

SOUND COMMUNICATIONS

SPECIAL NSCA ISSUE

Volume 39 Number 3

March 29, 1993



THE WANG CENTER

Restoration of a 1925 architectural jewel included a new orchestra pit, a new central cluster and "innovation under the balcony." The \$10 million restoration in Boston was undertaken by New Englanders Jaffe Holden Scarbrough, Boston Light & Sound, and EAW. **72**

INAUGURAL INSTALLATION

The start of a new administration allowed several sound companies to show what they could do. Our inquiring reporter went to the Clinton inaugural. The sound and the solutions were up to the prestige of the week-long event. Unlike the government, the sound companies "don't know how to do a bad job." **38**



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• **Rack Accessories, Part Two**
Drawers, panels, patch bays, cooling systems. They all contribute to the finished system—in usefulness, in quality, and in aesthetics. There is an "endless variety" of metalwork rack accessories. **32**

• **Job Documentation**
When the off-the-shelf labels aren't adequate, customized labels may fit the job. Three cable label computer programs are reviewed. All of them performed well, but some features were more useful than others. **24**

• **High Performance Voice Coils**
Mike Klasco continues his "Everything You Ever Wanted to Know..." series, this month investigating the voice coil: materials, methods, measurements, etc. What goes into the voice coil? And how does it affect loudspeaker performance? **86**

DOLPHIN SOUND

The Brookfield Zoo needed a new system for its Dolphinarium. Gand Sound used computer design, customized compact disc recording, and a combination of equipment that the dolphins checked out and approved. **46**

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World Radio History

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By T.G. McCarthy

Effective job documentation is a sound contractor's challenge. A review of three computer cable label programs lies within.

32 RACK ACCESSORIES, PART II

By Mike Klasco

This month our survey focuses on rack hardware, including drawers, panels, patch bays, and cooling systems.

38 THE CLINTON INAUGURAL

By William Freedman

Despite all the potential environmental pitfalls – nasty weather, wireless interference, acoustically muddy rooms – the sound crew retained for the 52nd Presidential Inaugural pulled off the four-day event without a hitch. Close to 200 audio professionals put in more than 8,000 man hours to work the series of events leading up to, during and after the inauguration.

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Last spring, the Chicago Zoological Society contacted Illinois-based Gand Sound about putting high level music and highly intelligible sound into a dolphinarium that was one-third glass, one-third concrete, and one-third water.

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The holiday season found contractor MAS Audio facing the task of installing three systems by the end of the year; and creating a one-of-a-kind special-effects sound-and-light show for a sports bar.

72 THE WANG CENTER

By Wynne Smith

This 1925 landmark was suffering from an elderly sound system until Boston Light & Sound, Jaffe Holden Scarbrough, and manufacturers such as EAW came to this historic venue's rescue.

86 THE VOICE COIL

By Mike Klasco

A glance at high performance voice coils and how they influence loudspeaker performance.

96 THE BASICS OF DIGITAL DELAYS

By Neil Shaw

When used to delay a signal with respect to time, the digital delay line has found many applications in modern sound system design. This first part of a three part article will briefly review the basic sub-block parts that are common to many delay units.

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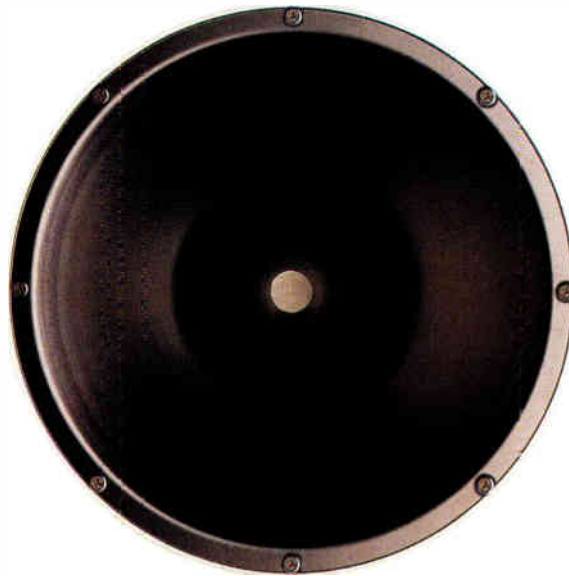
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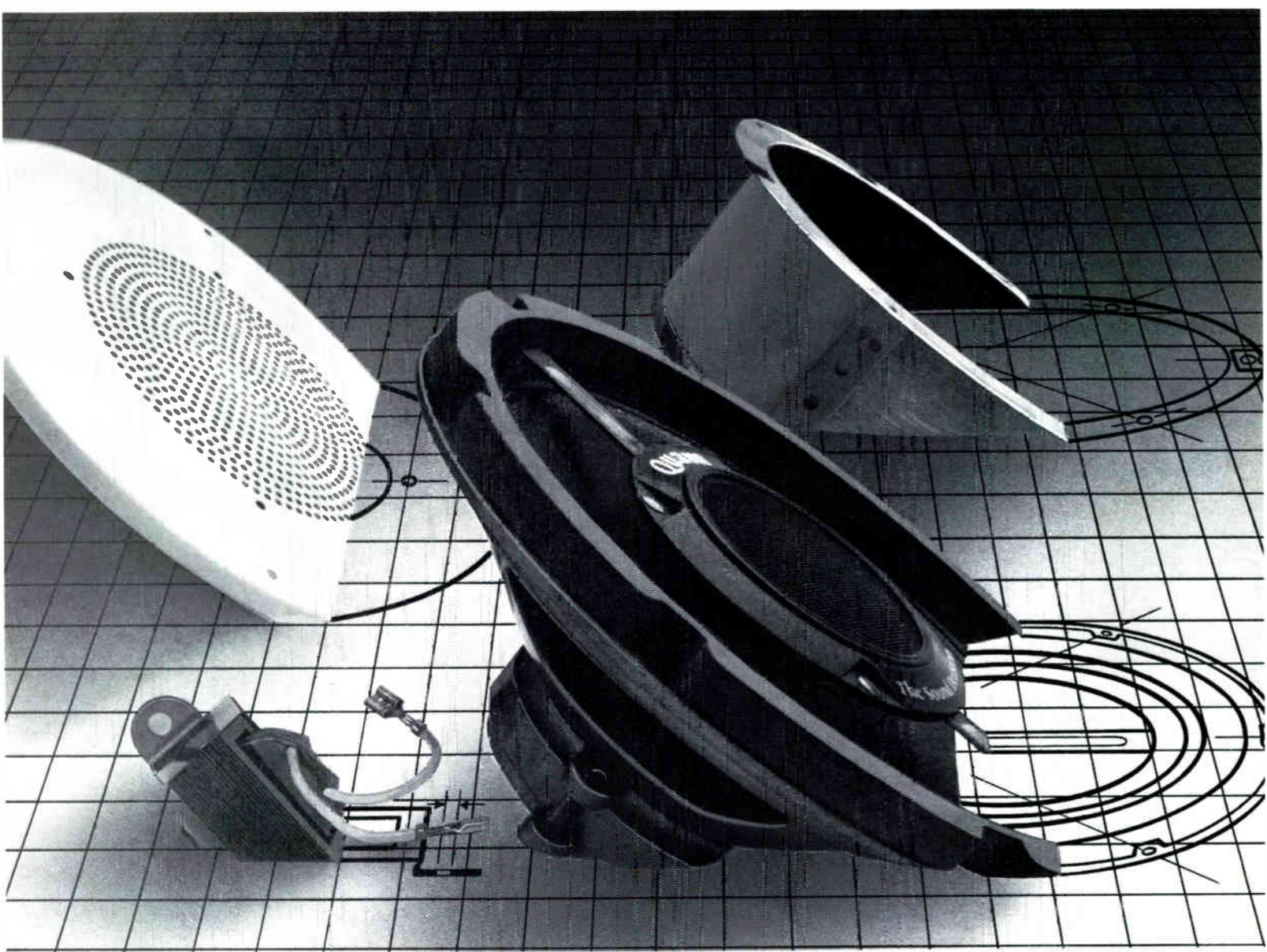
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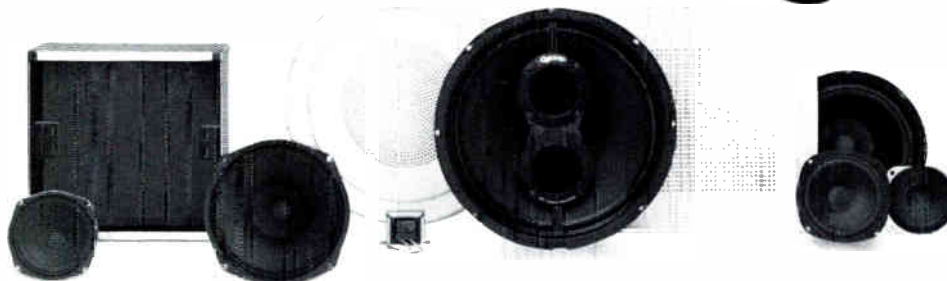
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NEWSLETTER

HARMAN INTERNATIONAL RESTRUCTURES; JAMES HEADS PRO DIVISIONS

Dr. Sidney Harman, chairman and chief executive officer of Harman International Industries, Inc. has announced a series of key executive appointments and a realignment of the company's 21 operating units. Among the changes is the move of Dr. Richard James to president of the Harman Professional Group from president of JBL, Inc. In his new position, James is responsible for the activities of Harman International Professional divisions including JBL/UREI Worldwide, Soundcraft, DOD and Harman Applied Technologies. The heads of these divisions report to James.

Other announcements include the naming of Dr. Floyd Toole as Harman International corporate vice president of engineering, overseeing all engineering functions, both brand and manufacturing driven. Cary Christie moves from president of Infinity to the newly created post of Harman International corporate vice president of marketing, charged with coordinating major new programs in home theater, distributed sound and multimedia. He reports directly to the chairman of the board.

Tom Jacoby has been named president of the Harman Consumer Group, responsible for worldwide activities of Harman consumer divisions including JBL consumer, Harman Kardon, Harman Video and Fosgate Audionics. Bruce Scrogin has been named corporate vice president of planning. Niels Jespersen has been appointed managing director, Harman Europe marketing.

DAUGHERTY JOINS TESTA COMMUNICATIONS

Kelly Daugherty has joined Testa Communications as advertising manager of the company's West Coast office. Testa Communications is the publisher of Sound & Communications, Post, DJ Times, Producer, and The Music & Sound Retailer. The company also produces television programs including NSCA-TV News, NAB-TV News, NAMM-TV News, AES-TV News, and CES-TV News.

Daugherty brings 10 years of experience to the new position, including sales of broadcast audio and video equipment, and advertising sales in industry publications. Vincent Testa, president of Testa Communications, said, "We're happy to enhance our west coast presence with a staff member of Kelly's quality." Daugherty added, "I'm happy to be a member of the staff of Testa Communications. The company is in the forefront of technology and marketing." Daugherty can be reached at (818) 282-0329.

TOA RESTRUCTURES

TOA Electronics, Inc. has instituted a "restructuring plan" establishing a "total systems" sales force and a new marketing division. The new sales force is directed by Richard Krochmal and is composed of six regional sales managers and four technical experts, each of whom is responsible for the sales of all TOA product groups. The six regional sales managers are: Bob Hager (northeast), David Meyer (northwest), Pete Newmark (southwest), Jonathan Parker (southeast), Linda Post (north central), and Robert Slaughter (south central). The four technical experts are: Chuck McGregor and John Murray (focusing on commercial and engineered sound), and Daryle Skaugstad and Paul Sears (intercoms). General management of the marketing division is provided by Jeff Pallin. Christina Foran has been given an expanded planning role. Bill Ghan is product development manager. Andrea Lucich has been appointed marketing coordinator. Helen Ordoveza continues as literature coordinator.

DJ EXPO SCHEDULED

The 1993 International DJ Expo is scheduled for August 23 through 26 in Los Angeles at the Universal City Hilton and Towers. As at previous DJ Expos, an exhibit hall will feature exhibits of mobile and club DJ equipment from manufacturers and distributors. Nearly 30 panels and workshops will be presented, including: "DJ Associations" and "Maintaining DJ Equipment."

NEWSLETTER

McGEACHIN JOINS NUMARK

Nick McGeachin has joined Numark Industries as Director of Export Sales. McGeachin was most recently director of export sales for Apogee Sound, and was European Sales Manager for the former Numark ownership before that. McGeachin is based in Numark's Valencia, California facility. "I'm delighted to be back," he said. "I've received calls from dealers and distributors around the world. We've rejoined forces with our colleagues on all continents." Jack O'Donnell, president of Numark, said, "The appointment of Nick McGeachin, in addition to Barry Seiden's appointment as national sales manager, brings Numark leaders back into the fold." Seiden was previously with Denon, and was sales manager of Numark Electronics before that.

MILLBANK ELECTRONICS AT NSCA

Millbank Electronics products will appear at the NSCA Expo in Orlando via Optim Audio headed by Daniel Gravereaux and Irv Joel. Millbank, a member of the Atapco Security and Communications Group, has been established for over 25 years as a designer, manufacturer, and supplier of audio communications equipment. The company is showing modular PA systems at the 1993 NSCA Expo.

PIONEER LASER ENTERS PRO AUDIO EQUIPMENT MARKET

Pioneer Laser Entertainment, Inc. has entered the professional audio equipment market with a series of "high end amplifiers and speakers." The ProKaraoke professional sound series consists of power amplifiers, a full range speaker system and subwoofers with the company's Opaxial transducer orientation, along with the company's LaserKaraoke commercial systems. Mark Makabe, senior vice president of PLE, said, "Once our LaserKaraoke systems were successfully established in entertainment venues, we saw the need for more dynamic speakers and higher powered amps in some locations . . . With TAD already involved in the high end audio market, we were able to use their technological expertise to create products that meet our own particular customer demands."

WINTER NAMM "BREAKS RECORDS"

The National Association of Music Merchants has reported that the twenty-third Winter NAMM International Music Market held in Anaheim in January was "the most successful trade show in the history of the Association." The show hosted a record 799 exhibitors and registered more than 45,000 people.

More than 800,000 square feet of space was devoted to the show, drawing visitors from more than 20 countries. According to NAMM, significant news media coverage was accorded the event, with 331 media organizations assigned to cover the show. Two separate satellite uplinks featuring video news segments of the show were sent on the second and third days of the winter market by NAMM-TV News and Testa Communications. The dates for the 1994 NAMM show are January 21 through January 24.

NEW INFOCOMM IN 1994

The next Infocomm show, in 1994, will combine the ITVA International Conference and the ICIA trade show into one event. ITVA, the International Television Association, has lacked an equipment display at its conference, which centers around seminars and workshops. ICIA (according to ITVA), "has been interested in broadening the appeal of Infocomm . . . by encouraging video and related communications associations to hold their conferences in conjunction with the trade show." ICIA president Monroe Jost said, "The corporate and independent production executive in ITVA will strengthen Infocomm." The first combined event will be held in the Anaheim Convention Center June 7 through June 11, 1994. Exhibitors have reportedly already reserved over 91,550 net square feet of space. ICIA, the International Communications Industries Association, has 1,400 members. In 1993, the association's trade show, Infocomm, held in New Orleans, featured 360 exhibitors and was attended by over 14,000 people. ITVA has over 9,000 "video practitioners working in the non-broadcast arena."

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Attractions of the First Quarter

When our "editorial calendar" was being formulated for the year, "Attractions" was plugged in for special attention this month. At the time, we hadn't really thought about what turned out to be the major attraction of the first quarter of 1993 — the inauguration of a new president. But our reporters were thinking ahead, and off they went to Inaugural Week in Washington, D.C. You can read about the sound system and the planning of such in our story in this issue.

Another event out of Washington D.C. this quarter was the restructuring of Harman International. Harman is officially headquartered in Washington, and corporate press releases are datelined from that city. You can read in our Newsletter some of the details of the restructuring, which includes the incorporation of international distribution of pro products under the aegis of the newly named Harman Professional Group, which now includes not only JBL/UREI, DOD, Soundcraft, and other JBL pro works, but the about-to-be-acquired Lexicon. While it's too early to confirm any new directions for either Lexicon or JBL right now, NAB may offer some hints. Other hints may be available soon as to just exactly what the Harman Applied Technologies group, which now comes under the Harman Professional Group, does. Richard James, the newly named head of Harman Professional Group (and previous head of JBL, Inc.), says stay tuned. H.A.T. is an R&D Group which has been working quietly for the last few years at Harman/JBL. The work of the group is about to get some marketing direction.

Other "attractions" that we've included in this issue include the Dolphinarium at the Brookfield Zoo in Illinois, whose sound system was de-



signed by Gary Gand Sound. And another attraction that we've written about in the past, but that leapt unwanted into our consciousness last month, was the World Trade Center, which of course prompted televised heads talking about "Life Safety Systems," which became the buzz-phrase of the moment. Apropos of the World Trade Center explosion, a faxed press release crossed our desk a couple of days after the event. It was from Odetics, explaining to the press corps what timelapse security systems are about and offering information on security measures.

We hope that the press release, which we assume was sent beyond the limits of the specialty press to which Sound & Communications belongs, reached its mark and prompts responsible publicity for the sound and communications industry.

Best regards,

Judith Morrison
Editor in Chief

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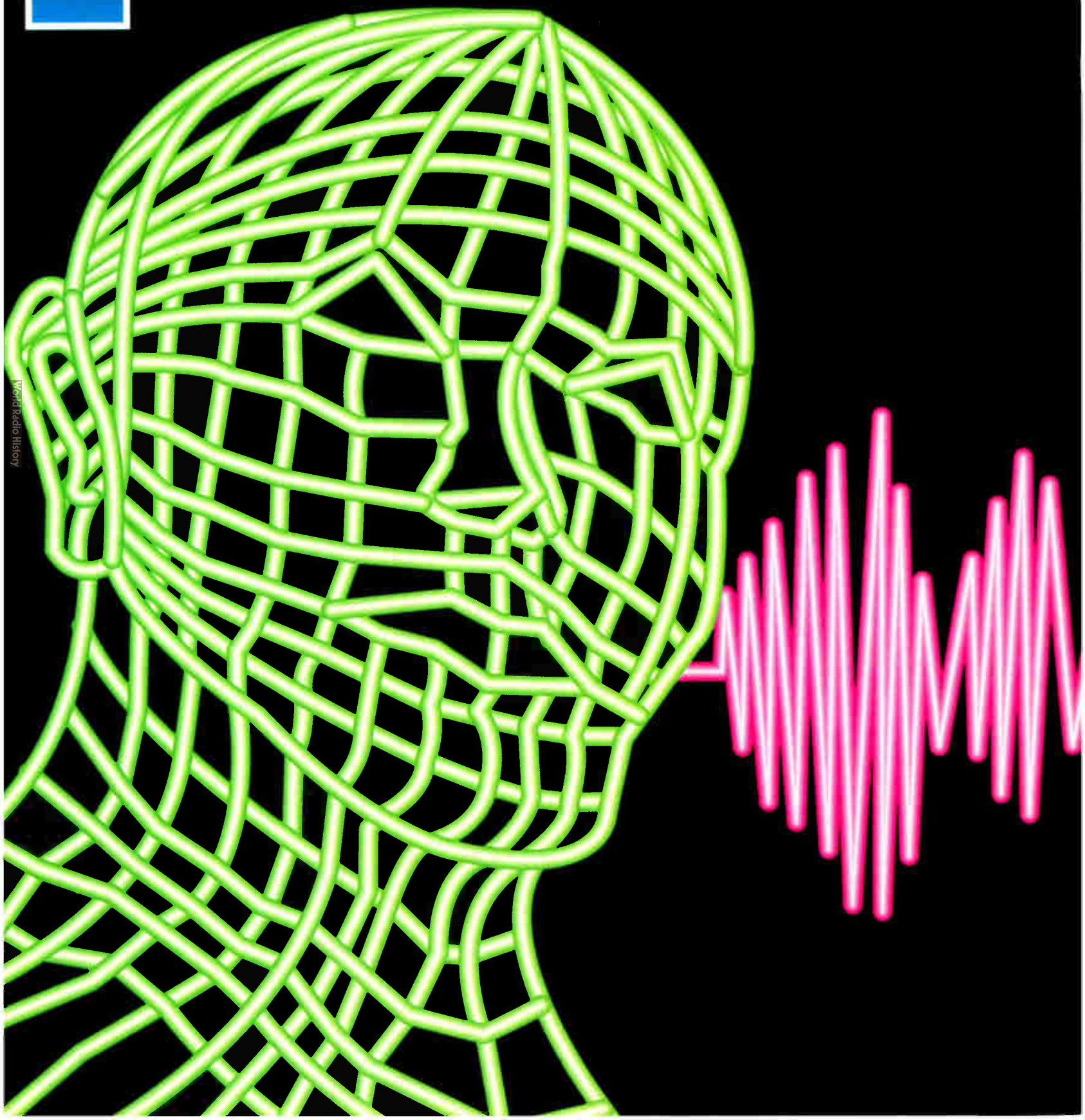
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Hanging Kits and Parabolic Mics

WHERE'S THE HARDWARE?

Mike Klasco's article "Tips on Clubs" (November 30, 1992 issue of *Sound & Communications*) refers to Sound Manufacturing Inc. ("SMI") as a good supplier of inexpensive hanging hardware kits. Where are they and how might I reach them?

Randy Freed
SoundProjects
Amagansett, New York

Stan Miller, the owner of SMI has shifted all communications directly to his home (of course the hardware is produced elsewhere). Because safety is at stake here, Stan likes to discuss hanging hardware selection directly with his customers.

All rigging parts in the existing catalog (and that were mentioned in the

Stan likes to discuss hanging hardware selection directly with his customers.

article) are available from inventory. Additionally, a full line of cargo control items like packing blankets and custom speaker covers have been added. An expanded catalog is now being prepared and will be mailed to everyone who faxes.

SMI can be reached at 213-850-5042, and faxed at 213-850-7399. Remember that Stan lives in California and this is his home number, so do not call before noon eastern time if you live on the east coast! The mailing address is Sound Manufacturing Inc., 3336 Primera Ave., Hollywood, California 90068.

SHOTGUNS OR PARABOLICS

Another reader asks where he can buy a parabolic microphone and why shotgun mics are used instead of parabolic mics for long reach applications. The

Answerman asked David Josephson of Josephson Engineering, the calibrated mic people in San Jose, California.

