Upgrades include: PC-control software, long-delay modules and expander subframes.

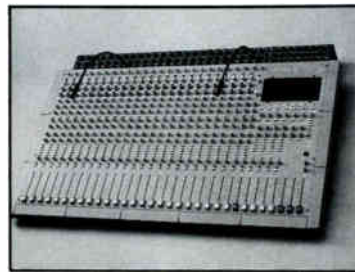
The software allows for control of the unit's programming from a personal computer hooked into the RS-232C port. This allows system adjustment to be made from the listening area.

Circle 5 on Reader Response Card

Submaster Consoles

Biamp Systems has begun shipment of the Olympia and Columbia mixing consoles. The Olympia series are four-submaster consoles that include four-band EQ with sweepable mids, six auxiliary sends, four mono and two stereo returns, a stereo input channel, a talkback system and an external power supply. The Columbia series are eight-submaster consoles with the features of the Olympia series plus two additional auxiliary send busses, direct outputs and auxiliary left and right Main outputs with independent level control.

Circle 6 on Reader Response Card

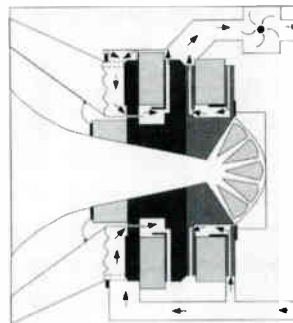


Actively Cooled Speakers

Bond ElectroAcoustics, a Division of Equity Sound Investments has introduced an actively cooled loudspeaker system which contains a single 12-inch and a 2.84-inch compression driver in a coaxial arrangement. It's available in either a compact trapezoid cabinet or a low-profile monitor.

Bond's "PowerCooling" system is a fan-actuated, forced air cooling system designed to "virtually eliminate power compression."

Circle 7 on Reader Response Card



Timelapse VCRs

Mitsubishi Electronics America, Inc. (MELA) has introduced the HS-5300U and HS-S5600U time-lapse recorders. The units feature self-diagnostics and automatic head cleaning, and provide 12 hours of audio recording performance with optional RS-232 output VHS or SVHS.

Other features include alarm search, multi-mode alarm options, and double density recording.

Circle 8 on Reader Response Card



Compact CCD

The Security Systems Division of Sony Corporation of America has introduced an ultra-compact monochrome CCD camera. The camera, called the SSM-520AM/S, measures 3 3/4-inches (height) x 2 1/4 inches (width) x 2 1/16 inches (depth) and weighs one pound, seven ounces. Its housing is made from water-resistant die-cast aluminum and can withstand a shock of 70Gs.

Circle 9 on Reader Response Card



Amp Addition

Electro-Voice has introduced the model 7300A amplifier, offering features not found on the preceding model 7300. The 7300 A delivers 250 watt/channel at eight ohms, 400 watts/channel at four ohms and 500

watts/channel at two ohms. Rather than a VI limiter circuit, the 7300A uses a proprietary protection circuit called "Output Z Protection." The circuit eliminates premature limiting and is stable with high reactive speaker loads.

Circle 10 on Reader Response Card

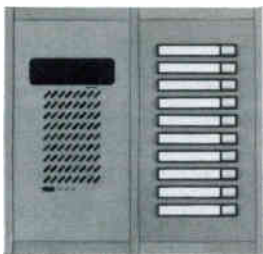


Multi-Unit Intercom

Aiphone Corp. has introduced the VY multi-unit video sentry system to the United States. The VY is designed for medium-sized applications serving up to 40 users.

Two styles of room stations are available including the single-unit video sentry (MY-1AD) audio-video monitor with integral headset and the modular video sentry (MY-U/IE) monitor with separate headset. Entrance panels use 10-call modules with backlit directory.

Circle 11 on Reader Response Card



Aiphone's VY-10DM 10-call lobby/directory station.

Panel Connectors

Neutrik has introduced its MPR/FPR series XLR-type panel chassis connectors. Featuring gold-plated contact elements, shell and chassis ground and self-tapping screws, the

MPR/FPR series connectors snap into pcb's for pre-fastening with a bottom retention pin.

Circle 12 on Reader Response Card



Compact CCD

The KP-M1 from Hitachi employs 2/3-inch CCD with 768 horizontal x 493 vertical picture elements. Less than three inches long the camera weighs 4.2 ounces.

Features include a multiple-step electronic shutter that offers speeds from 1/1,000 to 1/10,000 and can be switched from the outside of the camera. Frame and field storage modes are also externally switchable. The camera has an internal/external sync system and is asynchronous.

Circle 13 on Reader Response Card



Fiber Optics for CCTV

The SR-2000 from Meridian Technologies is a fiberoptic communication command center in an EIA 19-inch x 5 1/4-inch subrack. It accommodates up to 18 cards each with three channels of AGC video and one 200 watt switcher or 15 cards with redundant supplies.

Circle 14 on Reader Response Card



(continued on page 75)

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November 1991 73

QUEEN

(continued from page 45)

timers to handle the material and take care of it.

Sound & Communications: What computer setups do you have?

Queen: I have a digital VAX and a couple of PCs.

Sound & Communications: Do you do much computer assisted design? What software are you using?

Queen: I developed most of my own software before PCs came along, before people came up with most of the fancy software. So I've only recently begun looking at software packages. For example, I installed SysID, a measurement package from Ariel; an acoustical measurement package. I've looked at some of the speaker layout and speaker design packages, but generally I stay with my own.

Virtually everything I do is computer assisted and has been since I started.

Sound & Communications: How do you think computers are changing the field?

Queen: They certainly have made the potential for system and acoustic design accuracy much greater. They have also, unfortunately, resulted in a great deal of carelessness. People think they have a design because the computer comes up with something, but they don't. If they took the time to think, to look at the problem more carefully, more intuitively, they often would realize that they really have not done anything but made an elegant mistake.

Sound & Communications: Is the quality of engineering better as a result of computer proliferation?

Queen: I think the intuitive grasp of the field is pretty high in what I've seen in the graduates of the better engineering schools. But I think it's more the people who haven't gone to school recently who are running into problems, and perhaps making assumptions they shouldn't. And perhaps there are some people who would not be well qualified without the computer, who are relying on results from the computer, and don't have an intuitive feel of what their designs should be doing.

Sound & Communications: How much time do you spend reading, keeping up with technical data, and such.

Queen: Perhaps ten hours a week. Keeping up with data and such is most of my job.

Sound & Communications: What do you read regularly?

Queen: Mostly journals — the AES, Acoustical Society, and some of the trade press.

Sound & Communications: Are you on any computer bulletin boards or networks?

Queen: I'm on Compuserve, Easy Link. And the AES has its own network now. [See the September 1991 AES Journal for details — Editor]

Sound & Communications: About how many conferences, conventions, seminars, etc. do you attend per year?

Queen: Two or three AES, two ASA, a couple of others — six or seven altogether, I guess. Participating is important, in terms of getting and staying known and

keeping up with new developments in the field.

Sound & Communications: What are some of your current projects?

Queen: I have a number of transducer projects such as Sonic Systems with its Soundspheres.

Sound & Communications: Those are coaxes, right?

Queen: Well, you could call them co-spheres. Sonic Systems is one of those clients who came in with something that really looked like it shouldn't work and said "make it work." I found that, like with people, given a little support and understanding, they really could work amazingly well. I also work with people in the telephone business. I've done some very unusual telephone things with respect to conferencing and speaker phones.

Sound & Communications: Last question. You are working on speech intelligibility. There seems to be a general increase in expectations in sound quality. The average, even the home-product consumer has much higher demands when it comes to sound these days. Do you see that as continuing in the future?