A parabolic mic typically consists of a dish with an omnidirectional mic facing the center of this reflector, or slightly off the focus point, in order to reduce the rising response characteristic and narrowing pickup pattern typical of this type of system.

Parabolic mics have been around for decades, but have limited applications. One serious problem is that they suffer from serious resonances, which means that any sort of live pickup in conjunction with a sound reinforcement system is a no-no, resulting in

ANSWERMAN

impossible acoustic feedback. In the future, this problem may be correctable with DSP processing to filter out the reflector resonances. A similar technique has already been implemented in the restoration of early gramophone recordings.

Vendors of parabolic mics include Edmund Scientific (609-573-6250), and

They suffer from serious resonances, which means that any sort of live pickup in conjunction with a sound reinforcement system is a no-no.

Damark (800-729-9000). The mic in the Damark catalog is only \$30! The Damark mic is the CamEar Audio Zoom intended for use with

camcorders. The blurb on this mic promises sound pickup to 50 feet. Interestingly, the parabolic reflector is only a few inches in diameter.

A more serious effort can be found in Edmund Scientific's catalog, with two offerings; The Bionic Ear & Booster and the Electronic Parabolic Microphone. The Bionic Ear costs \$145 uses a 10-inch reflector, which is still too small for really effective directional discrimination for even the

Even a three-foot diameter reflector loses its directionality at 200 Hz.

midrange frequencies, although the upper midrange ought to be pretty directional. Edmund's more expensive parabolic microphone costs \$785, and has an 18 inch diameter dish, again, not quite enough to reach the voice range with good directionality. For this money I would look for a used Sennheiser shotgun, which is the long reach mic of choice in the movie industry, although AKG and others offer some decent alternatives.

Another limitation with parabolic mics is size. For a parabolic mic to work in a given frequency range, the reflector size must be large compared to the wavelength size. Even a three-foot diameter reflector loses its directionality at 200 Hz, and for most applications satellite dish sized reflectors are just not practical. Remember, a 100 Hz wavelength is 10 feet long. So why does the CamEar parabolic mic work when its reflector is only a few inches in diameter? Who said it worked?

For further insight into parabolic mics you can read about them in Harry Olson's *Acoustical Engineering*, available from *Professional Audio Journals* (P.O. Box 31718, Philadelphia, PA 19147). ■



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AUDIO IN ASIA, PART 3 — A QUICK FLYOVER OF TAIWAN

By Mike Klasco

Sometimes I feel like the Flying Dutchman of Audio! If you have read my notes from my adventures in Japan and Korea, then you know that many of my clients are either based somewhere in Asia, have factories there, or buy from that part of the world.

So a couple of times a year I find myself far away from home, but looking at familiar scenes — a rack of audio equipment, a cluster of speakers, or the inside of an anechoic chamber.

This month I will continue my story with a glimpse of audio in Taiwan.

Taiwan has not been taken as a serious contender in the pro audio market, although they have been making inroads in supplying low and mid quality equalizers, PA mixers, disco mixers, and cassette decks in the last few years. Unlike Japan and Korea, whose many large companies have massive R & D budgets, Taiwan's audio industry is comprised mostly of small and medium-sized companies with limited resources, a few of which have valiantly strived to break into high performance audio. And to further thwart these efforts in quality audio engineering, the intense growth of the personal computer industry in Taiwan has ab-



The skyline of Taipei, Taiwan.

The World Trade Center in Taipei, is a large convention center which is adjacent to the Hyatt Hotel.

sorbed many would-be audio engineers along with their government's financial and research support.

Yet quite a few decent "mid-fi" audio

NOT ALL OF TAIWAN'S EFFORTS TO PRODUCE QUALITY AUDIO PRODUCTS HAVE BEEN MARKET SUCCESSES.

products have been coming from Taiwan, and a couple more that can be legitimately counted as first-rate high-end audio products. Some of the products produced in Taiwan have established a good reputation for quality

and value. Audiophile amplifiers that have exceeded the performance and construction expectations that one would expect for significantly higher prices could not have been achieved in Japan or the U.S. due to the high costs, nor in Korea due to lack of locally produced top quality electronics components (i.e., capacitors, transformers, etc.). Not all of Taiwan's efforts to produce quality audio products have been market successes. Proton, perhaps the highest profile Taiwanese brand name brand and often used in residential and commercial audio/video installations, has faltered. Fulet, its Taiwanese factory, is staggering under enormous financial losses. Early this year Proton announced that it was pulling out of audio altogether, and attempting to

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

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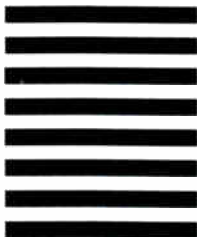
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shift production over to computer-related product lines.

It was the first week in October that I arrived in Taiwan, fully rested, having been lucky enough to fly first class. The seats in United's new 747-400s recline, enabling a traveler to obtain much needed beauty sleep, although the shape of the chair was disturbingly reminiscent of a dentist's chair.

The Taiwan Electronics Show is held at The World Trade Center in Taipei, a large convention center which is adjacent to the newly completed Hyatt Hotel. Hotel prices in Taiwan vary widely, with modern, clean, decent no-frills hotels costing \$50 per night, to over \$200 per night for five star glitzy palaces. Most fancy hotels feature night clubs and discos. One interesting aspect to the entertainment is that mostly the artists are Filipinos. Top forty (U.S.) hits are played and

THE TAIWAN ELECTRONICS SHOW IS HELD AT THE WORLD TRADE CENTER IN TAIPEI, A LARGE CONVENTION CENTER WHICH IS ADJACENT TO THE NEWLY COMPLETED HYATT HOTEL.

regardless of the original artist's style, the Filipino group sounds exactly like the original. Filipino groups are also common in mainland China, but we will get to that next month when we cover both the Philippines and China.

The Taiwan Electronics Show is open to the public most days, with the mornings reserved for the trade.

The exhibits include sections for audio, video, computers, electronic components, industrial machinery, and satellite receivers/telecommunications stuff. The audio and video sections

include everything from preamplifiers, power amplifiers, tuners, CD players, headphones, audiophile cables, to Karaoke, disco mixers, autosound, component parts (raw speakers, connectors, etc.), and junk audio. Pro-au-

TURNTABLES WERE STILL IN EVIDENCE, ALTHOUGH THE ONLY QUALITY UNIT I SAW WAS A DIRECT-DRIVE FROM HANPIN AND THIS IS EXPORTED TO A U.S. SUPPLIER FOR DISCO APPLICATIONS.

dio and high-end audio can be seen here and there, with the quality OEM manufacturers showing off the products made for their U.S. and European customers. Taiwan's lack of heavy capitalization shows in the absence of sophisticated "mecha-tronics," i.e., no locally made ultra-high performance CD transports, nor any DCC or DAT machines. There is only one local maker of CD transports, Hanpin, but these are "mid-fi" quality at best and not even being used by any of the value-priced audiophile brands from Taiwan. I did see a few CD separates; CD transports and matching D/A converters, but even the D/As inside these units were based on U.S. chip sets.

Turntables were still in evidence, although the only quality unit I saw was a direct-drive from Hanpin and this is exported to a U.S. supplier for disco applications. Like all disco fast start turntables, the direct-drive motor is of Japanese manufacture. There are no quality phonograph cartridge manufacturers in Taiwan, and outfits that had been in this business have retreated to their other mainstay, mics and mic capsules.

A number of fairly good headphones were on display, the better units using

Small Wonder

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

outstanding sonic performance and incredible reliability.

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

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

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

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

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

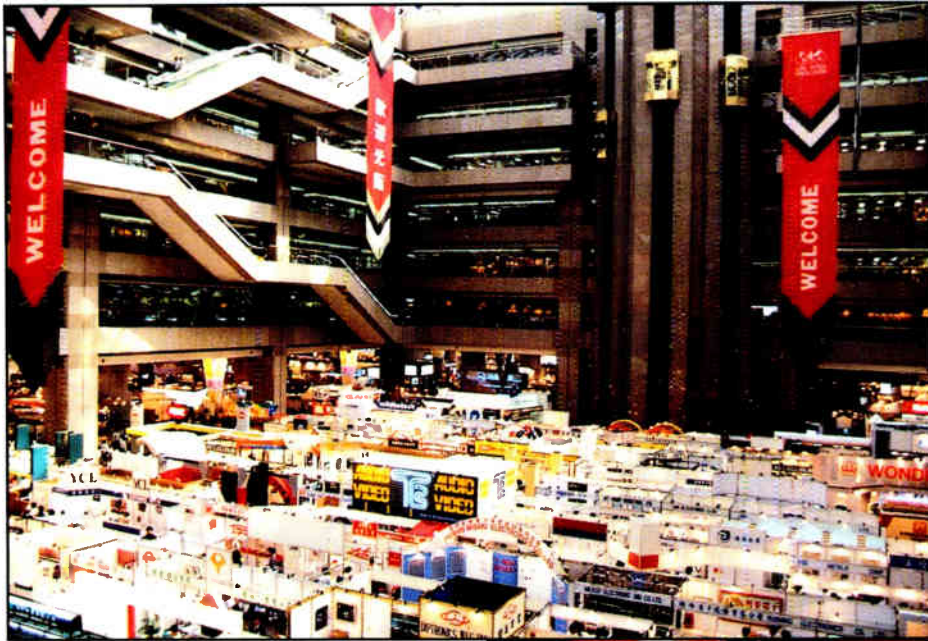
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ASHLY

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The Taiwan Electronics Show is held at The World Trade Center.

A look at the aisles at The Taiwan Electronics Show.



transducer elements from both Japan and Taiwan. Infrared wireless headphones as well as wireless mic systems were a popular items at the show.

SPEAKERS

Although there are over 100 speaker manufacturers in Taiwan, the largest speaker companies are subsidiaries of Japanese firms (Pioneer, Panasonic, and Foster). There are also two Taiwanese companies making clones of JBL and Altec "pro-audio" compression drivers, which briefly appeared in the U.S. a few years ago, but these are thankfully gone from our shores as

THESE ARE THANKFULLY GONE FROM OUR SHORES AS THEY WERE TERRIBLE COUNTERFEITS.

they were terrible counterfeits. The large Japanese-owned speaker companies in Taiwan are only focused on producing tonnage — which means mid-fi home and autosound products. The engineers at these factories are limited to production engineering, with design engineering being handed down from Japan.

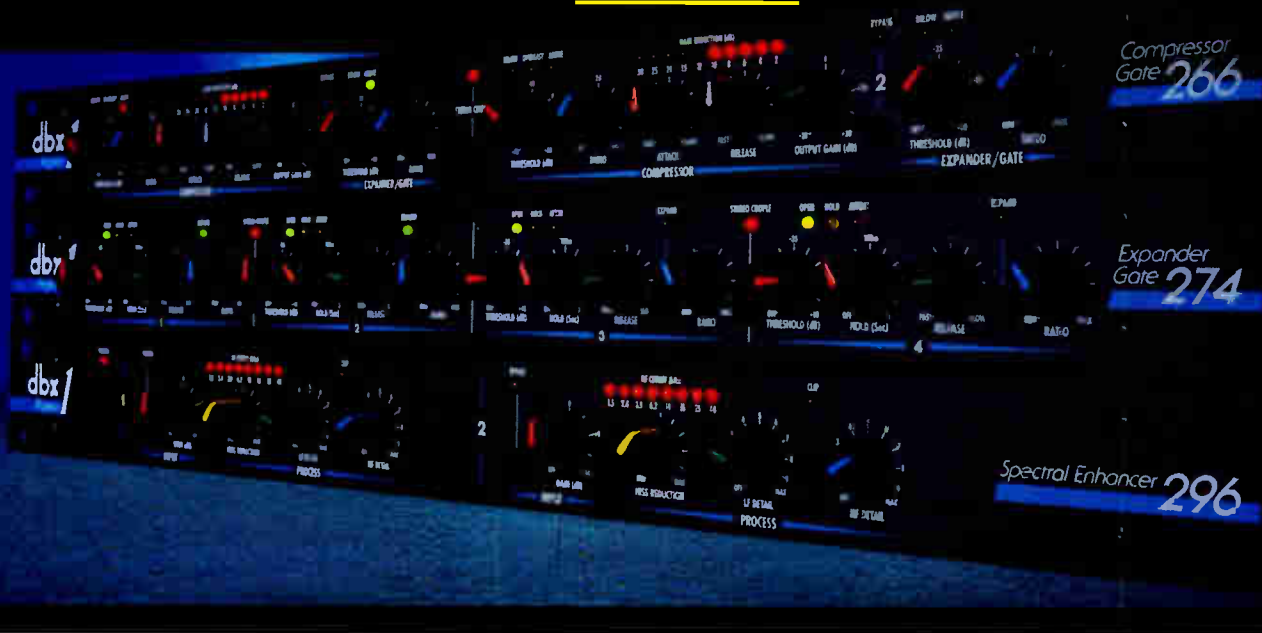
The rest of the speaker business in Taiwan is highly fractionalized, and the smaller speaker companies in Taiwan lack the funds and engineering resources to explore high performance materials and advanced loud-speaker techniques. When I work with speaker companies in Taiwan, it is on behalf of U.S. clients that are either selling high-tech materials, or U.S. companies trying to upgrade the products that they are buying from Taiwan.

One paradox that I encountered in the mysterious Orient was that Thiele-Small parameters taken in Taiwan were always way off from the data taken in the U.S. Perhaps this was a phenomenon similar to effects ob-

served in the Bermuda Triangle? A woofer free-air resonance shift of 10 percent (and often more) was common. This variation would be consistent within any production run of one model, yet a few models would have repeatable parameters from both sides of the Pacific. The solution to this riddle turned out to be the extremely high humidity in Taiwan, which loaded up paper cones like sponges with moisture. The added mass changed many of the characteristics. The speakers that were unaffected had polypropylene cones which are far less susceptible to humidity.

Next month I will finish up my story with tales from the Philippines and Shanghai, China. ■

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Job Documentation

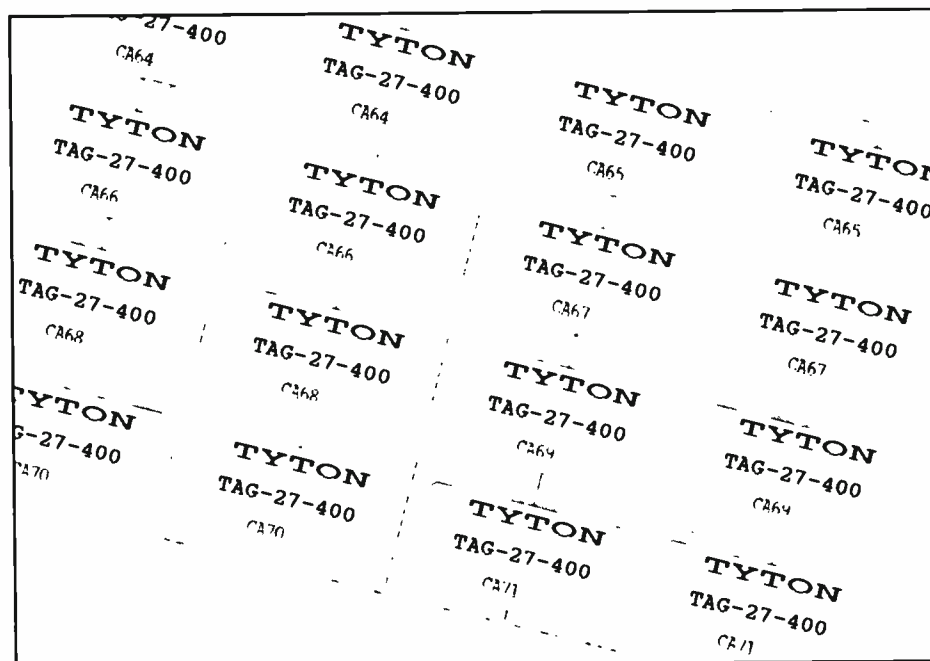
Review of Three Computer Cable Label Programs

BY T.G. McCARTHY

A challenge that sound contractors continually face is that of effective job documentation. Some months ago, I described the three-tiered system that we use, which is based on cable labeling. In most cases, pre-printed sets of adhesive backed numbers available from Brady, Panduit, 3M, Tyton and others suffice. But some jobs either require more elaborate labeling schemes or would go more smoothly if more elaborate schemes were used.

For example, in a large, dense installation like a television broadcast facility, it is desirable for cable labels to identify where each cable comes from and where it goes. It may not be enough to just identify the ends; intermediate labels may be needed in pull boxes and trunks. It may be helpful to include the date the cable was installed on its labels, and perhaps its function and who it was installed by. If there will be exposure to a harsh environment, as in a chemical plant, special material such as cloth or metal foil may be required. In some cases, industry standards may dictate a specific labeling protocol. It may be desirable to use graphics, bar coding and color.

So, there are times when off-the-shelf label sets are not adequate, and customized labels are needed. Other times they may not be called out in the contract, but their use would make the job go faster and easier. In the old



This is a partial sheet of labels showing a company name, a circuit identification, and serial numbers that repeat twice before incrementing. A wide range of type styles, sizes and colors can be used on a single label.

days, customized labels were produced one-at-a-time, by hand. Now, not surprisingly, several companies market cable label computer programs. I've tried three of them, all DOS based: BradyLabel by Brady, Pan-mark by Panduit, and Tagprint II by Tyton. In alphabetical order, BradyLabel version 1.0, runs on IBM or 100 percent compatible, requires two drives, DOS 3.0 or higher, at least 512 k of memory. It requires an Epson printer or one of a list of 17 printers capable of emulating Epson. The program is menu based, with each main menu choice dropping the user to a secondary menu. On selecting some choices, the user is

dropped to yet another level of choices. Hitting the escape key backtracks to the main menu. A mouse is not needed or supported.

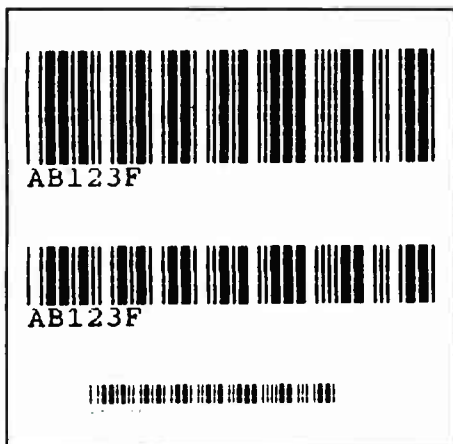
On first use, I set up my system defaults: printer type, data path, lines per label, characters per line, and label stock size and type. Brady lists approximately 220 stock sizes and types including barcode, tag, wrap around, sleeve and over laminate. The stock is available from Brady on pinfeed sheets, often in a choice of materials and colors. The program recognizes Brady part numbers, so there is no need to define stock parameters manually.

T.G. McCarthy heads up North Star Sound in Minneapolis, Minnesota.

M A C K E N Z I E

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All three programs support Bar Code. In this example Bar Code is printed in three sizes with human readable text included.

With defaults set, I'm ready to actually start laying out labels. I can create a new file, edit an old file, or use an old file as a template for a new one. Working from screen prompts, I select and position type, set serial numbers, center, justify, etc. An image of the label stock sheet appears on screen, so I can see how my text will look and fit as I go. BradyLabel includes an elaborate context sensitive HELP facility, which I can access any time by hitting

I can choose to have them printed one after the other, before going on to the next label; or I can cycle through the whole set once, then go back and cycle through the whole set again.

"F1". When I am finished with the layout work, it's normally saved on disk as a data file, though I can print it without saving if I want to.

To print from a stored file, I select the one I want from an on screen directory. Then I check the printing defaults, changing any that need changing. Next I designate the number of



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labels and number of copies I want. Let's say I want two copies of each label. I can choose to have them printed one after the other, before going on to the next label; or I can cycle through the whole set once, then go back and cycle through the whole set again. The

first way prints like labels next to each other on the same stock sheet; the second gives me separate sheets, each containing a complete set of labels. Finally, I load my stock in the printer and select PRINT.

Once set up, BradyLabel is easy to



A wide range of label sizes and types serve many applications.

learn and use. Most sound contractors will likely settle on just a few stock types and will not need the tremendous selection available. BradyLabel works well, but is a memory hog. The data sheet says it needs at least 512 k of memory and apparently it isn't kidding; it seems to need every bit of it.

Pan-Mark by Panduit, version 1.1, runs on IBM or 100 percent compatible. It requires two disk drives (hard drive recommended), DOS 2.1 or

It is menu based, with each main menu choice bringing up appropriate secondary menus. The escape key backtracks to previous menus and ultimately exits the program.

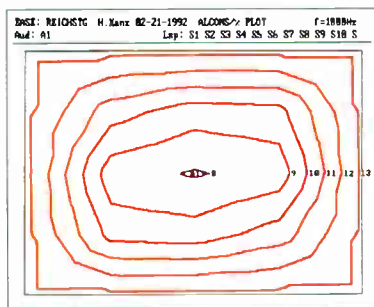
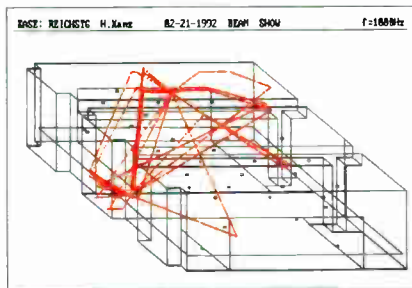
higher, at least 512 k of memory, a monitor capable of displaying 80 columns by 25 rows and an Epson or compatible dot matrix printer.

The program is supplied in both 5.25 and 3.5 inch disks. Installation is quick and easy, and the program runs smoothly. It is menu based, with each main menu choice bringing up appropriate secondary menus. The escape key backtracks to previous menus and

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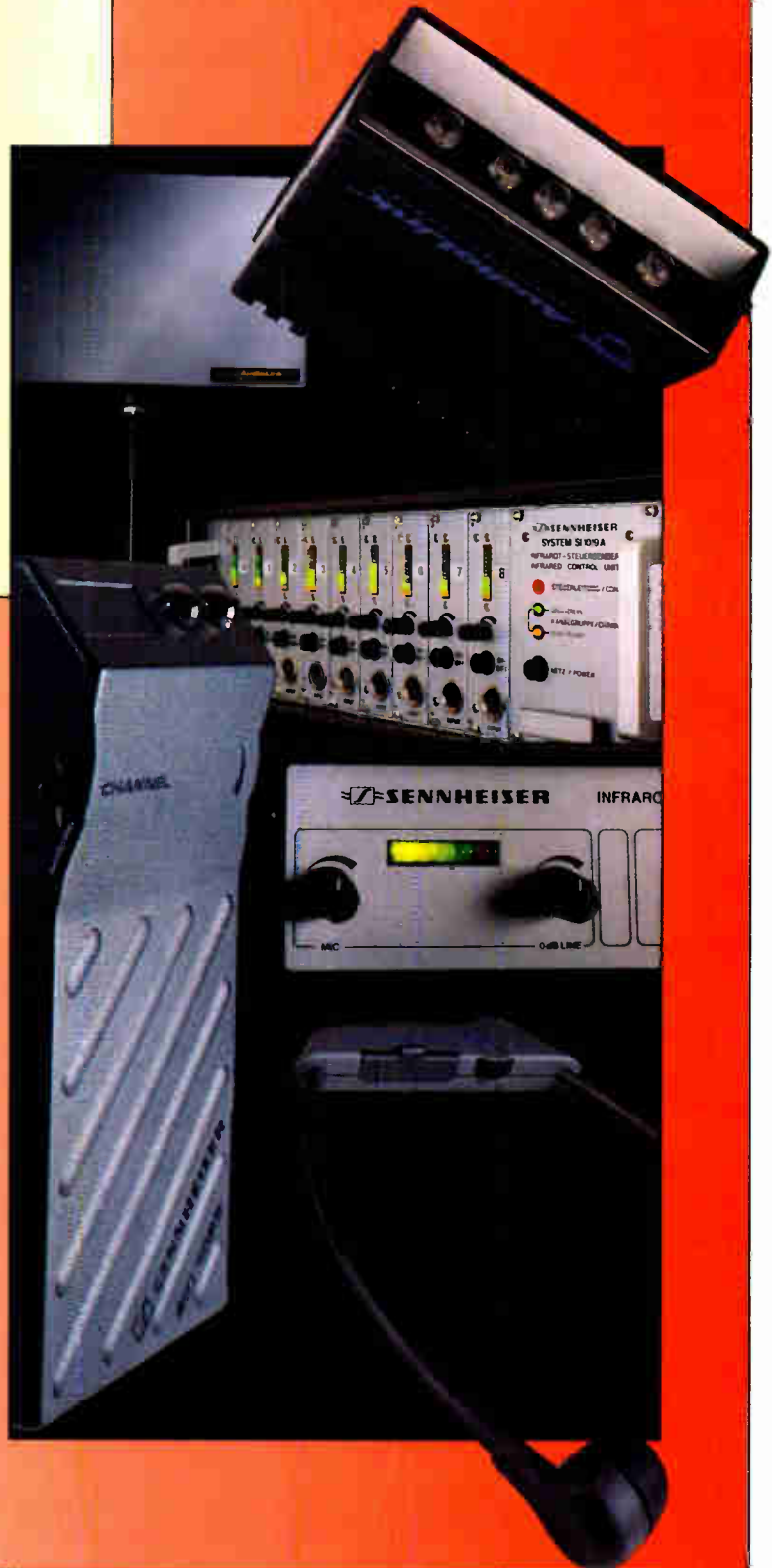
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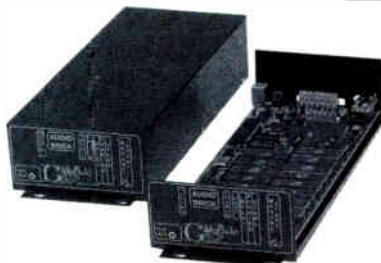
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ultimately exits the program.

After invoking Pan-Mark, I choose "Create New Label File" from the main menu. The program asks for a label specification and, if I need it, provides an index of choices. The library includes over 220 stock labels and data plates available from Panduit on pin feed pages. If one of those is not suitable, I can write a custom specification and add it to the library myself. Some listed stock will only fit in a wide carriage printer, and is so marked in the index.

Embedded prompts quickly guide me through the production of any imaginable serializing sequence.



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I select Panduit number PDL-40, which is a white, paper, adhesive backed label measuring 1.5 inches long by .25 inches high, 36 rows of four per pin feed sheet. This is going to be a terminal designation list, so I give it a DOS compatible file name (8 characters or less, no forbidden characters) "TERMS". The program asks if I want barcodes, and if yes, which of four types The program asks if I want barcodes, and if yes, which of four types (UPC-A, Code 39, Code 39 with check or Interleaved 2 of 5).

A representation of the sheet of labels appears on screen. I move the cursor from label to label and type in the text. Serialized labels are easily entered using "Design a New Serial Label" on the Edit Labels Menu. Embedded prompts quickly guide me through the production of any imaginable serializing sequence. When I'm finished entering, modifying and correcting, the file is stored on disk. To print a label file, select "Print Labels" from the Main Menu.

Other Main Menu choices let me modify and delete label files. The pro-

Compact Label Printers, Revisited

Some time ago, in Sound & Communications, I prepared an article on Engineering Tools For Cable Documentation. An overview was provided of the cable labeling software used in the "hands-on" field test by Tom McCarthy. Of course, Tom's review, in this issue, is of current releases of this software.

My article suggested that dedicated label printers that came bundled with their own software were an intriguing alternative to buying just a cable labeling software program. Especially appealing was the combination of label printer and software for about \$200; half the price of some of the specialized cable labeling programs alone.

The real question was whether the label printers were workable solutions for cable labeling. I checked out label printers from Seiko, Co-Star, and Avery. To test if these label printers were viable, I became the test subject. While the software on the Mac versions typically allowed sideways printing (useful for cable labeling), a fatal flaw in using any of these machines has made their operation and capabilities irrelevant.

During the past few months I noticed that labels printed about two years ago began to fade, and more recently the printing has disappeared altogether. Incidentally, direct sunlight exposure to the labels was minimal. In hindsight, the use of thermal printing technology in these devices should have tipped me off — most of us have had fax machines long enough to have experienced the same problem with fax thermal paper documents. But since the manufacturers suggest that applications for these machines include labeling magazine holders, floppy discs, document binders and other permanent and semi-permanent uses (not just mailing envelopes), I

assumed that some solution to "disappearing ink" had been worked out. Unfortunately, it appears (pun intended) that any long-term docu-

mented item using these labels will eventually become anonymous.

Label your cables with thermal label printers? Never mind! — Mike Klasco



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gram includes a comprehensive HELP facility, which is available at any time by hitting "F1". Pan-Mark by Panduit is functional and practical. It should more than meet the needs of any sound contractor.

Tagprint II version 3.05, by Tyton, requires two drives, DOS 2.0 or higher, at least 575 k of free memory. According to Tyton, the program will run with less memory, but not all graphics display and scaling features are supported. The manual says Tagprint II will work with most dot matrix printers and the HP laserjet series printers. Listings in the Install

I give it a name, select a size from about 65 catalog choices (or add my own size), enter the number of labels I want in the set, select a typeface

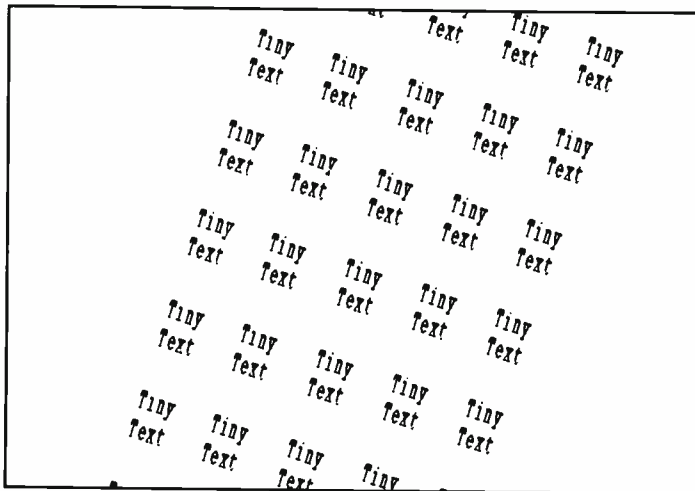
program indicate that it also supports some daisy wheel printers.

Installation of Tagprint II via an Install program is quick and simple, with prompts provided at each step. Modifications, such as the addition of a new printer, are made through menu selections in the Install program, and can be made without completely re-installing the whole Tagprint II program.

Tagprint II is started by getting into its directory and typing "LBL". The program loads, and self explanatory menus appear on screen.

To make a new label, screen prompts guide me through the steps: I give it a name, select a size from about 65 catalog choices (or add my own size), enter the number of labels I want in the set, select a typeface (including three types of bar code), etc. Next I enter text, starting serial number and other layout details. Once defined, I save the label to disk. I can print the set, in full or in part, and I

Small labels can be produced. A pin feed printer is necessary to maintain alignment in this application.



can modify and rename it.

I did not actually try it, but Tagprint II has the capability of importing clip art files; it can print graphic images on labels. The program can also import data in ASCII form from a database program.

Tagprint II has an "F1" HELP facility, not quite as elaborate as the others, but adequate. The program is easy enough to use that most operators will find that they seldom refer to the instruction book, which is thin and concise. The program is not overly memory hungry, but data files can get a little heavy; a 1 to 99 two line serial label set typically takes almost 70 k. Tagprint II does what it needs to do and should more than meet the needs of sound contractors.

All the programs work, all use blank stock that their manufacturers supply, and each program will function with stock supplied by other manufacturers. Customer support by all manufacturers was good. Tagprint II supports non-dot matrix printers, but bar codes, images, and some types of stock require dot matrix. The programs permit us to select a few printers that are not tractor feed, but I see that as a "get by" concession. Label stock comes on tractor feed substrate, and tractor feed may be important for keeping everything in register. Some forms of label stock, such as cable sleeves, may not even

pass through a non-tractor feed printer.

If I were going to purchase just one of the three programs, I would probably eliminate BradyLabel because of its heavy memory requirements. Of the two left, I would probably select TagPrint II because of its simplicity. I would also plan to use a tractor feed dot matrix printer.

The bottom line is that after having these label programs for over a year,

The program can also import data in ASCII form from a database program.

we haven't gotten to the point where we use them on a day-to-day basis. For routine operations the books of pre-printed number sets do what we need to do. The programs are indispensable for larger installations where elaborate labeling schemes are specified or necessary. In an application like that, they save a tremendous amount of time, help coordinate and plan the job, and are used to track its progress.

BradyLabel: Brady, P.O. Box 2131, Milwaukee, WI 53201. (414) 351-6630.

PanMark: Panduit, P.O. Box 246, Cumming, Georgia 30130. (404) 889-1800.

Tagprint II: Tyton Corp., P.O. Box 23055, 7930 N. Faulkner Rd., Milwaukee, WI 53224. (414) 355-1130. ■



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Rack Accessories, Part II

Shelves, Drawers, Panels, and Cooling

BY MIKE KLASCO

In Part one of this series, we took a look at power conditioners, uninterruptible power supplies, voltage regulators and the like for racks. This month our survey focuses on rack hardware, including drawers, panels, patch bays, and cooling systems.

There is an endless variety of metalwork rack accessories, with quite a few industry suppliers. Fit and finish versus price is always a consideration, but since the equipment enclosures are what your client and their customer see first, it is a shame to compromise on these appearance items. Details such as heavy metal gauge, a power coat paint finish, an extruded aluminum trim, glass doors, and quality hardware all contribute to the impression of a professional installation.

SHELVES

Many consumer audio products are not tooled for rack installation, so shelves are the simplest solution. A rear flange on the shelf can improve rigidity and reduce buckling and warping. Most rack hardware suppliers offer shelves, including Atlas/Soundolier, BGW, Middle Atlantic, and Winsted. Raxxess offers the option of pre-punching the bottom of the shelf

to aid fastening of half-rack devices.

Sliding shelves are handy for turntables, mixers, top-loading and "hands-on" equipment. Rack slide kits enable ready access for ease of maintenance. Rack slide kits available from Winsted are custom designed for direct mounting to many audio-video products. Atlas/Soundolier has a VCR (or other heavy component) slide-out shelf that uses two sets of mounting rails for secure support, while Middle Atlantic has an unusual sliding rail system (SRS) for rear access to equipment.

Many racks are not limited to holding pre-set equipment, but are parts of control systems. Rackmount shelves that protrude from the face of the rack can provide the visibility of controls and access required. Winsted offers bolt-on editor shelves, as well as top-of-rack controller consoles. Atlas/Soundolier has protruding flat surface platforms that can be used for writing or other functions.

TELEVISION MONITOR ADAPTORS

Wedge shaped television monitor adaptors mount to the front of the rack and angle the monitor downward. Recently, installers have been using these adaptors in control console systems for enhanced visibility and easier access to audio rackmount components. The effect of the six-to eight-foot

extension at the top end of the wedge provides a futuristic look to the entire installation. Atlas/Soundolier and Winsted have been offering this hardware for years, but recently, various rack system resellers have "discovered" this space station styling.

CUSTOM PANELS

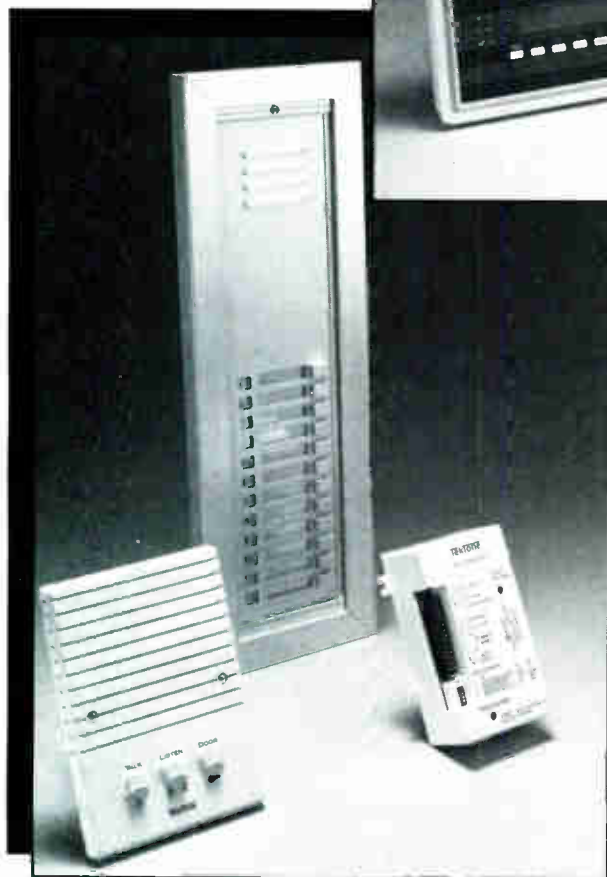
For really classy jobs, such as high-end custom home installations, just dumping the audio components on a rack shelf won't do. A number of suppliers offer custom punching services, and offer semi-custom rack panels pre-punched for literally hundreds of audio components, custom zoning or control panels, as well as an endless number of combinations of connectors on termination panels. Some vendors will supply the connectors on termination panels, saving time in ordering and assembly. A few of the outfits that supply custom services are Middle Atlantic and RCI. BGW offers its universal connector plate system using six pre-punched single wall gang plates with a wide variety of standard insert plates, while L-Com specializes in RF and computer rackmount patch bays.

RACKMOUNT STORAGE DRAWERS

Storage drawers are available from most rack hardware suppliers and are

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

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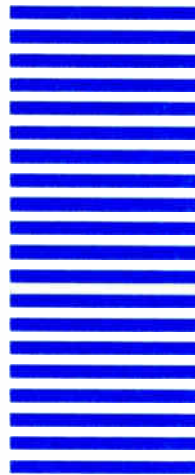
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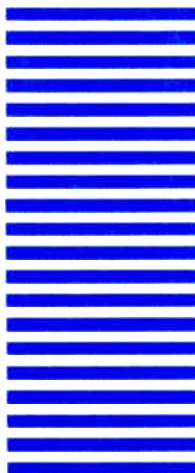
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great for storing needed odds and ends, such as spare fuses for amplifiers, spare phonograph needles for discos, specialty screwdrivers so security covers can be removed and your carefully EQ'd settings can be screwed up by the idiot who does the mixing, and so on. On second thought, don't forget to order the optional key lock for the drawers.

RACKMOUNT HOLDERS

CD, cassette, DAT, VHS, LP/laser-disc and floppy disc rackmount holders are offered by Middle Atlantic. I tried their CD holders in my home system and it really is convenient and cleans up the appearance of the installation. Similarly, Raxxess offers the Rak-Vault for rack storage of these types of items with a locking cover. Winsted also has a comprehensive selection of CD disk bins, and related storage rack utility devices.

SECURITY COVERS

Security covers are ideal for preventing tampering of equipment settings by "inquiring minds" and these covers mount over existing gear. Mounted with tamper-proof hardware, these covers can usually be removed without removing the equipment.

Blank panels fill unused rack space, perforated panels can be used to help ventilation. Closing a bunch of power amplifiers within a rack can build up heat quickly, and cooling is a key consideration in rack layouts.

COOLING

Rackmount fan systems are available from many suppliers, with BGW offering additional functions such as circuit breakers, power outlets and noise filters. High airflow in minimal rack space can be achieved with configuring the fans at right angles to the rack panel. For example, Winsted offers up to nine fans in one rack space and Matrix offers a three-fan package. The Fan Alarm is a three-fan one-rackspace unit from Unitrack that can sound a warning, flash a light, or turn

off your equipment in case of a power stoppage. Wait a minute. If the power is off, won't the equipment be off?

In the more conventional vertical orientation, Raxxess offers pre-punched panels for one to three fans. Middle Atlantic will sell you the fan panel metalwork and filter kits. These washable filters enable good air flow while minimizing dust and pollutants from getting into mechanical equipment, such as CD players, tape decks, and video tape machines.

One high-tech solution to keeping dirt out of the rack, yet providing cooling, is to use a heat exchange. The idea is to equalize the heat inside the rack to the ambient temperature outside the rack, without airflow through the rack envelope. A typical heat exchanger mounts to the side of the rack

and consists of a self-contained package of heat pipes, a heat sink and fans. Suppliers include Lytron, Norlin and Rittal, with lower cost units running about \$700. Rittal offers a free workbook and the THERM software program to help you determine your cooling requirements for racks. For those of you who brown-bag your lunch and store it in your rack, Hoffman offers top-mounted rack air conditioners in 2,000 and 4,000 BTU sizes. Other benefits of these rack air conditioners are to cool equipment and control rack humidity in tropical installations.

In the next installment of this series, Sound & Communications will look at rack enclosures, new options in rack RF shielding, fancy cosmetics for racks and more. ■


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A Sound Inaugural

Clinton's Inaugural Tests Sound Professionals' Skill

BY WILLIAM FREEDMAN

Whoever thought of holding the presidential inaugural in Washington during January was not a sound engineer.

But despite all the potential environmental pitfalls — nasty weather, wireless interference, acoustically muddy rooms — the sound crew retained for the 52nd Presidential Inaugural pulled off the four-day event without a hitch. And no one was caught bugging any downtown office buildings.

THE BIG PICTURE

Laurence Estrin, president of Best Audio in Van Nuys, California, was commander-in-chief of the sound reinforcement team. He estimates that close to 200 audio professionals put in more than 8,000 manhours to work the inaugural. The day after it was all over, he was back in California preparing the sound for the Super Bowl in Pasadena.

But this past January was not the busiest month of his life. "Four years ago, we did the inauguration on a Friday," Estrin said. "The following Saturday was the Super Bowl in Miami."

According to Estrin, there was not a great deal of new technology or equipment involved in President



The front of the Capitol with a view of the swearing-in platform and podium.

Clinton's inaugural. (A cynic might say that this can be proved by how well everything went.)

"We're using new consoles, that's about it," he said, mentioning Yamaha PM4000, Gamble 56 and Midas XL3. "They have more routing capability, better sound, and easier operation for one person."

The inaugural was a challenging undertaking, but none of the specific, individual challenges were ones that engineers and technicians haven't been grappling with for decades. D.C.,

however, has two environmental problems that cause great consternation to audio professionals as well as many others: the government and the media.

Every time you see a Secret Service agent with that thing in his ear, that's a chunk of bandwidth used up. Whenever you see a news correspondent standing in front of the White House with the word "live" hovering over his head, there goes another slice. And if you live around the Beltway, whether or not you work for Uncle Sam or the networks, you're still important

William Freedman is a Washington, D.C.-based freelance writer.

enough to have a cellular phone.

This was Tom Turkington's problem. Turkington is the rental department manager of Systems Wireless, Ltd., of Herndon, Va.

"We were bonkers," he said. "We had everything possible to be frequency-changed out." The Washington Area Broadcasters Association designated Systems Wireless to be the official frequency coordinator for low-power wireless microphones and wireless intercom systems. Turkington estimates that he was juggling 900

Turkington estimates that he was juggling 900 mics, channeling them to seventh-order frequency harmonics.

mics, channeling them to seventh-order frequency harmonics.

He said that his job was made easier by using Vega mics.

"They have a tighter front end — much more selectability," Turkington said. "They can pass a narrower band and reject everything else."

The Vega mics rescued some sound providers who had brought other mics which "wouldn't operate in the high-RF environment," according to Turkington.

The bandwidth limitations were a major concern, but they did not turn out to be an insurmountable problem. By all accounts, there were no live, on-air glitches the entire four days.

CALL FOR REUNION

Let's be honest. What made the Clinton inaugural different from the Bush inaugural was the amount of Hollywood talent that showed up. Big-name entertainers are more liberal than mainstream Americans and they're going to rally around a Democrat. This isn't news. But it explains what Bob Dylan, Diana Ross and LL



One of two main speaker towers at the inauguration supplied by Techniarts of Silver Spring, Maryland.

Cool J were doing on the same outdoor stage. Quincy Jones' "Call For Reunion" concert didn't just reunite some of America's top performing talent; it also brought together some topnotch sound techs.

The stage was set in front of the Lincoln Memorial. Six delay towers brought the sound to hundreds of thousands of ears. "People said they could hear all the way down to the Washington Monument," a distance of about half a mile, said Ronnie Smith, executive vice president of Maryland Sound Industries, which provided the feed to HBO.