Queen: Well, I think the on-going improvement in performance is as much due to us making newer technology and materials available as it is from expectations. There are fantastic things we can do today — things like adaptive equalization, high temperature, lightweight loudspeaker drivers — things we only dreamed about 30 years ago. I hope we can keep up that kind of dreaming. ■

CONCERT

(continued from page 30)

the demand placed on the system by new video facilities at several CONCERT sites. Currently, the new switch is operating with 64 inputs and 80 outputs. It ensures that the video signals from the site where someone is speaking are sent to every other site but not back to the originating site.

The original cameras for the CONCERT system were JVC KY 320 Plumbicon cameras. This vacuum-tube camera system was upgraded recently to a solid-state system. Because these cameras are based on semiconductors rather than tubes, they are more reliable and less likely to wear out. As mentioned earlier, the cameras are

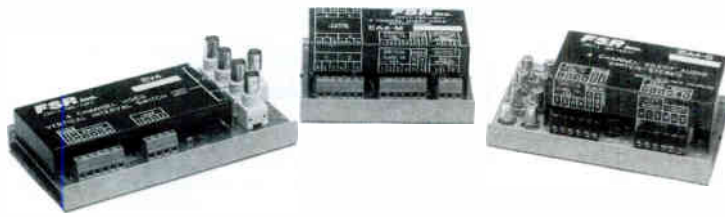
voice-activated via the Shure AMS automatically to select the person speaking. A Grass Valley 100-N production switcher used in the teleclassrooms switches the cameras from the instructor to the students or the graphics screen.

Future plans for CONCERT include a link to Capitol Satellite in Raleigh in the near future, pending FCC approval. This link will enable CONCERT sites to transmit satellite programs on the C and Ku bands. Plans also are under way for new CONCERT sites at the Institute for Academic Technology and the North Carolina Biotechnology Center in Research Triangle Park to be installed in the coming months.

CONCERT also implements compressed video for the CONCERT sites at BGSM and UNC-C. This requires addi-

tional equipment, namely echo-reduction units, to ensure the quality of the audio. The equipment cost, however, is balanced somewhat by the increased efficiency.

In addition to operating CONCERT, the MCNC Center for Communications houses a research department that works on developing high-performance communications. One of the group's projects is the development of a prototype gigabit network known as VISTAnet. The project goal is advancement of networking technologies in support of advanced supercomputing applications. Currently, the prototype network is in operation between Research Triangle Park and Chapel Hill. It provides physicians at UNC-CH with access to the supercomputing resources at MCNC's North Carolina Supercomputing Center. ■



Switching Modules

A series of EV-4 audio and video switching modules has been introduced by FSR, Inc. The EA-4 is a 4-input, 1-output audio switcher available in stereo and mono. The module has 600-ohm transformer-coupled output. The EV-4 module is a 4-input, 1-output composite video switcher with switching occurring during the vertical interval of the outgoing signal.

Circle 15 on Reader Response Card



Portable Test Set

Audio Precision has introduced the Portable One Plus audio test set for field, studio and benchtop audio test and measurement applications.

The unit is a two-channel audio test set which adds graphic sweeps and hard-copy output to printer to the features of the previously released Portable One. This allows for sweeping, viewing and printing both graphic and numerical data from frequency, phase and distortion sweeps, as well as instrument settings and bar graph displays.

Circle 16 on Reader Response Card

CCTV Switcher

Gyrr, a division of Odetics, has introduced its DigiScan III digital switcher. Through digital circuitry the DigiScan III allows selection of video recording input from as many as 16 cameras, in any combination of color and black and white, with playback options of one camera, nine cameras or all 16 images on one screen.

The unit doesn't need a camera-switcher pulse from the VCR, and has plug-in compatibility with most CCTV cameras and recorders.

Circle 17 on Reader Response Card



Spectrum Analyzer

Gold Line has introduced the DSP-30 one-third octave audio spectrum analyzer. The DSP-30 is a portable, realtime, multi-function test instrument for applications including machine alignment, live music, equalization, and elimination of feedback. An 85 dB window enables a user to view the dynamic characteristics of a hall and to monitor distortion levels.