"The need for TV is for audio to be heard and not seen," Smith continued. That meant hiding monitors under the stage, using wireless microphones extensively throughout, and employing other tricks of the trade.

Another concern was that the typical person down front was probably not an avid concert goer. A zone distribution system was used so that the

people in the back could hear clearly, and the political cronies in the front row wouldn't bleed out of their ears. This system had to be flexible enough, and line mixer Rob Colby had to be skilled enough, that singers, rappers, orators and a 100-piece orchestra could all be heard cleanly.

"We used the minimum number of speakers for maximum coverage," Smith said.

The Call For Reunion was followed by a walk across the Arlington Memorial Bridge to Lady Bird Johnson Circle. (That's how the Washington area honors someone — they name a traffic jam after her.) En route, the Harlem Boys Choir sang. Once across the bridge, bells were rung. Then fireworks were set off. None of this was easy.

"We got the real dirty jobs, the really oddball stuff," said Jay Arthur, general manager of special events for Capron Lighting and Sound in Boston.

His crew's job was to hang almost a



MTV NETWORKS

President Bill Clinton and Hillary Clinton.

mile of lights and a dozen time-delayed speakers across the bridge. Alec Guinness' crew had an easier time on the River Kwai.

"It was kind of a mess; it was a boat-

load of cables," Arthur said. "The bridge was open to traffic up until the morning of the event and was packed with cars constantly. You risked your life every time you ran across with cable."

But it could've been worse. Arthur recalled his assignment for the 1984 inaugural. He did the parade. Astute Washington-watchers will note that the 1984 inaugural had no parade. It was so cold outside that then-President Reagan had to break with tradition and move the whole thing indoors. "The cable would snap right in front of us, it was so frozen," Arthur said.

PARADE

The Washington weather was more hospitable this year, to the delight of Ken Derr, president of National Events in Newington, Virginia. His company was charged with implementing parade audio this time around. But even under the best conditions, it's a challenge to get a signal up Pennsylvania Avenue from the Capitol to the White House.

In this case, it took 7,800 feet of cable, 102 paging horns, 40 superboxes, and seven zones (four

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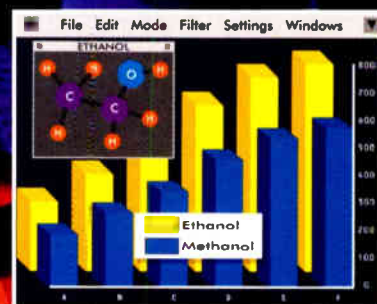
Even under the best conditions, it's a challenge to get a signal up Pennsylvania Avenue from the Capitol to the White House.

announcing platforms and three entertainment sites).

"All we did was make little sounds louder," he said. "When you go and figure out bang per watt, it's really something."

Derr credits Miles Clark, National Events' production manager, and Thomas Linthicum, whom he describes as "the wire guru genius behind all of it," with much of the parade's success. The team also did the Faces of Hope luncheon at the Folger Shakespeare Library and the American Gala's cast party (featuring Kid Creole and the Coconuts).

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Vice President Al Gore and Tipper Gore at MTV's Inaugural Ball.

"This was pretty good for January," said Derr, whose full-service sound/lighting/staging/power company works 1,200 events a year.

It almost wasn't, though. Linthicum may be a "wire guru genius," but he's not a magician.

"My biggest headache was getting signal from one side of Pennsylvania Avenue to the other," Linthicum said.

It seems that National Events got a late start on the parade because of a delay in bid approval. By the time they were ready to lay cable across to the presidential reviewing stand, there was no place to put it. According to Linthicum, CNN and NBC had dibs on the power utilities' conduits, and weren't about to let anyone else go crawling around down there. That left Linthicum to negotiate with the phone company. Problem is, phone signals don't generally run across the street; they run back to a central switching facility and then out to wherever you want them to go. When you're dealing with time-delay complexities, you don't want that. Eventually, National Events was able to get clearance from the phone company to run a line across the avenue just for Bill Clinton's victory lap. The signal had to travel across unshielded wire. Bet you didn't notice. (What's important is, Clinton didn't notice.)

REUNION ON THE MALL

At least one thing about the inaugural was fairly commonplace, as far as sound reinforcement is concerned: the Reunion on the Mall. This was, in es-

sence, a super-hyped community festival with food tents, information tents, souvenir tents and, of course, bandshell tents.

"It really wasn't that big a challenge, we do this kind of venue so often" said Joel Solloway, director of production services and special events for Cleveland-based 8-Day Sound.

The only hard part was getting invited to bid on the action. When the Presidential Inaugural Committee sent out requests for bids, they remembered who designed the sound for the Clinton-Gore team's second bus trip, when the ticket and their entourage rode through Ohio and Michigan. The result was that 8-Day Sound got the contract on Town Hall, a big white tent (4,500 seated underneath, a like number standing outside) in a sea of big white tents.

But there was more to it than political payback. The sound was crisp and clear.

"I thought they pulled off an absolutely fantastic job," said Ken Samuels, production manager for the Radiators, a New Orleans band that played in Town Hall.

AMERICAN GALA

Out in Landover, Maryland, there stands that tribute to mediocre hockey and downright embarrassing basketball called the Capitol Centre. But for one splendid, magical night, nothing went wrong there.

The American Gala, held at the Cap Centre, was the big, black-tie show that, among other things, reunited

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World Radio History

Fleetwood Mac. They sang "Don't Stop" as the finale. (It was a gutsy call for Bill Clinton to pick a theme song off an album called "Rumours.")

"We didn't use any of their gear," said Bruce Burns, president of Los Angeles' Burns Audio, regarding the Cap Centre. "We went with our own stuff and computer equalization from the Solstice Company in Mill Valley (California)."

Burns implemented a Patrick Boltzell design that added a second-delay ring for the outer perimeter, used a lot of lavalier pickup from the in-the-round stage, and called for hanging tons of speakers from the ceiling. Weirdly enough, if it had snowed that day, they would have had to cancel this indoor show.

"We were right up to our weight limitation on the ceiling," Burns said.



Bill Moore of Techniarts pictured in front of the central system for the inauguration. Most of the sound system is located under ground in a vault.

A "wireless room" routed 22 Vega mics through an RF analyzer, which was monitored for encroachment. If a signal didn't look like it was going to make it, the frequency was changed immediately.

The result: "The producers were just ecstatic," according to Burns.

SWEARING IN

Maybe a definition or two remains unclear. The "inauguration" refers to

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the ceremony where the president-elect becomes the president. The "inaugural" refers to everything else happening in D.C. for days on end surrounding the inauguration. This includes everything listed above, as well as balls, private parties for the insiders, and semi-private parties that let outsiders pretend they're insiders.

But no article on the inaugural would be complete without some passing mention of the inauguration. It's just a bunch of speakers up on a platform. Child's play? As if.

"The inauguration is really performed in the round," said William Moore, director of engineering for Techniarts Video International of Silver Spring, Maryland. "There are dignitaries seated behind, risers on either side, and 250,000 people in front."

Moore's company implemented a



Side view of a speaker tower at the inauguration.

Jacek Figwer design; both Techniarts and Figwer were retained by the architect of the Capitol to make the "absolutely foolproof" (Moore's words) sound system go. This required 10 time-delay zones and a lot of allowance

for weather. According to Moore, the worst-case weather scenario would be "cold, ice and freezing rain the week before, turning warm the day of the event." Ever work on a 50-foot scaffold tower sunk in five feet of mud? Ever do it on the National Mall, where freak winds can kick up at any time?

But all things considered, both the inauguration and the inaugural went swimmingly.

"It's very difficult to work under the constraints of a presidential inaugural," said commander-in-chief Estrin. "There's a million things happening, and they all have priority."

"All the companies were incredibly cooperative," he continued. "They represent the best sound companies in the world. In the United States, we're blessed with these, and they don't know how to do a bad job." ■

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The Brookfield Zoo

Not Since H2 and O Were Put Together has Science Had Such an Impact on Dolphins and Entertainment.

BY GARY LEE

Gand Sound is located in Northfield, Illinois. The Custom Installation division has been involved in many diverse projects this year. From the DePaul University basketball stadium to Chicago's Lyric Opera House; from Siebert Chapel at Carthage College (with the fifth largest pipe organ in North America) to the new Illinois Tollway building. Last spring, the Chicago Zoological Society contacted Gand about putting high level music and highly intelligible sound into a facility that was one-third glass, one-third concrete, and one-third water. The building is the Seven Seas dolphinarium at the world famous Brookfield Zoo in Brookfield, Illinois. The structure was built in 1987 on a new site to replace an existing facility built in 1960. The sound system was marginal, and had to be upgraded three times to improve the original installation. How many times have we all seen this situation? Try putting an audio band-aid on it.

The following Q and A session in-

Gary Lee is a freelance writer and photographer specializing in audio in the Chicago area.



The Brookfield Zoo dolphinarium is one-third glass, one-third concrete and one-third water.

cludes comments from Hank Horton, manager of the Custom Installation division of Gand Sound, Kurt Wagner, applications engineer for Bose Corporation (Bose speakers, and the Bose Modeler program figured critically in the installation), and Rich Weissensel,

technical services manager for the Brookfield Zoo dolphinarium.

Lee: Gentlemen, tell me about your backgrounds.

Horton: I have been managing sound installations at Gand Sound since 1988.

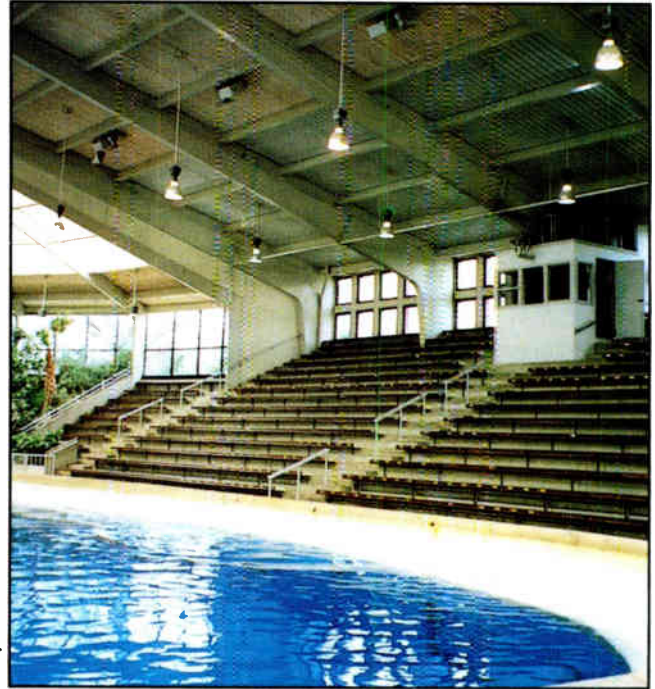
Wagner: I have been an applications

engineer for Bose for three years. Prior to that I was with Opryland for seven years out of Nashville.

Weissensel: I have been with the zoo for fourteen years, ten at the dolphin buildings. I have worked many of the jobs associated with the dolphins, including narrating dolphin shows.

Lee: Tell us about the dolphinarium show.

Weissensel: Brookfield Zoo attracts over 2,000,000 visitors per year. Over 500,000 people see the show each year, in the 2,000 seat facility. In the summer we do four shows a day and two a day in the winter. We had the need for a new show format. We wanted to revise the live narration, and make it more educational and relevant to visitors by linking the well being of humans to the well being of charismatic dolphins and ocean ecosystems.



Bose 402 speakers over the main viewing area.

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

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



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The foliage behind the holding pools serves to hide the Bose cinema system from view.

Subjects like drift net fishing, conservation and pollution are more timely than tricks and the circus type of show that is typical of theme parks. Our show is entertaining, but we wanted to encourage people to be personally involved and to take action for conservation.

Lee: What prompted the search for a new sound system?

Weissensel: We were getting complaints that the audience could not understand what the narrators were saying. The music was coming out of the overhead speech system and was not giving us the kind of impact that audiences expect today. The room is all hard surfaces. Consultants had said that the room needed additional acoustic treatment, but the zoo did not want to alter the appearance of the facility. We wanted to have high impact. We wanted the music portion of the show

Brookfield Zoo attracts over 2,000,000 visitors per year.

to be an experience that was tied in with the action in the pool. The speech should be directed to all audience areas, (including the stairs and walkways), and reinforce the live narrators with wireless head set mics. The music should come from hidden areas behind the plants and trees.

Lee: Tell us the concerns from the contractor's view.

Horton: The main requirements were speech intelligibility and even coverage. The room has some acoustic treatment (acoustic cinder block rear walls, and one-third of the ceiling has acoustic panels) and would not have additional treatment.

The program material consisted of live narration, and prerecorded music with narration on cassette. We opted for a Cinema system for the music and a separate system for speech. The music system needed to be extended

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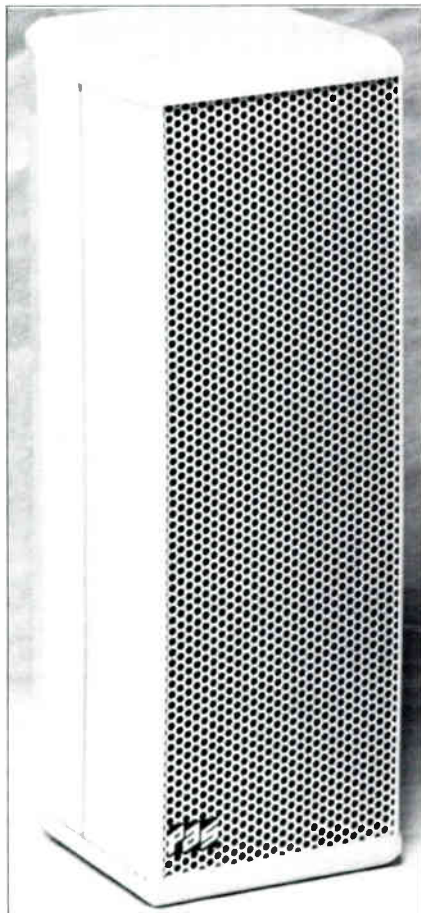
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range, getting into sub bass regions for sound effects and to add impact to the music. They wanted the audio size and impact of a live concert. We decided to convert the music and prerecorded narration to compact disc using the Yamaha YPDR compact disc recorder (for which we are a dealer). This gave us higher fidelity and reli-

ability than could be had from cassettes. The wide dynamic range gave the music more of a live concert feel. The former system used six double cassette players, so the order of the show could be changed depending on the behavior and response of the dolphins. The CD gives us instant cuing of tracks and the bonus of no deterio-

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Three pairs of stacked Bose 802s were painted off site to match the back wall.

ration from use.

Lee: In a relatively short time, desk top computers have taken a front seat in the design of sophisticated sound systems. The Bose Modeler program running on an Apple Macintosh computer has become as important as a Sawsall in tools of the trade. Tell us how you used the Modeler.

Wagner: I performed a site survey with Reed Strutzenberg, Bose Midwest sales manager and Hank. I took a copy of the facility blueprints and loaded the data into the Bose Modeler software program running on an Apple Macintosh IICX with a 13 inch color monitor. Step #1 was to look at speaker coverage. Using 1 watt input, I calculate the SPL throughout the facility. Then I take it up to maximum level to work out the power amp requirements based on the proximity of each cabinet to its coverage area. The locations of the original speakers were good for the speech system, but it had been through several fix ups. Instead of solving the overall problem, components were tacked on the bottom or side of the cabinets to try and remedy

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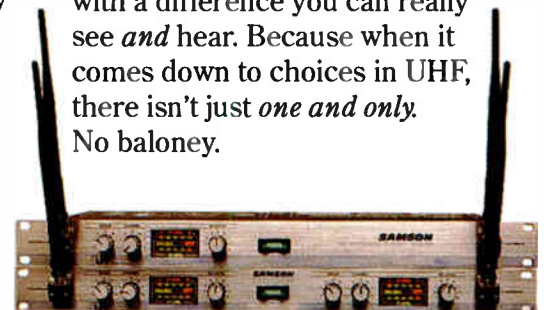
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Directional microphones are of little use if they point backwards, sideways, or in any direction but at the source.

The new CH230 miniature back-electret condenser microphone from Electro-Voice is suspended from a cable with a braided shield (instead of spiral). The result: the mic stays where it's supposed to be instead of spinning out of control with changes in temperature and humidity.

Did we mention great performance? The CH230's dynamic range of 105 dB is almost 14 dB higher than most competitive models, and a humbucking transformer reduces hum pickup by more than 20 dB. A steel shield over the preamp eliminates electronic and radio-frequency interference, while screw terminals on the output provide greater long-term reliability than typical three-pin connectors.

Ideal for miking choirs, orchestras and live theatre, the new CH230 from Electro-Voice puts a new "spin" on great performance.



Also available
in white (CH230W)



the design flaws in the original plan. The pool in the center of the facility holds over 800,000 gallons of water. There was concern over the reflection of sound off the top. The wood decking on the ceiling reduced the reverb time.

Lee: What speakers did you choose for each location?

Horton: The Bose Modeler told us that the reverb time of the low end would not present a problem for music. The speech system had to have close proximity to the crowd for intel-

The narrators had to be able to walk in the aisle in between the pool and the front row of bleachers without fear of feedback.

ligibility and offer exact coverage of the seating areas on both ends and in front of the main pool. The narrators had to be able to walk in the aisle in between the pool and the front row of bleachers without fear of feedback, yet have complete coverage end to end all the way up to the last row. The speech system would have to produce the vocal range exactly.

Wagner: The choice for the speech system was the Bose 402 because of its low profile and unobtrusive size. The music system was to be hidden behind the trees and foliage at the back of the pool. We went for a "wide screen" cinema ambiance with three stacked pairs of 802s and two Acoustic Wave Cannon subwoofers. The plants are compensated for with the Bose controller set on "screen compensation" which boosts the high end to get through a standard perforated projection screen.

Lee: Tell us about the underwater viewing area.

Weissensel: It has eight 8-foot x 8-foot Plexiglas windows that are six inches

Exciting New IQ Products Unveiled!

Vastly increased capability. Vastly increased convenience. Just two things that the new IQ Turbo software, MRX Matrixer and AMB-5 Matrixer provide Crown IQ System users. Here's an in-depth look at all three exciting new products:

IQ Turbo 1.0

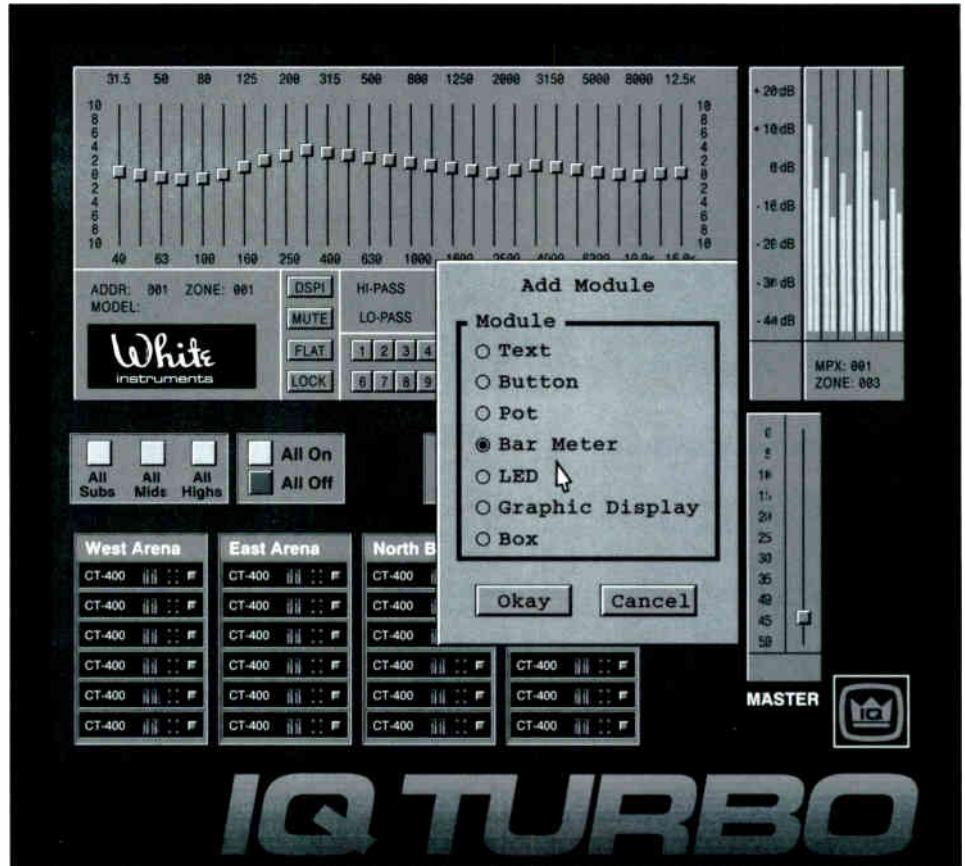
New Turbo 1.0 software is the fastest, most user-friendly and complete software package ever developed for controlling an audio system.

IQ Turbo provides real-time monitoring and instant control of every audio system facet by utilizing advanced algorithms. The end result is that it is designed to fit the needs and technical expertise of any user or application.

IQ Turbo allows the user to decide what level of complexity to work with, from construction of a simple on/off switch to the building of a multiple component screen in full color. In effect, IQ Turbo can be likened to a giant box of "electronic crayons" that lets the user create a completely personalized system.

For example, power amplifiers can be constructed on the computer screen to show every control and monitoring device found on the actual unit. A push of a button will then indicate power, signal presence, levels, circuit protection and more.

IQ Turbo provides two levels of graphic control. The first level, Graphic Display Modules (GDM's),



A sample IQ Turbo screen.

allows control of every monitoring and control feature of the actual component depicted on the computer system.

The second level, Dynamic Objects, can be created to control or display different aspects of the actual component.

Using GDM's, Dynamic Objects, or a combination of both, the user can create an unlimited number of graphic panels for controlling a system. All graphic panels are resizable, with an infinite range of colors and a wide selection of typefaces available. The only limitation is the total memory of the PC!

IQ Turbo also offers Multi-Link, which allows the linking of multiple amplifiers together where they can then be sorted or grouped by any desired control criteria.

Available as a stand-alone soft-

ware package, IQ Turbo provides a host of additional features when used with Sys-Config software.