Circle 18 on Reader Response Card



Full Range Speakers

SoundTech has introduced a full range speaker system. The P28CD features a pair of 80 inch STS speakers with foam surrounds mounted in a tuned infinite baffle for bass efficiency to 80 Hz. High frequencies are reproduced to 20 kHz by a compression driver and constant directivity horn.

Circle 19 on Reader Response Card

PEOPLE

JBL and Biamp Appointments

Kamlet at JBL Pro

Rick Kamlet has been appointed Product Manager at JBL Professional. In this position, Kamlet is involved in the research and development of JBL loudspeaker and electronics products.



Kamlet

Previously, Kamlet has held positions as TOA's Manager of the Engineered Sound Products Division and National Sales Manager for the Professional Music and Entertainment Division. He has also worked at Numark Electronics as Manager of Engineering and Technical Services.

Sales at Sennheiser

Matt Robertson has joined the staff at Sennheiser as Sales Manager, Western Region. Robertson is responsible for the marketing of Sennheiser products in the western part of the U.S.

Infinity Adds Marketing

Infinity Systems has added Marketing Production Manager Eric Kreis to the company's marketing department. Kreis' responsibilities include overseeing the production phases of

literature, P.O.P. and collateral items.

Previously, Kreis served as Marketing Production Manager for Japan Digital Laboratory in Westlake Village, California.

Camden and Lippel Promoted

Biamp Systems has promoted Ron Camden to Vice President of Sales. Camden had been the National Sales Manager for Biamp since 1987.



Camden

Tom Lippel has been promoted to the position of En-

gineering Manager for Biamp Systems. Lippel, who has more than 25 years experience as an audio engineer, joined Biamp two years ago after serving as Manager of Analog Development for Mitsubishi Pro Audio Group.



Lippel

CALENDAR

Upcoming Events

DECEMBER

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

Image World Miami: Miami, FL: Contact: (800) 800-KIPL. 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

FEBRUARY

SMPTE (Society of Motion Picture and Television Engineers): Detroit, MI: Contact: (914) 761-1100. February 7-8.

Infocomm: Washington, D.C.: Contact: (703) 273-7200. February 6-8.

ISC (Int'l Security Conference) West: Las Vegas, NV: Contact: (708) 299-9311. February 11-13.

MARCH

Audio Engineering Society: Vienna, Austria: Contact: (212) 661-8528. March 24-27.

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CROWN
HARMAN VIDEO (JBL)/NEC*
STEWART FILMSCREEN
NEC
TOA
IRP/YAMAHA*
YAMAHA
JBL
JVC
TOA
NAKAMICHI
MIDDLE ATLANTIC/PREMIER*
ALPHA
SENNHEISER
FSR

* Indicates tie

... IN LAST SIX MONTHS

PRODUCTS

● Microphones
● Projectors
● Screens
● Video Monitors
● Loudspeakers
● Mixers
● Signal Processors
● Amplifiers
● Cameras
● Intercoms
● Audiotape Players
● Racks
● Wire/Cable
● Hearing Assisted
● Remote Control A/V

FIRST PLACE

SHURE
SONY
DRAPER
SONY
JBL
TOA
RANE
TOA
PANASONIC
AIPHONE
TEAC
ATLAS/SOUNDOLIER
WEST PENN WIRE
WILLIAMS
AMX

SECOND PLACE

AUDIO-TECHNICA
HARMAN VIDEO (JBL)
DA-LITE
PANASONIC
ELECTRO-VOICE/
ATLAS/SOUNDOLIER*
IRP/JBL*
TOA
CROWN
SONY
BOGEN
TASCAM
H.O.M.E.
BELDEN
SENNHEISER
CRESTRON

THIRD PLACE

CROWN
ELECTROHOME
STEWART FILMSCREEN
NEC
TOA
YAMAHA
IRP
JBL
JVC/JAVELIN*
TOA/TELEX*
SONY
PREMIER
ALPHA
PHONIC EAR/COMTEK*
FSR