MRX Matrixer

The new MRX Matrixer provides the ability to reconfigure and repatch an audio system via computer, making it an automated, electronic patch panel that can save hours previously devoted to manually repatching wiring configurations.

Other applications abound, from zone paging to broadcast switching to surveillance system operation. Basically, applications of the MRX are limited only by the imagination of the user!

The MRX, on a plug-in card that can run in the new IQ Card Cage or

Inside:

SMX-6 Takes Off	2
Crestron Comes Aboard ...	3
IQ At Michigan Tech	4

New continued on Page 3

SMX-6 Superb As Gating Device

Crown's SMX-6 intelligent multiplexer, introduced last year, has already caught on in a big way.

The SMX-6 has proven especially popular for microphone gating, and in fact is already employed for that purpose in a number of notable venues, including the Chicago Mercantile Exchange, the Lexington (Kentucky) City Council chambers and a prominent Detroit law firm.

Carrigan Enterprises of Walnut, California recently installed an SMX-6 at the heart of a complex, large-scale teleconferencing system at California Polytechnical University's San Luis Obispo campus. The new system provides audio/video teleconferencing for up to 250 students and a lecturer in a Cal-Poly lecture hall linked with other university lecture halls thousands of miles away.

Tim Carrigan, multimedia systems

engineer for Carrigan Enterprises, convinced Cal-Poly that the SMX-6 is the only product of its type up to the challenge of providing intelligible, efficient microphone gating for a large lecture hall with very live acoustics and high levels of ambient noise.

In fact, ambient noise levels of the room, when empty, reach more than -18 dB. This level increases even more with noise created by students (talking, paper rustling, etc.), and rumble from the HVAC unit.

"The room's aesthetics couldn't be altered significantly to provide better acoustics, and the university didn't want to install a lot of obtrusive equipment," Carrigan says. "In other words, we couldn't install 250 individual microphones."

Instead, Carrigan mapped out six microphone zones within the room, utilizing six Crown PZM-30D Pressure Zone microphones mounted in the apex of customized two-foot, V-shaped clear plexiglass boundaries, ideal for capturing voice. Two microphones are suspended overhead, while two mics are attached

to each side wall. All of the mics feed the SMX-6.

"This is where the SMX proves to be the key," Carrigan explains. "We only have a range of about five dB for gating a mic on or off. The SMX is the only device of its type to provide a gate-level setting low enough to effectively capture and gate individual voices in this noisy environment."

The SMX also allowed Carrigan to tailor the sensitivity of each microphone. "The side wall mics, picking up additional reflected sound from the wall, proved to be much more sensitive than the two ceiling mics. With the SMX, we were able to subtly reduce the sensitivity of the wall mics while increasing the sensitivity of the ceiling mics.

"The autogain of the SMX is another advantage," he continues. "When a gate is on, the unit automatically adjusts a voice to the level where it is most intelligible. The SMX rides that level during the entire duration of someone speaking, insuring that the voice isn't distorted or too soft."



Next IQ School Slated For September

The next session of Crown's popular IQ School will be held September 8-11, 1993. At IQ School, Crown technical personnel lead classes that focus on the use and practical application of IQ System hardware and software.

Lab sessions provide IQ School participants with hands-on instruction and experience. In addition, actual applications of IQ products are presented and detailed, in depth, by contractors and consultants.

The fourth day of IQ School is reserved for certification testing. To receive IQ certification, an attendee must pass a lab test and simulation test, as well as an oral review.

To register for IQ School, or for more information, contact Sandi Walters at Crown, 219/294-8000.

Certified IQ System Installers

The following audio professionals received IQ certification after passing stringent testing following IQ School in September, 1992:

James A. Ford,
Ford Audio-Visual, Inc.

Jay Paul,
Trump Hotel & Casino

Al Colucci,
Ronco Specialized Systems

Bob Adams,
Hoover & Keith

Dave Portugal,
Midwest Audio Group

Don Garrett,
Magni-Sound, Inc.

Jay Foster,
Ancha Electronics

Peter Russell,
Staging Techniques

Randy Vaughan,
Ambassador Enterprises

Rene Guerrero,
Electra Productions

Richard Feld,
Maris Equipment Co.

Richard Lair,
Consultant

Robert Cass,
David L. Adams Associates

Stan Ames,
Acromedia

Tom Bielec,
Acoustical Engineering, Inc.

Brian Bylenok,
AEI Music Network

And the late **M.L. Marsh**, M.L. Marsh Associates, who passed away shortly after receiving certification.

IQ Users List

Following are recent additions to the IQ System user's list. To have your IQ installation listed, contact Keith Clark at **219/234-7017**. In addition, your installation could be highlighted in a press release or major feature article for trade publications.

Walt Disney World
(several installations)

Boettcher Concert Hall,
Denver, Colorado

Sound Services,
Little Rock, Arkansas

American Royal,
Kansas City, Missouri

Indiana State Fair Coliseum,
Indianapolis, Indiana

California Polytechnical University
San Luis Obispo, California

Lexington City Council Chambers
Lexington, Kentucky

Michigan Technological University,
Houghton, Michigan

Chicago Mercantile Exchange
Chicago, Illinois

Jonas Productions,
Indianapolis, Indiana

Clinton Presidential Inauguration,
Washington, D.C.

Wisler Named Pro Audio Liaison

Joe Wisler has recently been named Crown's professional audio liaison, where he is responsible for the coordination of marketing efforts of Crown products to the pro audio and music markets.

A 20-year industry veteran, Wisler previously had served as western regional sales manager for Crown before a recent stint with Cytech Laboratories of Elkhart, Indiana.

Wisler has also worked with the Satellite Radio Network of Denver, Colorado in addition to serving as coordinator of audio services for the PTL television network. He is a member of Syn Aud Con and the Audio Engineering Society (AES).

New continued from Page 1

with any freestanding compatible unit, is buss-controlled and can be situated anywhere in the IQ System loop.

The new Card Cage is a full rack-mountable unit with distributed intelligence. Both **Macintosh** and **PC** software are available for use with the MRX and Card Cage.

Four MRX cards are available: MRX-12 and MRX-24 master cards, and MRX-12S and MRX-24S slave cards. Up to 31 slave cards can be used with a single master card.

The MRX-12 has 25-amp relays, great for high power applications like switching power supplies or amplifier outputs. Both master and slave MRX-12 cards have 12 contactors wired directly to the card edge, are bi-directional and provide single-ended switching.

The MRX-12 works especially well in establishing a zone page matrix. For example, an MRX-12 could be branched out to 12 different sets of cards, providing 12 x 12 zone paging.

The MRX-24 has one-amp relays, ideal for low power applications like line level units. Both MRX-24 and MRX-24S have 24 contactors wired in four rings of 6 x 1, are bi-directional and provide all-balanced switching. The rings provide 24 x 1, 12 x 2, or 6 x 4 matrixers. Adding up to 24 slave cards can provide a 24 x 24 matrixer.

All MRX cards are totally passive, making them suitable for switching mic level, line level, loudspeakers, security systems and even non-broadcast video. When used with Sys-Config software, the MRX can be made to reconfigure automatically. It

Crestron On Board As IQ Licensee

Crestron Electronics, manufacturer of remote control systems, recently signed on as an IQ System licensee. The agreement allows for total integration of Crestron and IQ Systems in applications like stadiums, conference centers, theaters and much more.

"We're very pleased that Crestron has joined Crown in

is also possible to provide reconfiguration with the MRX via modem.

AMB-5 Multiplexer

The new AMB-5 Multiplexer is designed for use as an ambient control system. Perfect for installations where noise levels or crowd densities frequently change, it automatically compensates for ambient noise.

The AMB-5 offers simple operation and provides economical and reliable sound level management without the added expense of custom software. It includes five intelligent mic/line inputs and one output, with an additional input for an ambient sensing microphone.

Automatic mixing is provided and includes capabilities like independent channel compression, gating and priority ducking. In addition, the AMB-5 functions as a passive 6 x 1 mixer that is output independently to channel two, ideal for monitoring an installation.

As with the SMX-6, the AMB-5 can reconfigure itself through downloadable "Algo Packs," which allow programming of specific capabilities into the memory and processor of the unit.

**IQ Turbo
can be likened
to a giant box
of "electronic
crayons"**

providing cutting-edge technology in the service of our customers," says Gil Nichols, Crown division leader. Crestron joins Rane Corporation, T.C. Electronic and White Instruments as IQ System licensees, and licensing negotiations continue with a significant number of other manufacturers.

For more information regarding IQ System licensing, contact Dr. Clay Barclay or Gil Nichols at Crown, 219/294-8000.

IQ Satisfies Diverse Needs At Michigan Tech

The Student Development Complex (SDC) Ice Arena, located on the campus of Michigan Technological University (MTU) in Houghton, Michigan, serves a wide variety of needs.

Home to the MTU Huskies of the Western Collegiate Hockey Association, the 4,200-seat facility is also used for physical education classes as well as commencement exercises, large-scale speeches and presentations.

In 1991, the university contracted Mavri, Inc. of Jenison, Michigan to design and install a completely new system. Because MTU is an advanced technological university, students and faculty are highly computer literate, making use of an IQ System at the SDC a natural.

IQ Macintosh 1.4 software controls the arena's 20 Crown Com-Tech 400 amplifiers via IQ-P.I.P. modules from a single computer screen located in the audio control booth. IQ PC software is also installed. While not currently in use, it may be utilized for future expansion of the IQ System.

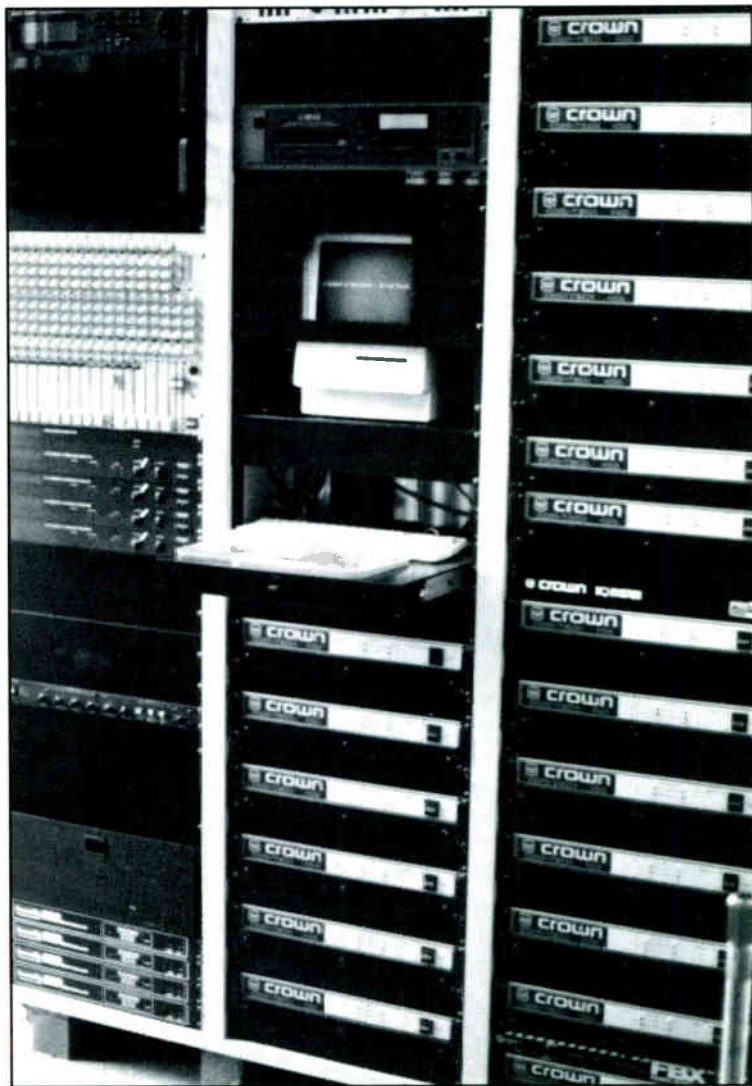
IQ allows control of a variety of functions, including user-access and power levels, as well as on/off and level control of specific components and clusters.

One of the most valuable functions, however, is the IQ System's

ability to store up to eight system presets. Mavri programmed a variety of presets, including ones for hockey games, hockey pre-game shows and announcements, general skating, commencement and speaking events, as well as several others.

The bottom line: system operation is simplified to the point where the Zamboni driver maintaining the ice can handle complete system on/off capability without assistance.

A TOA Saori System is employed in conjunction with IQ. Utilizing the



IQ controls the arena's Com-Tech amplifiers from a single computer.

The SDC Ice Arena in the speech and presentation mode.



AUX port of the IQ-P.I.P. modules, IQ controls equalizer, delay and notch filter presets. To avoid potential groundloops, Mavri chose to optoisolate the IQ and Saori Systems, with the Saori allowing the match of equalization to any IQ System preset.

The Saori mainframe includes a liquid crystal display for monitoring EQ settings. IQ provides the ability to lock the Saori settings — they can't be changed unless the IQ System is unlocked via a special access code.

The university has expressed their complete satisfaction with all facets of the system. And in fact, Mavri received a letter from a grateful MTU Huskies season-ticket holder, stating that for the first time, he can actually hear everything clearly.

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Elkhart, IN 46515-1000

thick in the side of the pool. This is located under the main grandstands below street level.

Horton: We included a 70 volt distributed system in the ceiling in the underwater viewing area which was a composite of both speech and music systems. This system also had its own compact disc player and front end to supply music between shows or when the facility was open for underwater viewing only.

Lee: Tell us about the front end for the system.

Horton: Because the system is operated by the narrators, it had to be simple yet flexible. Using the Micro Audio computer controlled mixers and equalizers, we were able to install a system with only one knob! Our units came from the same batch that were



The main control room contains two Tascam CD players to play back the custom zoo CDs. Two cassette decks were included for experimenting with program material.

SOUND INVESTMENT.



Ross Systems

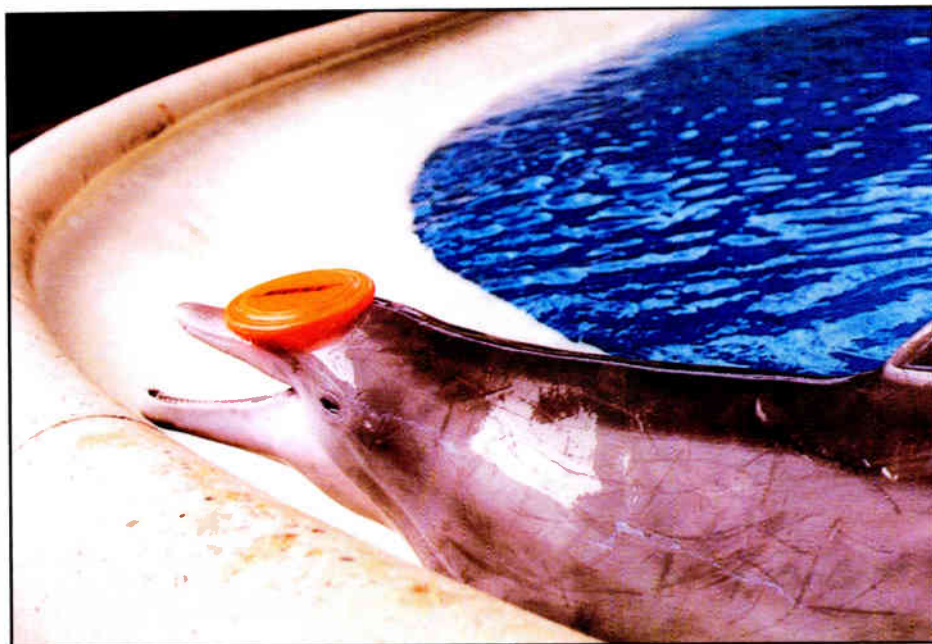
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Circle 253 Reader Response Card

World Radio History



Ally the dolphin gives the system a listen while balancing her favorite toy — a Bose Frisbee!

going to EuroDisney. This knob had eight presets for different sized crowds — off, center only soft (for lectures and training), center and both ends at five levels of increasing volume in 6 dB increments. The rack mount units are programed using a Toshiba laptop computer which we also sold as part of the installation. Another division of Gand sells computers for audio and music production.

Lee: What amps did you use?

Horton: Crown Com-Tech model CT200, CT400 and CT800 amps are located in several places, in close proximity to the speakers they power, and are on timers for hands off operation.

Lee: Were there any adjustments made on the part of the dolphins?

Weissensel: The dolphins are very curious and intelligent. The dolphins range in age from seven to 23 years old. We had to get them ready for the music and the levels. We started with the dolphins in the holding pools behind the main viewing area. The three holding pools hold about 235,000 gallons of saltwater. The subwoofers needed to be brought in slowly to build a consistent feeling among the group. The dolphins would hang out

by the speakers to check out the sounds.

Horton: The Bose 402 ceiling speakers were hung with an electric lift as no propane fumes could be tolerated in the proximity of the dolphins. All other speakers were mounted manually with ladders.

Lee: All this saltwater sounds like it would present its own set of conditions.

Horton: We had to contend with a salt air environment from the water. Everything had to be stainless steel, plastic or zinc anodized. The speakers were painted off site with marine grade epoxy paint to match the stained wood ceiling and brick work of the back wall. The cinema system is invisible to the untrained eye.

Lee: How did you work around the show schedule?

Horton: Summer is peak season for the park and they couldn't afford to have the dolphinarium out of commission while the new system was being installed. The current show was running every two hours from 11 am to 5 pm, seven days a week. We were able to put the system in with no downtime during the day, so no shows were can-

celed. Most of the on site work was done in four days using six men on staggered shifts after and before show hours.

Lee: Does the Modeler program really work?

Wagner: The Modeler program allows us to document 100 percent performance. We expect to come within 1 dB of the spec. on final testing of an installation. With the building plans, a site survey, and the computer I can honestly tell a client "Believe me, the system will work" and guarantee the results. I print the finished proposal in color on an HP Paintwriter.

Lee: And what do the critics think?

Horton: Several of our vendors have seen and heard the show and given the sound rave reviews. Comments like, "The music blew me away. It was powerful, but really clean." "The vocal sound was very natural and easy to listen to." "I didn't have to strain to understand what was being said." "The vocal seemed to be all around us, but the music came at me from the pool. How did you do that? I couldn't see any speakers!" ■

EQUIPMENT LIST:

- 21 Bose 102F72 ceiling speakers
- 8 Bose 402 speakers
- 6 Bose 802II speakers
- 2 Bose 102 controller
- 2 Bose Acoustic Wave Cannon subwoofers
- 1 Bose Cinema controller
- 1 Crown Com-Tech 200 power amp
- 5 Crown Com-Tech 400 power amp
- 2 Crown Com-Tech 800 power amp
- 2 Tascam CD 301 compact disc player
- 2 Tascam 112b cassette deck
- 2 Micro Audio DCA6000 controller
- 2 Micro Audio DCM6200 mixer
- 2 Micro Audio 1.2 RE equalizer
- 1 Micro Audio RS232 interface
- 3 Telex hearing impaired systems
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World Radio History

A Two Minute Offense

Thirty Days in the Life of MAS Audio

BY ART STEINMARK

The new administration and a recovering economy could mean boom times for audio contractors, if the experience of MAS Audio is any indication. "I actually think people were waiting for the election," Michael McCook, system engineer, says. "When mid-November rolled around, our phone started ringing and it hasn't stopped."

December found MAS facing the near impossible: Install three new systems by the end of the year. And create a one-of-a-kind special-effects sound-and-light show for a sports bar. Each job presented a particular set of challenges, and coordinating their installation in a month was the proverbial "logistical nightmare," according to Roger Williams of MAS.

"Ordinarily you'd hope one or two of the jobs could be put back, but each of these customers had a definite deadline, and we decided to make them all," he says. "We love the work, but burning the midnight oil around Christmas-time doesn't win you any points at home. Fortunately our subcontractors and suppliers came through when it counted."

Art Steinmark is a business writer based in New Hope, Pennsylvania.

60 Sound & Communications



Klipsch 101-BR speakers installed on both sides of the room in "The Church."

SYSTEM 1: THE CHURCH

Out among rolling farms, the Amwell Church of the Brethren sits at the end of a narrow road on a large flat lot. The church was founded in 1859. It burned in 1950 and was rebuilt in 1951. Today, it's a neat frame building with white siding on the edge of fields that run to a low range of hills in the background.

After deciding that the existing system was "inadequate," the church contacted three firms to bid on installing a system in four zones: the sanctuary, the annex, the kitchen and the nurs-

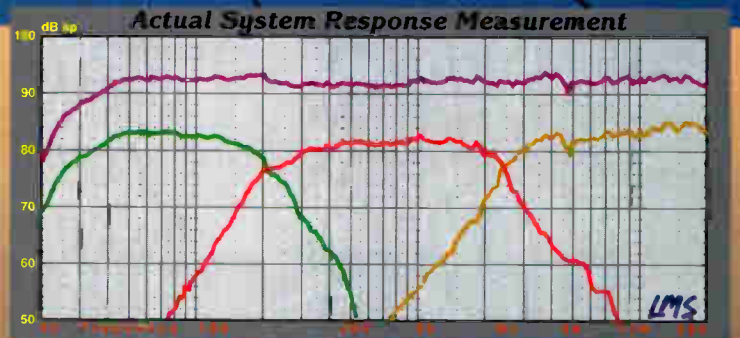
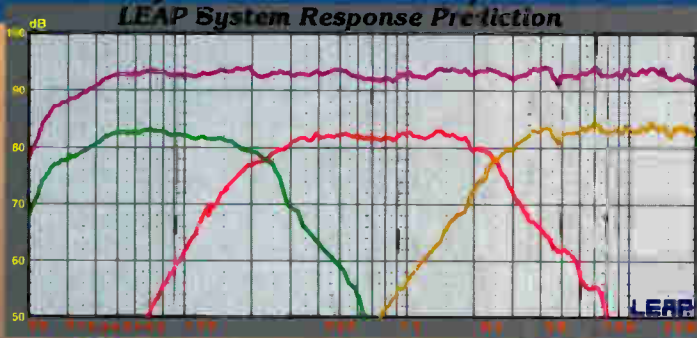
ery. The request for proposal (RFP) was detailed, and represented a knowledgeable consideration of the church's requirements, including:

- Evenly distributed sound reinforcement in the plaster-walled sanctuary.
- Transmission of services in the sanctuary to the other three zones.
- Capability to mix live and pre-programmed material in all zones (for example, when singing along to recorded music).
- Amplification for VCR or film projector audio in all zones.

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A Crown PZM-6FS mounted to a Plexiglas wedge boundary gives a gradual-proximity effect in "The Church."

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•Record/playback capability in all zones (for example, to record proceedings).

MAS proposed a distributed system with volume control in each zone; EQ and input jacks for record/playback in the two main zones (sanctuary and annex); a specially installed PZM in the pulpit; and a wireless microphone allowing live input to the system from anywhere in, or near, the church.

Their design was selected because it effectively addressed all requirements. "During our presentation, we were careful to provide a coherent explanation of each design aspect," MAS's Nicholas Palmese recalls. "Plus, we evaluated everything in terms of being cost effective. As a result, the system gave them everything they needed within their budgeted amount."

For example, in the 100-foot x 60-foot sanctuary, they installed six Klipsch KP-101 speakers, three on each side of the room, arrayed from front to back. "This layout gets around the reverberant characteristics created by the plaster walls and the large open area," Williams explained; "it avoids exciting the room." It has the added advantage of being affordable. A standard ceiling-mounted cluster, requiring special equipment for installation, was outside the scope of the budget.

Jeff Brook, MAS woodworker and cabinetmaker, built and installed the custom equipment rack at the front of the sanctuary in a through-wall niche that allows easy access for wiring. Microphone and line-level signal lines were home run to it for the sanctuary and annex; speaker lines were run to all four zones. A Studiomaster Diamond 8x2 mixer and two Carver PST-24 cassette decks effectively gave the church all the flexibility required.

Going beyond the RFP specifications, MAS recommended a Samson Concert II wireless microphone sys-

New Products



Presentation Switcher Series

The IN3800 series of Presentation Switchers is announced by INLINE. S-Video, Composite video, RGBH&V and audio are easily routed from up to 12 inputs to 3 or 4 outputs. Multiple video formats can be simultaneously routed through a Presentation Switcher, and some models offer previewing capabilities.

Specifications:

- IN3830**
Inputs: 8 sets of 5 BNCs and balanced audio inputs on captive screw terminals
Outputs: 1 set of 5 BNCs, RCA (composite video), 4 pin mini-din (S-Video) and 4 audio outputs on captive screw terminals
- IN3834**
Inputs: 8 sets of 5 BNCs and balanced audio inputs on captive screw terminals
Outputs: 4 sets of 5 BNCs and 4 audio outputs on captive screw terminals
- IN3850**
Inputs: 12 sets of 5 BNCs and balanced audio inputs on captive screw terminals
Outputs: 1 set of 5 BNCs, RCA (composite video), 4 pin mini-din (S-Video) and 4 audio outputs on captive screw terminals

- IN3854**
Inputs: 12 sets of 5 BNCs and balanced audio inputs on captive screw terminals
Outputs: 4 sets of 5 BNCs and 4 audio outputs on captive screw terminal
- Bandwidth:** Video 120 MHz
Audio 20 MHz
- Control:** Front panel buttons source and destination selection. Full RS-232 remote capabilities. I/O interface for projector control.
- Power:** 95 to 250 VAC automatic adjustment

The Presentation Switcher Series comes with a professional labeling kit for the front panel. All models are rack mountable in 3 rack units. Contact INLINE at 310-690-6767



IN2580

INLINE introduces the IN2580, a VGA Interface/Distribution Amplifier Card, that fits into a standard AT chassis and eliminates the need for a separate interface and distribution amplifier. With up to four VGA outputs, horizontal position control and loop through cable, the IN2580 provides an elegant solution for permanent installations and is perfect for rental applications. Contact INLINE at 310-690-6767



PATHFINDER Series of Matrix Switchers

INLINE, Inc. announced the expansion of the PATHFINDER series of matrix switchers. The series now has available models for routing in RGBS and Stereo audio, Y/C and Stereo audio, Composite Video and Stereo audio or Audio matrixing. The PATHFINDER series is available in various configurations of inputs and outputs within a total of 16 channels. Each channel can have up to 4 BNC connectors and 2 RCA connectors or all RCA connectors. The number of inputs and outputs can range from 2-in-14-out to 14-in-2-out or any combination in between. Mikhail Gershfeld, President of INLINE says, "Not only is the PATHFINDER flexible, it will replace all the switchers and DA's needed to create a true matrix the 'old way' thereby reducing the time and labor cost for the installation."

The PATHFINDER series can be ordered either as a dedicated unit or a completely re-configurable unit. Reconfiguration of inputs and outputs is easily accomplished with front panel controls or RS-232 commands. Also, complete remote control via RS-232 provides the ultimate in flexibility for permanent installations. The PATHFINDER series is rack mountable in a 3 rack units. Contact INLINE at 310-690-6767



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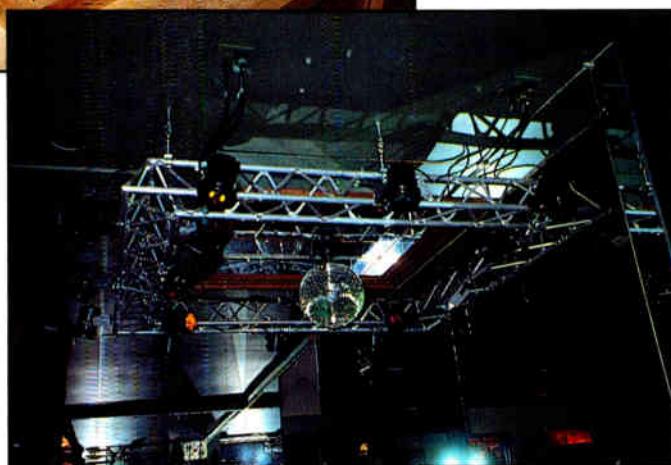
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A Furman DJM-8B mixes sound from two Technics 1200 MK-II turntables and a Carver PRO PSD-36B CD changer (not shown) at "The Dance Club."



A custom six-foot-square eight-inch-triangular lighting truss was required to save the existing mirrored ceiling at "The Dance Club."

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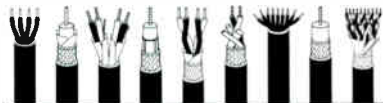
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Circle 78 Reader Response Card

tem with an Audio-Technica #851 lapel mike to allow presenters to get out from behind the pulpit. "During system check-out, we were satisfied that the dbx noise reduction on this new Samson Wireless really keeps it quiet," McCook notes.

Another MAS recommendation was the pulpit microphone design and application, that they based on a concept from a recent Syn-Aud-Con seminar. To obtain a natural proximity effect, be unobtrusive, and leave the pulpit clear for books and papers, a Crown PZM-6FS Pressure Zone Microphone was set onto a Plexiglass wedge boundary. "With this installation, the person speaking doesn't have to be as concerned with addressing the microphone. And it's not in his or her face," McCook says. "After some research and experimentation, we determined that a 70-degree angle of incidence (between the two planes of the boundary) provided optimum gain and the desired directionality."

SYSTEM 2: THE DANCE CLUB

It's Saturday night and for the first time in seven years people are on the dance floor at the Lambertville Station. A DJ is mixing program from CDs, LPs, and cassettes. Amid a subtle display of smoke, lights, and mirrors, the couples are, as owner Dan Whitaker says, "dancing in a world of their own."

The Lambertville Station is a magnificently restored stone train station with oak woodwork and brass fittings, throughout. The dance club is at the bottom of a wide double-stairway just off the lobby; the small sunken dance floor is surrounded by interconnected vault-like seating areas with tables. When an earlier disco was converted to a piano bar, the old sound and light systems were removed. So MAS started with a clean slate and an empty room.

The new sound and light system had to blend in with the decor, accommodate architectural elements of the historic building, provide appropriate

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World Radio History



The MAS-486 — a full-range cabinet — is one of five speakers driven by three Hafler Pro series amplifiers at "The Residence."



The owner of "The Sports Bar" got a sound-and-light system described as "Times Square at rush hour with an ambulance trying to get through."

sound for the dance floor, and meet the needs of a disc jockey. "Our main business is dining, so I wanted a system that would create a dance-club atmosphere without overdoing it," Dan Whitaker says.

Matching the interior was the easy part. MAS specified Klipsch KP-250s in oak-finish cabinets, and a Klipsch KP-115 subwoofer was built into the stairwell descending to the dance floor. The system is driven by two Hafler PRO-2400 amplifiers, one in stereo for the 250s, and one in mono for the KP-115... enough power to get the dancers, and probably the dance floor, moving. "We didn't have a

subwoofer before," Whitaker says. "I think as much as anything, this makes people want to dance." MAS at tributes part of the system's punch to the Furman DJM-8B mixer with "Punch 10" Bass Enhancement.

The equipment rack is in a custom-built DJ booth. MAS worked with the Lambertville Station's carpenter during design and installation. The two Technics 1200 Mk II turntables are isolated from rumble and howl by "floating sandboxes" built into cavities on top of the console. Each turntable

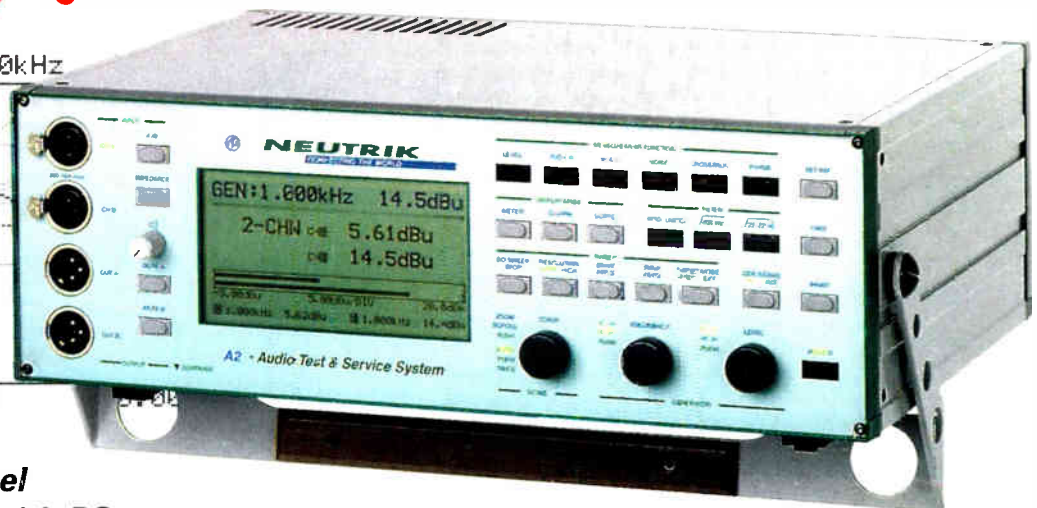
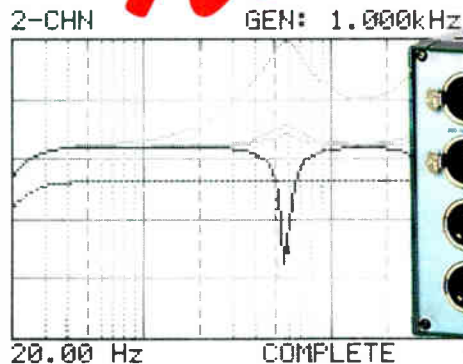
is on a gasketed plate with back X-bracing that, in turn, rests on about 200 pounds of sand. "There's no book on this design, that we know of," Williams says, "but we've found this to be effective."

The lighting system installation had to preserve the mirrored ceiling over the dance floor, where the ceiling was also higher. A custom-fabricated six-foot-square, eight-inch-triangular lighting truss was hung level with the ceiling of the DJ booth and the surrounding seating areas. McCook says, "We

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were able to save the mirror and use it to enhance the lighting effects.”

Owner Dan Whitaker has been pleased to find many of his old customers returning. “They’ll tell me they came here on their first date, things like that,” he says. He is similarly pleased with the sound and lighting systems. “My DJ is thrilled to death: the systems do everything that was promised and more.”

SYSTEM 3: THE PRIVATE RESIDENCE

A historic town on the Delaware River, New Hope, Pennsylvania is a scenic destination for shoppers and club goers. Living between two of the town’s most popular night clubs gave Marcus Fresco an idea: Have the same company that installed the clubs’ systems build him one, too. Hello MAS Audio.

Williams humorously notes that the primary requirement was for “high sound-pressure levels in a small, confined area,” enough to match up with the adjoining clubs. And with 1010 watts RMS driving five cabinets, the system can do that. But in fact, this system produces concert-quality audio at all volume levels.

Marcus’s method of rating the system is simple and effective. First of all he wanted something that “wouldn’t blow up,” and it hasn’t done that. And to evaluate the finer points, after hearing an artist live, he comes home and puts on a recording for comparison. His opinion of the system: “You’re there. The fidelity is absolute. You hear all the music.” Concerning the individual components, he feels the BBE 322, Hughes AK-100, and Furman Punch 10 add essential clarity and emphasis.

The system works this way: The Hafler 5000 drives the MAS-designed “Big Blue” 486-A speakers, the 2400 drives the Klipsch LSIs, and the 1200 is bridged mono and drives the MAS 486-B subwoofer. Clearly, with this



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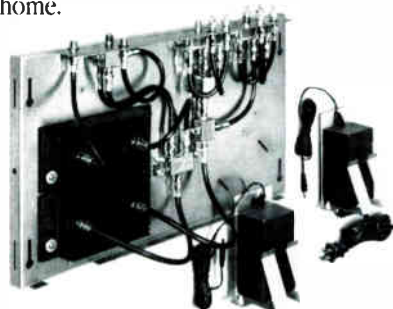
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kind of amplification he has to be careful of causing structural damage to his house and innocent passers-by, but Marcus warns the only down side is that "you have to allow a lot of time for friends to test drive their new CDs." Oh, and there is one other thing: the nightclubs next door have been complaining.

SYSTEM 4: THE SPORTS BAR

Sometimes two floors of fun and games, sports memorabilia, video screens, neon light, and a paint scheme of psychedelic colors aren't enough. Like after home runs, touchdowns, big tips, or anything else that calls for your standard one-of-a-kind heart attack light show.

Owners Bobby and Nancy Soriero told MAS, who had already installed their music and video systems, that they wanted something new and exciting. He says, "People come here because it's a sports bar and it's fun. One way we keep it fun is to upgrade our systems and put in new things."

The MAS solution was a custom-designed system of lights, car horns and an air-raid siren. Chris Meyers, who does high-voltage/code electrical work for MAS, explains, "When the system is triggered, relays shut off the room lights, neon lights, pin lights and bar signs." (The TVs stay on.) Simultaneously, the horns, siren, police beacons, strobe lights, Lyte kaleidoscopes and a six-head helicopter come on. The effect, Michael McCook says, is like "being in Times Square at rush hour with an ambulance trying to get through."

And the customers love it. Even if they don't know that its pseudo-random horn sequencer comes courtesy of a senior test engineer at the nation's leading developer of superconductive Josephson junctions. Known mysteriously, only as "Mother," he designed, built and programmed the "discrete honking" that is essential to the system's absurd,

Mardi Gras effect.

Anticipated refinements to the system will add a tunable eight-bank tone generator for a "speed-dialing" sound effect, and the capability of isolating and triggering the lighting for use by live bands. Bobby Soriero says the system "builds the party atmosphere every time it's used." Confirming this is the fact that, knowing only he can trip it, crowds have begun to applaud his arrival at the club.

ALL SYSTEMS GO: THE AFTERMATH

Despite having only begun the requisite proposals and sales presentations in mid-November, MAS completed the four installations before the end of the year. The quiet country church, the revived disco, the high-decibel home, and the full-tilt sports bar presented a range of system requirements; yet working on them all at once brought several things into focus.

In the '90s, the need for custom features and exceptional sound will drive up the number and variety of prospective applications. But budget realities will remain the same. Therefore, it's up to audio contractors to present solutions that fit the budget. Bottom line: there are more potential customers for custom-designed and installed systems, if you can make the numbers work.

Handling greater volumes of work requires a special set of logistical skills. Preplanning, sequencing and coordination of subcontractors are imperative. "Having a good hardware store nearby doesn't hurt, either," adds Williams.

When it comes to crunch time, the cooperation of subcontractors and suppliers is essential. Close scheduling depends on having the right components at the right time.

When you're counting on suppliers, your reps are key players. Pat Conneen of Audio Associates, whose

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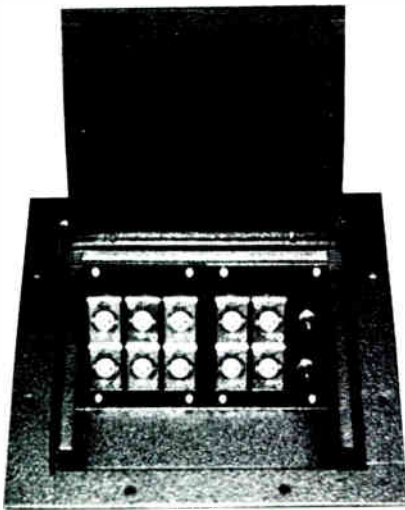


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company represents Hafler and Klipsch, describes MAS's December as a "two-minute offense that lasted a month." He says that guaranteeing

delivery dates is "just doing his job." But according to MAS, that kind of teamwork, is essential when you suddenly have a lot of jobs to do. ■

EQUIPMENT LISTS

SYSTEM 1: THE CHURCH

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- 2 Carver Pro PST-24 Cassette Decks
- 1 Furman GQ-15 Balanced Equalizer
- 1 Hafler PRO 2400 Amplifier
- 1 Stewart PRO 50-B Amplifier
- 1 Crown PZM-6FS Pressure Zone Mic
- 1 Samson Concert Series II Wireless System
- 1 Furman PL-8 Power Conditioner
- 11 Klipsch SP-101 Speaker Brackets
- 2 M&G Autoformers
- 1 MAS Custom 24-Space Rack Enclosure

SYSTEM 2: THE DANCE CLUB

Sound:

- 2 Klipsch KP-250 Speakers (Oak)
- 1 Klipsch KP-115 Subwoofer
- 2 Hafler PRO-2400 Amplifiers
- 1 Furman DJM-8B Mixer
- 2 Furman PL-8 Power Conditioners
- 1 Furman GQ-15B Equalizer
- 2 Technics 1200 MK-II Turntables
- 2 Stanton 680-EL Cartridges
- 1 Carver PRO PSD-36B CD Changer
- 1 Shure SM58 Microphone
- 1 Middle Atlantic RK-16 Equipment Rack
- 2 Omnimount 100WBX Series Speaker Mounts

Lighting:

- 1 American DJ CC-4000 Lighting Controller
- 1 American DJ SC-System Remote Switcher
- 1 American DJ SC-EX25 Extension
- 16 American DJ PL-1001UL PAR-36 Pinspots
- 1 American DJ M-1212 12 inch Mirrorball

- 1 American DJ M-AC8 Motor Assembly
- 1 American DJ Diamond Moonflower
- 1 American DJ S-91 Mini Strobe
- 1 American DJ F-300 Fogger
- 1 Custom Truss Assembly

SYSTEM 3: THE PRIVATE RESIDENCE

- 2 Klipsch LSI Full-Range Cabinets
- 2 MAS 486-A Full-Range Cabinets
- 1 MAS 486-B Subwoofer
- 2 Furman PL-Plus Power Conditioners
- 1 Furman Punch 10 Bass Enhancement System
- 1 Rane ME-15 Equalizer
- 1 BBE 322 Sonic Maximizer
- 1 Hughes AK-100 3-D Sound Processor
- 1 Carver PST-24 Dual Cassette Player
- 1 Toshiba Digital VHS
- 1 Hafler DH330 Tuner
- 1 Toshiba XR9057 CD Player
- 1 Hafler 915S Pre-Amplifier
- 1 Hafler PRO 1200 Amplifier
- 1 Hafler PRO 2400 Amplifier
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SYSTEM 4: THE SPORTS BAR

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Boston's Wang Center

Restoring A Classic Showplace

BY WYNNE SMITH

Constructed in 1925 by noted architect Clarence Blackall and developer Max Shoolman, the Wang Center is a living reminder of Boston's opulent Roaring Twenties, when vaudeville shows, big band concerts, and first run films complete with full orchestral accompaniment occupied its stage.

During the ensuing six decades the hall had fallen into complete neglect and disrepair, reaching its nadir in 1982, when the ceiling fell in. A \$1 million bequest from computer magnate Dr. An Wang gave a strong initial impetus to Josiah A. Spaulding, Jr.'s campaign to raise \$10 million for the restoration of the magnificent old theater on Tremont Street. The restoration campaign was titled "How Can You Mend A Broken Art?"

Spaulding, President/GM of the Wang Center, enlisted President/CEO of John Hancock Financial Services Stephen L. Brown as chairman of the restoration committee. Recognizing that a superlative design and construction team would be necessary in order to achieve its goals, the committee turned to Finegold, Alexander

& Associates, Inc. as the project architects.

FA&A hired Conrad Schmitt Studios, one of the country's oldest interior decorating and historical restoration artisans, for the historical and decorative elements. Walsh Brothers Inc. of Boston served as general contractors, while Mass Electric Construction handled the electrical requirements. FA&A turned to Jaffe Holden Scarbrough Acoustics, Inc. of Norwalk, Connecticut (JHS

for the design of the theatrical sound system, which would be installed by Boston Light & Sound.

Renovation began in earnest with the hiring of Paul Torjesen, a veteran theater renovator. According to Torjesen, the stage house and mechanical aspect were in excellent shape, but the audience side of the curtain was a disaster. The theater was plagued with poor sight lines and acoustics due to damage caused by the ceiling cave-in.



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Wynne Smith is a freelance writer who frequently writes for manufacturers such as EAW.

The renovation of the Wang Center was accomplished with the aid of Jaffe Holden Scarbrough Acoustics, Inc.



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The Wang Center prior to the present installation.