* Indicates tie

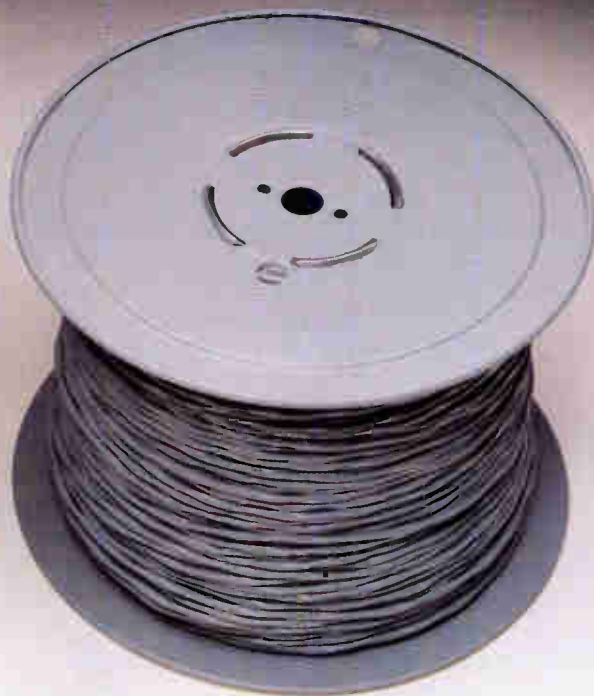
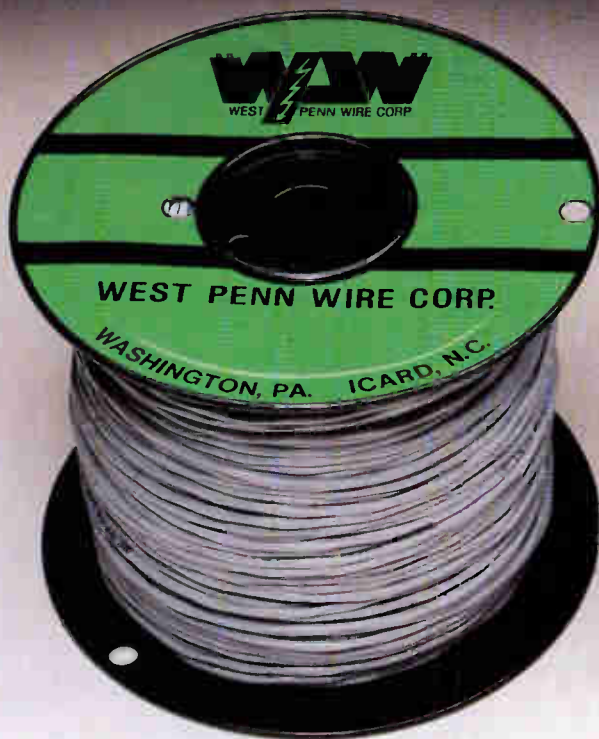
See page 69 for "Notes on Product Check."

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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THE WIRE GROUP
INTERCONNECT SYSTEMS PRODUCTS

Circle 217 on Reader Response Card

World Radio History

From Night Spots, To Tight Spots.



JBL has been hanging around in small clubs and concert halls for years. And we've learned a lot in the process. Like how to design and build loudspeaker systems that deliver, day after day, night after night. Our Control Series™ is no exception.

The Control 10,™ for example, delivers high acoustic output with an impressive frequency range of 35 Hz to 27 kHz.

This compact 150 watt three-way system is equally at home in restaurants and clubs or corporate board-rooms and other presentation environments. And its fully shielded enclosure will let you safely locate the system adjacent to video monitors without effecting CRT performance.

Quick and Easy Installation

With a wide range of mounting hardware available, you'll be hard pressed to find an application too tough for the Control 10. In fact, all Control Series



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



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

Whether your application calls for ceiling or wall mounting, rack mount or even mic stand and tripod mount, the Control Series will solve your installation needs quickly and easily while giving you the sonic performance your application demands.

Next time you find yourself in a tight spot, remember Control Series then call your JBL representative. We'll send you complete product information and specifications.



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