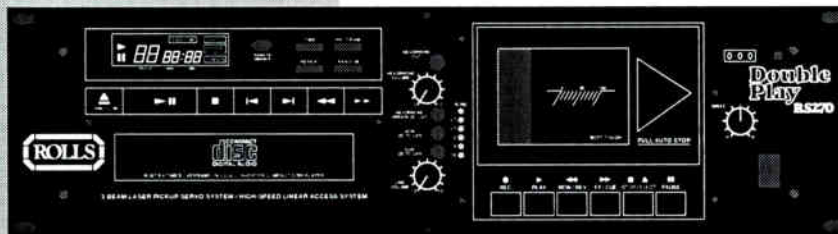
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PHASE ONE: A NEW ORCHESTRA PIT

A major proviso of the project was that the restoration should not detract from or in any way limit the ongoing operation of the theater. The first phase of renovation began with only six weeks in which to work miracles before a scheduled performance of West Side Story. Murals were restored and the Grand Lobby's crystal chandeliers were cleaned and gold leafed. The orchestra pit was redesigned and enlarged by JHS.

The Wang Center serves as the home to the Boston Ballet, the Bay State's principal dance company, which uses a full orchestra. But the hall's original concrete orchestra area, typical of old movie house pits, was designed for only 30 musicians. The ballet and similar events required a much larger pit with better acoustical balance.

JHS's Russ Cooper spearheaded the design of the physical acoustics for the pit conversion. The pit was rebuilt in wood and enlarged to accommodate a full modern orchestra of 85 musicians.

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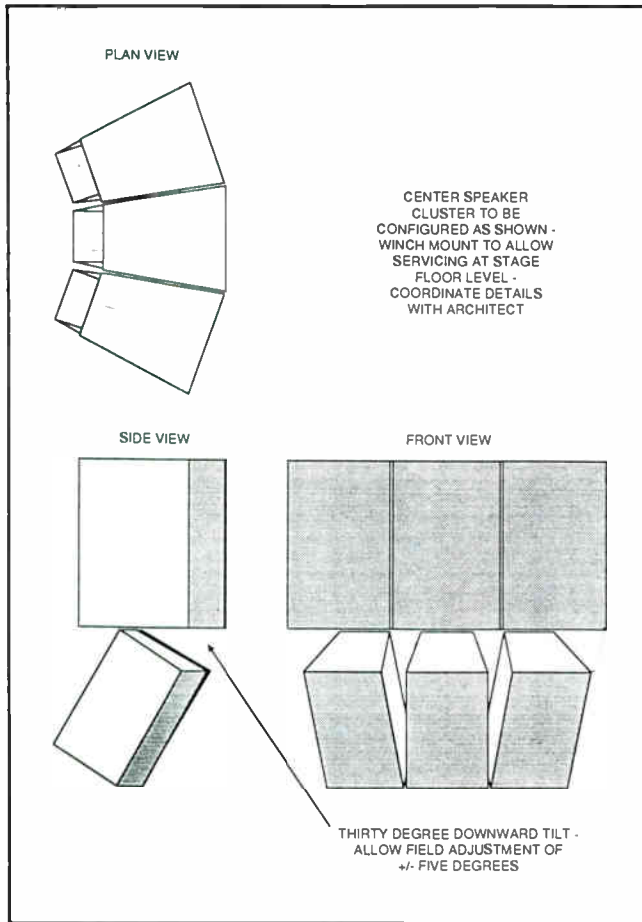
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The center speaker cluster.

It was also acoustically redesigned so that the stage no longer traps the music. Sight lines were improved by raising the last eighteen rows on the orchestra level 16 inches and constructing new box seats with an unobstructed view of the stage. The theater now has between 3,600 and 3,800 seats (reduced from over 4,000), depending upon the size of the orchestra, which can expand into the first few rows.

JHS did not suggest any other room treatment aside from some quieting of the air handling system and replacing the side drapes which had once covered huge expanses of black glass over the balcony and had been removed during the Wang Center's Classic Film Series. When returned, the curtains reduced reflections from that area.



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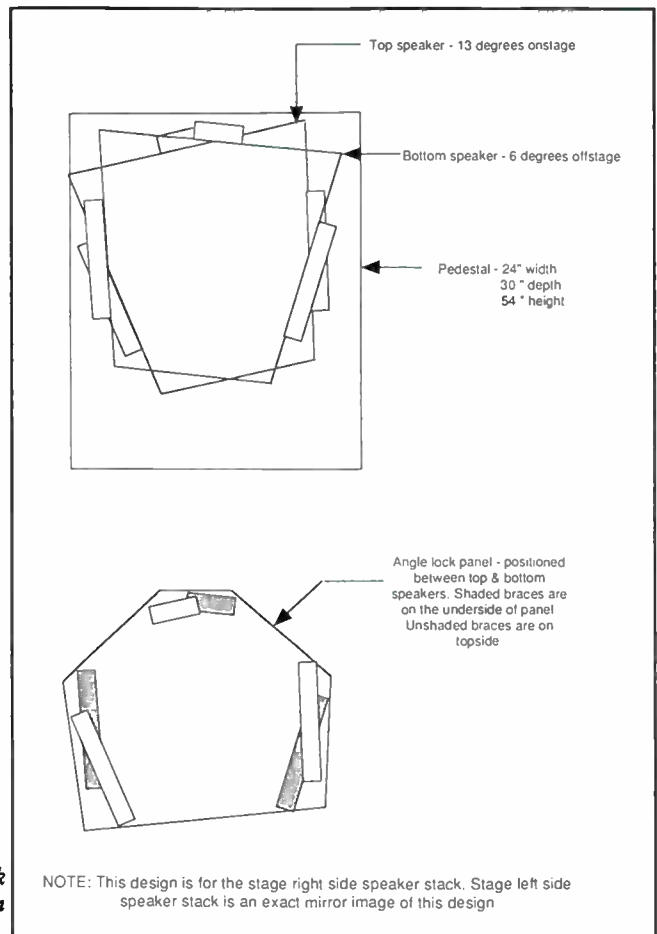
[800] CAL-SWCH

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The existing sound system consisted of an enormous cluster designed by Bolt, Beranek & Newman in 1980 along with auxiliary speakers supplied as part of a manufacturer's marketing promotion. During this first phase of the restoration the Wang Center's management and sound engineer held a meeting with the project architect, representatives of JHS, and Boston Light & Sound personnel to discuss the new sound system. David W. Robb, Director of Electro-Acoustic Design for JHS and designer of the system, was delighted when all participants independently arrived at the same conclusions regarding equipment, placement and manufacturers.

One of the first issues unanimously agreed upon was the use of EAW speakers. Robb had used EAW for

The side stack speaker position and angle lock panel.



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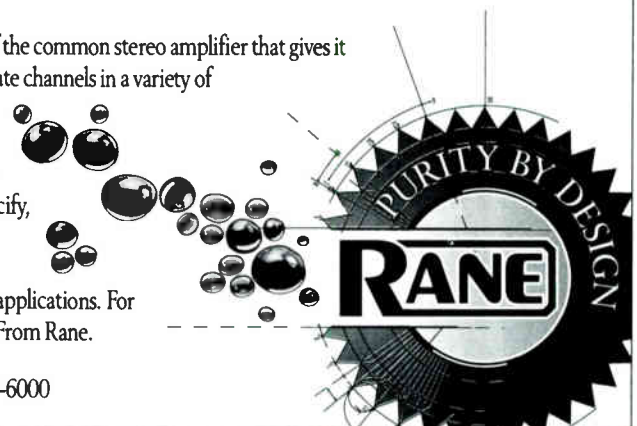


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other installations. Boston Light and Sound had been renting EAW systems to the Wang Center for its Classic Film Series. Paul Coughlin, Sound Engineer/Projectionist for the Wang Center, was familiar with EAW speakers from the Film Series. He'd also seen touring groups successfully using EAW road gear. Wang Center management was sold on EAW as the speaker vendor when informed that factory support for the installation, if needed, would be available from EAW headquarters in Whitinsville Massachusetts, an hour outside of Boston.

The new sound system design included 44 speaker locations: six speakers under the lip of the stage and 38 more throughout the auditorium. As

part of the pit conversion, JHS placed six "lip" speakers across the front of the stage. Generally these lip speakers

The new sound system design included 44 speaker locations: six speakers under the lip of the stage and 38 more throughout the auditorium.

are not used with a live pit band, although they may be used as foldback monitors on a Broadway show, where it is sometimes helpful to have a vocal

subgroup from the performers on stage fed to the orchestra and conductor. The primary purpose of the lip speakers, however, is audience fill. Some Wang Center events use smaller orchestras that occupy only half of the pit. In these instances additional seating is set up in the pit, out of the coverage pattern of the speakers located on the sides of the stage and in the center cluster above. The lip speakers are targeted at this area and are run at very low levels to cover only the first few rows.

For the lip speakers, David Robb wanted a coaxial device that was as small as possible and had accurate conical dispersion. However, it would not be required to go down below 200 Hz. Robb eventually chose an EAW unit designed by EAW Vice President of Engineering Kenton G. Forsythe for the Tokyo International Forum, a multi-use performing arts facility. Forsythe chose a Scandinavian coaxial for its size, reliability and fine sound quality, which he attributes to the unique way the tweeter sits right inside of the voice coil. He designed a passive crossover network for the speakers and enclosed them in a box eight inches square and six inches deep.

EAW was very forthcoming in its support for this project, according to all involved. The lip speaker crossovers had not been completed when installation of the pit was under way. To keep up with the grueling renovation schedule, Eastern Acoustic Works sent the empty back boxes to be mounted into the stage. Knowing that the lip speakers had to be mounted back into a hole specifically set into the stage, EAW routed the back of each box so that the wire, when laid in and stapled, would "jump" on to the next lip speaker. This construction detail kept the wires from being pinched. When the crossovers were completed, EAW Applications Engineer Sandy Macdonald carried the crossovers and speakers to the Wang

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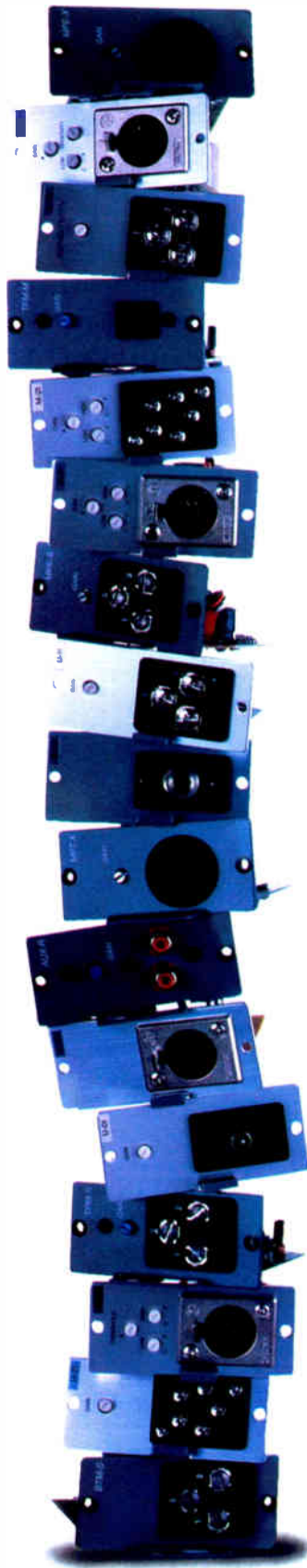


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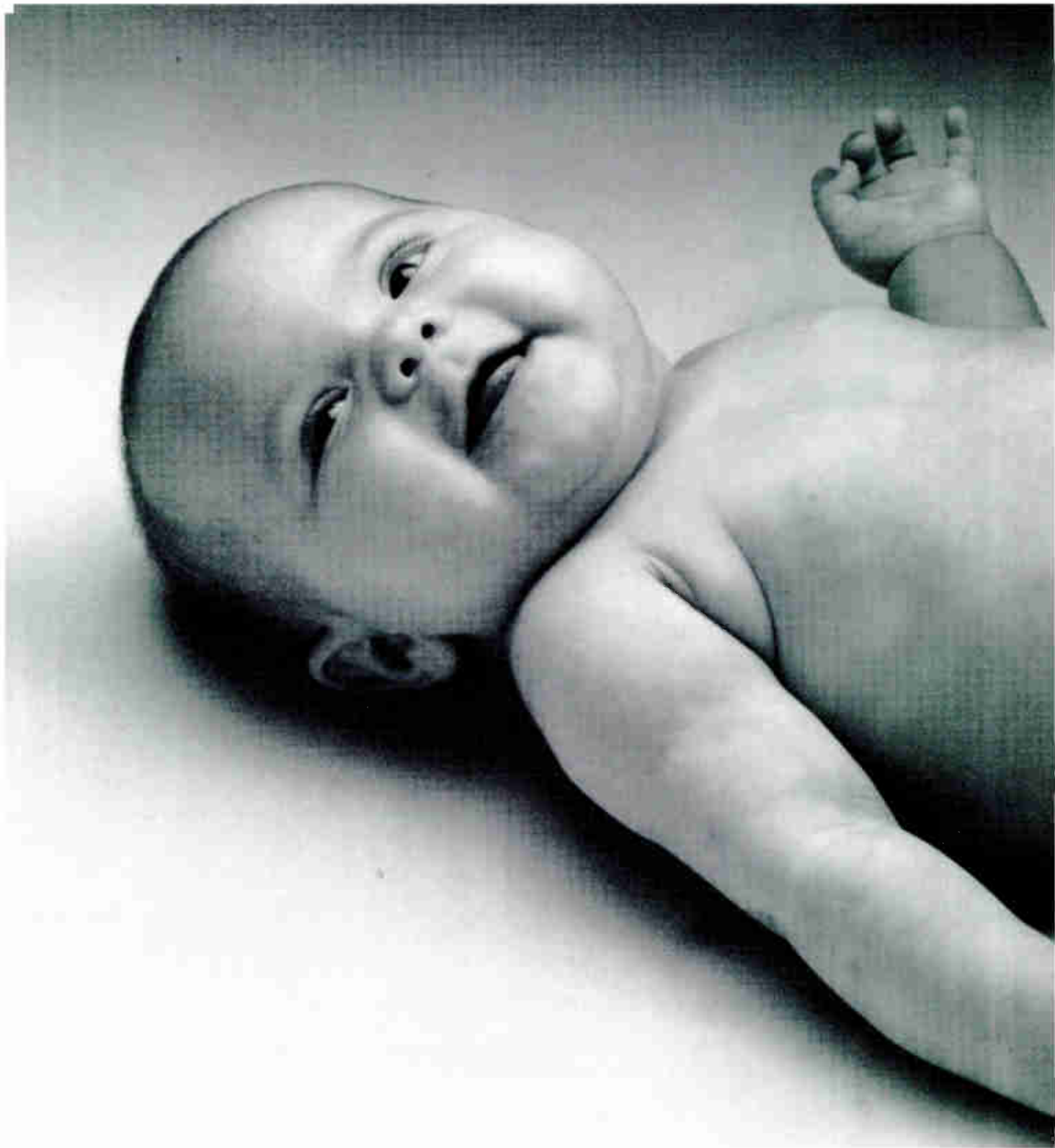
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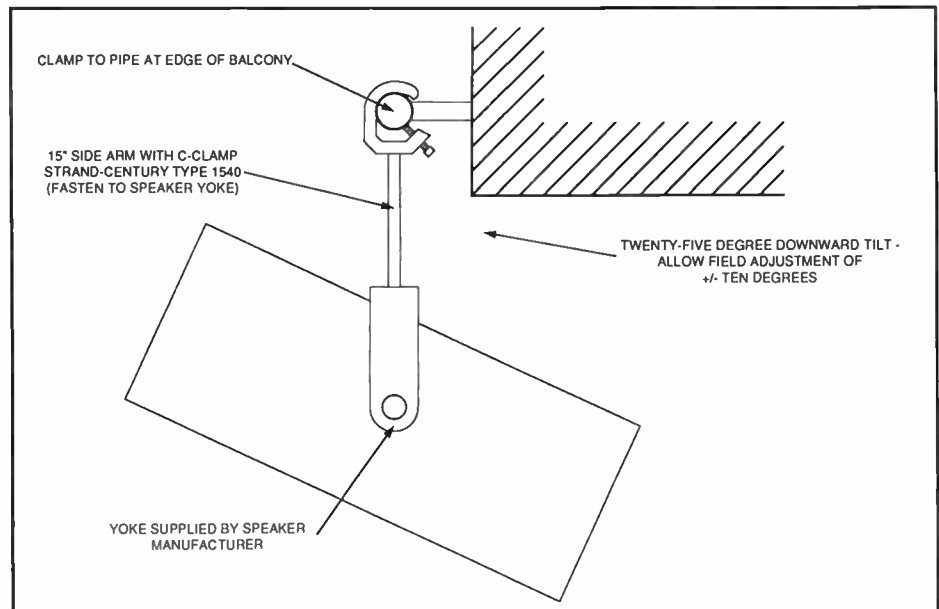
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The underbalcony speaker.

Center, set them into the premounted boxes and wired them into place.

PHASE TWO: A COMPACT CENTRAL CLUSTER

The major portion of the sound installation took place during the second renovation phase. The theater closed again briefly so that the electrical, heating/air conditioning, and sound systems could be replaced. New fire detectors and alarms, along with an upgraded electrical system, were necessary to convert the Wang Center's lighting system from DC to AC power, eliminating the hall's history of blowing out 14,000 light bulbs, each of which had to be replaced by hand, whenever a heat wave caused Boston to brown-out. The "air conditioning" system installed in 1925 had to be turned on three days prior to any performance to cool the theater to 68 degrees. No matter how long it ran, however, temperatures soared into the 80s the moment the theater was filled and the theatrical equipment was turned on.

During this time, nearly 100 tradesmen worked full out on the new cooling system, and electricians labored to completely rewire the vast hall while rewiring and cleaning the twenty-eight crystal chandeliers. Decorative elements such as ceiling murals were painstakingly restored to their original elegance, while skilled artisans recut and reset plaster, copying from one section of the original rococo design that had been saved. Repair of the in-

tricate woodwork was being completed and new carpeting being installed as David Robb, Zeke Zola, Boston Light & Sound System Engineer Mark Rowinski and Paul Coughlin began the major portion of the sound installation.

This phase began with the installation of a new center cluster consisting of a top tier of three EAW KF850s and a bottom tier of three KF600i's. To dampen resonance in the cavity between the KF850s and the KF600i's, Zola and Rowinski lined the top of the bottom cabinets with Sonex. A hanging grid assembly was created and the existing multi-purchase hand lines that had hung the original center cluster (due to weight and age it required six men to move) were removed and replaced and a winch installed by Clancy, Inc. With its new rigging the center cluster, which hangs above the front edge of the stage, can be lowered all the way down to the orchestra pit floor.

The KF850 Virtual Array systems are three-way horn-loaded design that provide good pattern control, according to David Robb. "Kenton Forsythe is a master at the horn loaded mid-bass device," he says. "No one else even thinks about trying to make this kind of device. They don't even make them badly, they just don't make them at all. There are many boxes with one inch horns crossed over at 1200-1500 Hz. They're fine if you stand right in front of them, but once you move off-axis they have some real problems —

there's no pattern control at all. "EAW has spent a fortune on machinery. Every design is stored in computer memory and can be called up time and again. One reason their speakers sound so good is that the cabinets are so rigid: Internal resonances don't eat up the efficiency of the drivers," Robb explains.

Along with the standard production KF850 and KF600i Virtual Array systems, there are several custom designed pieces in the Wang Center. On either side of the stage at the edge of the proscenium sit two EAW KF600i's. Robb originally specified two units that could be rolled onto the stage as needed. Preliminary discussions with the architect concerning the feasibility of building speakers into an area just off the proscenium, or the possibility of building subwoofers into the

walls, or creating a cavity in the proscenium arch where the speakers could be tucked, were fruitless. It was reluctantly decided that two KF 600i's and two SB528s (vented subwoofer

Removable stairs provided by the Wang Center allow performers to walk up and onto the subwoofers and across onto the stage.

systems each containing two 18 inch drivers) would be rolled out from the sides of the stage for performances. The configuration was to have been over four feet wide and could have been very ungainly. However, Robb devised a more elegant design.

The first change was visual. Robb

stacked two KF600i's stacked vertically. Sandy Macdonald of EAW, at The Wang Center during the installation delivering the lip speakers, suggested a pedestal. Braces designed into this pedestal aim the bottom speaker six degrees offstage. A board with a second set of offset braces is placed on top of the bottom speaker: This set of braces aims the top speaker thirteen degrees on stage. The pedestal is actually larger than necessary due to Paul Coughlin's request that it be able to hold the Boston Ballet's traditional Klipsch LaScalas, yet still fit against the proscenium wall.

Due to the way the Wang Center stage was constructed, it was not possible to set the subwoofers underneath, so Robb's design made the subwoofers extensions of the stage itself, part of the sound system and a



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part of the architecture as well. "Caliper" stages were designed to support speaker stacks and other gear carried in by road shows in the area between the wall and the orchestra pit rail. EAW built these caliper stages as custom subwoofers. Kenton Forsythe used a total of four 18-inch woofers in an enclosure that's strong enough to hold up anything the theater can place on it. Removable stairs provided by the Wang Center allow performers to walk up and onto the subwoofers and across onto the stage.

INNOVATIONS UNDER THE BALCONY

Robb decided against a traditional distributed in-ceiling speaker for underbalcony fill because of the cutting of wood and plaster that would be required. Instead, an underhung system places low-profile EAW UB42 "Stealth" systems in front of and aimed at the audience. The first ring of speakers is located right at the edge of the main balcony. A new lighting pipe was mounted across the front of the balcony and the first six speakers were clamped to this pipe. Because the radius of the balcony rail does not have the same center as that of the center cluster, the four inner speakers are on one delay time and the outer pair is on a different delay.

A second line of underhung speakers was aimed down into the boxes located underneath the rear of the balcony. This second underbalcony system uses UB42s in the center for wider coverage and smaller custom-made UB21s for the outside, close to the box. A total of twelve delay zones ensures complete sound coverage throughout some deeply recessed areas. Here very small speakers were necessary and Robb used 14 OWI 702s. In addition to these delay lines there are separate delays on the top and bottom tiers of the center cluster, for the left and right side stacks and on the lip speakers. This allows precise acoustical alignment of all the

various systems.

"The UB systems are a perfect example of why we welcome custom projects," explains EAW President Ken Berger. "They were originally designed for the Wang Center, but they are now a popular element of our standard product line and have been installed all over the world."

Electronics were a mixture of new components and old standbys salvaged from the previous system. Since the budget was tight, the Soundcraft board remained as Paul Coughlin was comfortable with it. Crown Micro-Tech amps originally used in the old system were re-deployed for the film sound system.

T.C. Electronics true stereo 1280 delays were installed and used as two separate mono channels. For some of the underbalcony areas that require multiple outputs from one feed, Robb used 1-in 3-out TC-1380s. The new systems employ Crest Audio amplifiers throughout. Robb has used Crest FA Series amplifiers successfully in other installations and specified them at The Wang Center. BL&S suggested Crest Professional Series amplifiers, pointing out that the power amplification system could be upgraded later to computer control at a relatively low incremental cost. In anticipation of this upgrade, all of the necessary cabling has been incorporated into the new system. Remote control would be handy since the amplifiers are located underneath the stage, far from the control booth.

The hours of hard thought and weeks of hard work paid off when the renovated Wang Center opened its doors. "We are absolutely delighted," Josiah Spaulding said. "The system sounds remarkable no matter what event it's being used for. Whether it's James Taylor in concert or a performance of Swan Lake, the EAWs perform flawlessly." With a calendar that includes The Phantom of the Opera, the Boston Ballet and a variety of pop concerts, Spaulding believes that the Wang Center has become the showplace of New England. ■

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The Voice Coil

Everything You Ever Wanted to Know About High Performance Voice Coils

BY MIKE KLASCO

This month's article is about high performance voice coils and how they influence loudspeaker performance. Upcoming articles in this series will explore loudspeaker technology, from new magnetic geometries to the reasons that compression drivers and horns sound different.

I have promised a series of informative articles, not just about materials or design techniques, but also about what really goes on in a speaker when it reproduces music.

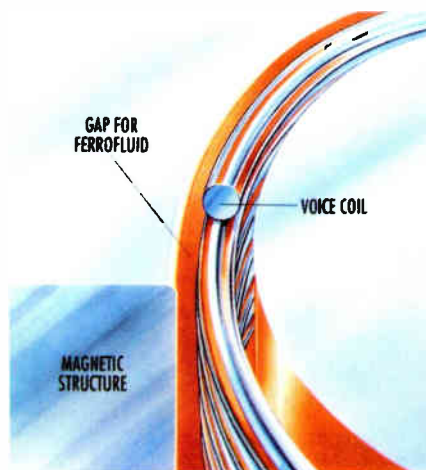
OVERVIEW OF THE VOICE COIL

Almost all loudspeakers used for commercial and professional sound applications are electrodynamic, consisting of a diaphragm or cone, suspension and a motor.

The motor is composed of the magnet, pole piece/back plate, front plate and voice coil assembly. This month we are about to take a long (hopefully not too long) look at the voice coil.

The voice coil assembly consists of a coil of wire wound onto a former

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



Ferrofluids as used in Voice Coil applications.

and terminated with flexible leadout wires. The flexible wires connect to the speaker's terminals.

MAGNET WIRE AND INSULATION

Voice coils are wound from magnet wire. Magnet wire is available in a wide range of sizes, cross-sectional profiles, and wire insulation coatings. The insulation layer is called the Base coat. Magnet wire is often pre-coated with an adhesive, called the Top coat, which is reactivated by a solvent during winding. Alternatively, the wire

can be wet-wound, with the top coat adhesive applied to the non-adhesive coated wire during the winding operation.

AWG (AMERICAN WIRE GAUGE)

The wire gauge is selected by a number of factors, including desired DC resistance, mass considerations, (current) power handling, and magnetic system considerations. A high power subwoofer might use as heavy a gauge as #28 AWG, while a super tweeter might use a wire gauge as fine as #38 AWG. Fine wire is considered 34-44 AWG. Note that with AWG, #32 AWG has twice the diameter of #38 AWG, #26 AWG is twice the diameter of #32 AWG, and so on. Every 6 sizes increases the current capacity by a factor of 4, and every 3 sizes increases the capacity by a factor of 2. Conductor material considerations aside, strength is directly proportional to cross sectional area of the wire.

CONDUCTOR MATERIAL

Copper wire is most commonly used for speakers, although aluminum and copper-clad aluminum is also used. Copper is more conductive than aluminum, and substitution of aluminum for

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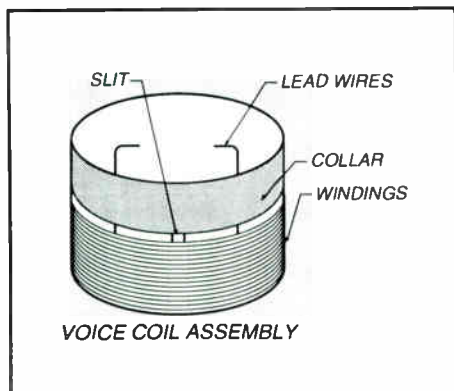
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copper requires a larger diameter wire for the same conductivity. Copper offers superior strength and is much easier to solder to than aluminum. Copper-Clad Aluminum (CCA) offers much of the benefits of both materials, but is still not as robust as copper wire. Esoteric wire, such as oxygen-free

wire and six-nines (ultra-high purity) copper wire have yet to gain wide acceptance in voice coils.

ROUND VERSUS FLAT WIRE

Round wire is most commonly used

Benefits include greater wire density in the gap, and a single layer of flat wire has less inductance than two or more layers of round wire.

in voice coils. In high performance speakers, wire that has been flattened and wound-on-edge is sometimes used. Benefits include greater wire

density in the gap, and a single layer of flat wire has less inductance than two or more layers of round wire. It is far simpler to buy flat wire coils than to produce them. Flat wire requires that the round wire be flattened (usually by rollers) and spooled. The wire may be flattened to various aspect ratios, with 4:1 or 5:1 most common, with the state-of-the-art reaching 7:1 and beyond. Care and special techniques are required to prevent the wire insulation from cracking at the edges of the flattened wire. Electrodeposition of the insulation is one solution to this problem. As the flat wire coil typically has a single layer, special techniques must be used to return the wire back to the top of the coil.

WIRE INSULATION

There are many types of wire insu-



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lations offered for magnet wire, with characteristics optimized for transformers, relays, clocks, motors, generators, etc. For loudspeaker voice coils the field narrows, but there is still a large selection. At first glance, simply ordering the highest temperature rated wire would seem to be a good idea. At closer examination, other issues arise.

If the wire build (the insulation thickness) is too heavy, then not enough conductor is being efficiently placed in the gap, and too heavy an insulation will keep the heat in the wire which is not desirable. Note that the wire insulation coating thickness normally decreases with smaller gauge wire, the rationale being the turn-to-turn voltage will be lower. There are quite a few wire insulation formulations, and designations include U.L. Recognized Temperature Class and NEMA Specification.

ASSEMBLY OF THE BOBBIN TO THE SPEAKER Bobbin to Coil

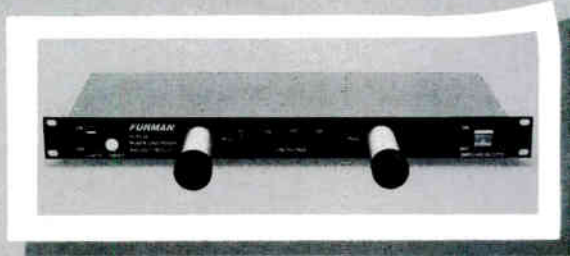
Typically the adhesive is reactivated on the bobbin and wire by either M.E.K. or alcohol during the winding operation. Heat considerations are most critical between the coil stack and the bobbin, and the adhesive should have at least the same temperature operating range as the wire insulation.

Care must be taken by the manufacturer to press the leadout wires close to the bobbin so as to prevent any gap from forming.

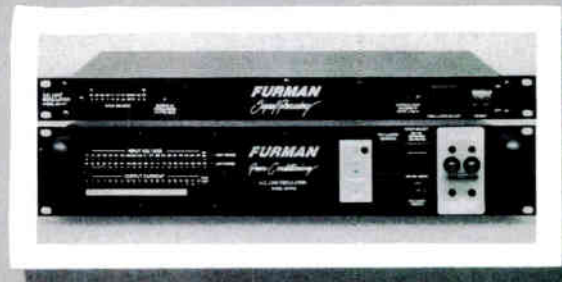
Leadout Wire Types

Leadout wire types vary depending on the speaker, but either braided "Litz" wire or flat strip conductors are used. There are many choices of braided wire, with variations in gauge, fabric strands woven in with the wire. Flat conductor strips are sometimes used, with phosphor bronze or Beryllium copper being the most common alloys due to their low metal fatigue when continuously flexed.

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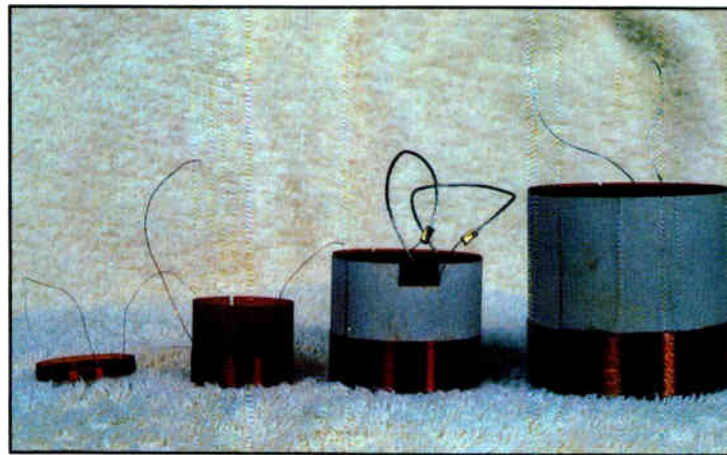
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Bobbin To Spider Adhesives

A range of adhesives can be used for this application. Adhesive selection is made on the basis of performance, process, and cost. The key performance variables are temperature durability, mass, flexibility and adhesion.

Temperature must be addressed because of the close proximity of this joint to the heat generating coil. The heat dissipation/thermal transfer properties of the bobbin material defines the relationship between coil operating temperature and bobbin to spider exposure.

Viscosity is a primary process selection variable. Adhesives are offered in many viscosity increments, ranging from water-thin to gel.

Flexibility refers to the ability of the adhesive to non-destructively dissipate the flexing stress that is generated at the spider/bobbin interface. The more rigid the adhesive, the more concentrated the stress at the spider/adhesive interface. Adhesives which are rubber-modified enhance peel, impact, and dynamic load characteristics.

Mass refers to the strength/weight profile of the adhesive. A key design benefit of cyanoacrylate adhesives is that, relative to solvent and epoxy-based adhesives, a smaller mass of adhesive material can be used to create the required joint strength.

Viscosity is a primary process selec-

tion variable. Adhesives are offered in many viscosity increments, ranging from water-thin to gel. The correct viscosity can bridge spider/bobbin gaps, wet and flow into the mesh of the spider without wicking, resist running and migration down the bobbin. It is important that the adhesive does not wick out of the joint interface into the spider because this will stiffen the fibers and form a stress concentrator. The concentrated stress can fatigue the fibers and cause them to break.

VOICE COIL ASSEMBLY

Most speaker manufacturers have found that purchasing pre-assembled voice coils is a high quality and cost-effective solution. Finished voice coils wound on bobbins are available from numerous suppliers. The typical voice coil vendor has many years of experience in this highly specialized area. Alternatively, speaker manufacturers may start with the coated blanks (the name for the bobbin when it is flat) and wind either directly onto the bobbin or bond the bobbin to a ready-made coil stack. The voice coil wire is pre-coated with a thermo-setting adhesive. As the coil is wound onto the bobbin, the insulation coating (and the bobbin) is activated with MEK, alcohol or another solvent. The entire voice coil assembly is then cured. Traditionally the coil is baked at about 350-degrees F to snap-over the thermosetting glue. When thermoset, a molecular crosslinked bond results. Baking time will depend on the wire gauge and the number of layers.

SELECTING BOBBINS FOR A SPECIFIC COIL ASSEMBLY

Three coil materials are typically used for medium and high power

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The OTTO-1604 retrofit kit consists of an INTERNAL GAIN CELL BOARD which easily installs inside the CR-1604 mixer's chassis below its main circuit board an external, rack-mountable MIDI CONNECTION BOX. Computer-style ADB connection cable is included.

FADER UPDATE MODE lets you control OTTO from external fader packs that generate MIDI continuous controllers.

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OTTO ASSIGN switches the screen between up to 3 OTTO-ed CR-1604s.

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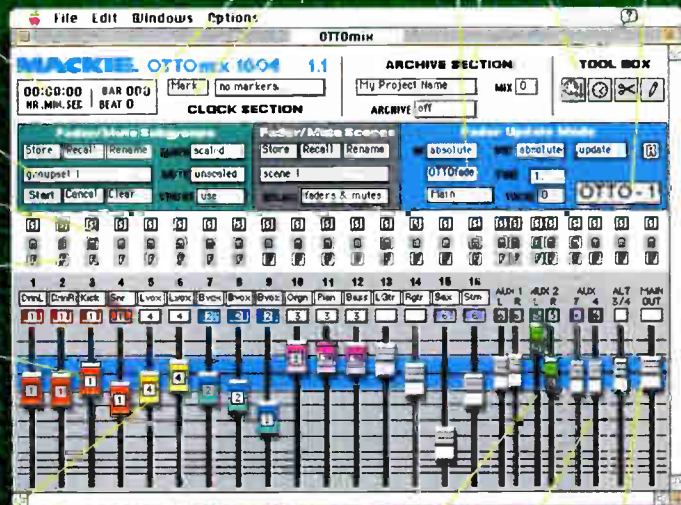
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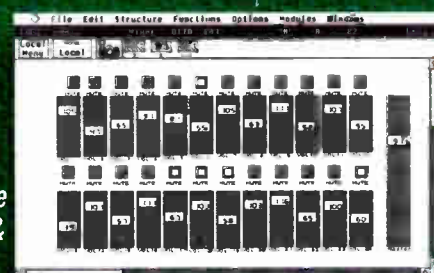
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OTTO-1604 connects to MIDI sequencers via an outboard MIDI connection box that includes IN, OUT and THRU jacks. Front panel buttons control: LEARN, SNAP, SHOT MUTE and BYPASS functions. You can also add an external fader pack for hands-on control... and daisy-chain up to three OTTO-ed CR-1604s (via MixerMixer) for 32 or 48-channel automation!



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speaker applications. They are aluminum foil, polyimide resin film, and aramid fiber paper (Nomex). Aluminum was the first practical material available for high temperature operation, but it has shortcomings. Aluminum suffers from eddy currents generated within the coil. These eddy currents counteract the intended force and result in reduced top-end response and increased distortion. Aluminum has excessive thermal conductivity for optimum speaker operation and can burn the cone and spider under high power operation. Aluminum is easily dented in production, thereby reducing yields.

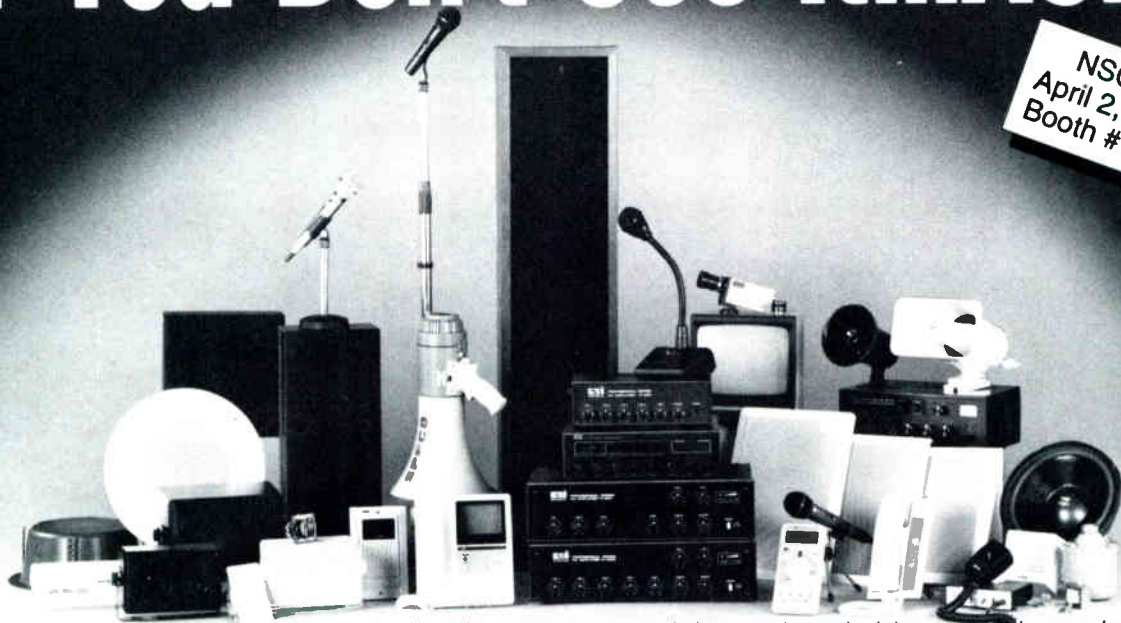
Polyimide is essentially interchangeable with all existing bobbin materials. First introduced by DuPont in the 1970s for speaker applications under the trade name Kapton HN,

polyimide's acoustical properties include low mass and freedom from eddy currents. Polyimide results in lighter yet stronger bobbins than aluminum. Specific gravity of polyimide film is about 30 percent lower than aluminum, yet specific strength is typically 30 percent higher at all temperatures (up to and beyond 480 F). Polyimide is not electrically conductive (eliminating eddy current effects) and will not cause shorts due to wire insulation cracks between the bobbin and wire. In the last few years, Allied and ICI have introduced polyimide films. More recently, DuPont has developed and commercialized an advanced polyimide film, Kapton MTB.

MTB polyimide film is manufactured specifically for the loudspeaker industry. MTB is a thermally conductive Kapton film with up to three times the heat

dissipating capacity of type HN film. While more thermally conductive than other polyimide films, MTB is not so conductive that it will excessively heat the spider or cone. To achieve optimal thermal characteristics for speaker bobbins, DuPont has worked extensively with the speaker industry. The first generation thermally conductive polyimide film was Kapton XT and offered twice the heat transfer of conventional polyimide films. It had been successfully used in many high performance speakers for almost a decade, with Peavey being one of the first users. Kapton MTB is a second generation thermally conductive film, filled and pigmented to provide three times the heat transfer of conventional polyimide film. Aside from pulling the heat off the voice coil, the emissivity (the ability to radiate this heat) of the film is

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further enhanced through the use of a black rather than amber film color. High adhesion is attained through an advanced and extremely uniform treatment which creates a micro-texture on the Kapton film's surface.

KRAFT PAPER

Kraft paper is limited to low temperature operation speakers. Another problem is the glue wicking effects of Kraft paper, which result in sloppy glue joints. Kraft paper is hygroscopic (absorbs moisture) and is affected by humidity. If ferrofluid is being considered, then Kraft paper is inherently incompatible.

NOMEX

Nomex has appeal for compression driver designers. It has extremely low mass and the transition joint between the bobbin and the dome diaphragm is easily formed. Nomex is acceptable for medium temperature operation.

FIBERGLASS AND COMPOSITES

At various times, fiberglass and composites have been tried for bobbins. Hidden problems have included delamination of coil from bobbin due to poor matching of thermal expansion coefficients and severe material fatigue characteristics (brittleness) due to flexing, resulting in creasing and failure. In most cases these materials have disap-

peared from the market, although some subwoofers continue to use this material due to its high stiffness.

BOBBIN THICKNESS

One or 2 mil is used where mass is critical, such as in high frequency speakers. Standard 2 and 3 mil is ideal for automobile speakers. Three mil is popular for many consumer audio applications, while 5 mil is used where wall strength is critical, such as for higher output speakers, especially subwoofers.

VENTING THE BOBBIN — BETWEEN VOICE COIL AND NECK JOINT

Some speaker engineers use holes punched into the bobbin between the voice coil stack and the neck joint. Primarily this technique is used to improve cooling. Air cavity pressure buildup may be reduced behind the dustcap with this form of bobbin venting. Other positive effects are mass reduction and dampening torsional bobbin resonances. Not so attractive is the nasty turbulence "whistling" that can result if the air velocity is too great through the vents or if the vents become partially blocked on large excursions. In woofers that use ferrofluids, vents can cause splashing if they are located too close to the coil stack. If the vents are too large, then the structural integrity of the bobbin is compromised and buckling may result. Notching

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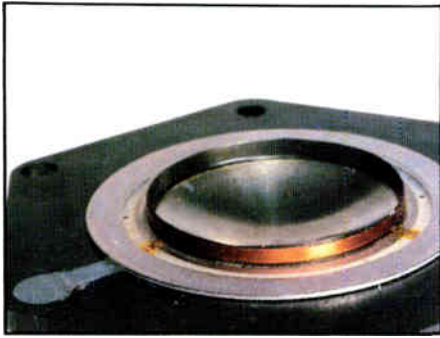
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Close-up of Kapton in use.

(tearing) failure at the vents is a potential problem, although this is far less significant a factor with polyimide or Nomex than with aluminum bobbins.

COLLARS

A collar is one or more turns of a band of material located between the coil stack and the neck joint. Often, the collar extends into the neck joint. Collars are not required on polyimide bobbins. Primarily the collar is used to properly dress the leadout wires from the coil, but leadout wires may be glued directly to the bobbin.

Secondary features are to enhance adhesion and maintain roundness. The collar may be used to build up the outside diameter of a stock bobbin in order to fit an existing cone body. Collars may be formed from Nomex, Kraft, or ceramic paper.

Kraft paper is popular for collars as it is easy to work, but it is not as appropriate for thermally conductive bobbins which operate at high temperatures. To reduce thermal failures, Kraft paper may be impregnated with a high temperature coating after the collar is formed.

DuPont Nomex 411 and 410 are commonly used for collars. Spun lace Nomex collars are used when high adhesion is required. Nomex 410 is "callendared," a process where the material is fed through rollers at high temperature. The processed

material is stronger and less absorbent. Nomex has a higher temperature tolerance than Kraft paper, which is a benefit if thermally conductive Kapton MTB is to be used.

A collar is one or more turns of a band of material located between the coil stack and the neck joint.

We have just touched upon some of the many challenges of producing reliable, high quality loudspeaker coils. If you did not get enough, contact Doug Wells at DuPont (415-323-7963) and ask for the Kapton Speaker Cookbook, a detailed exploration of the voice coil. ■

SOUNDSPHERE SPEAKERS KEEP NEWSDAY PRESSES ROLLING...

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

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

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

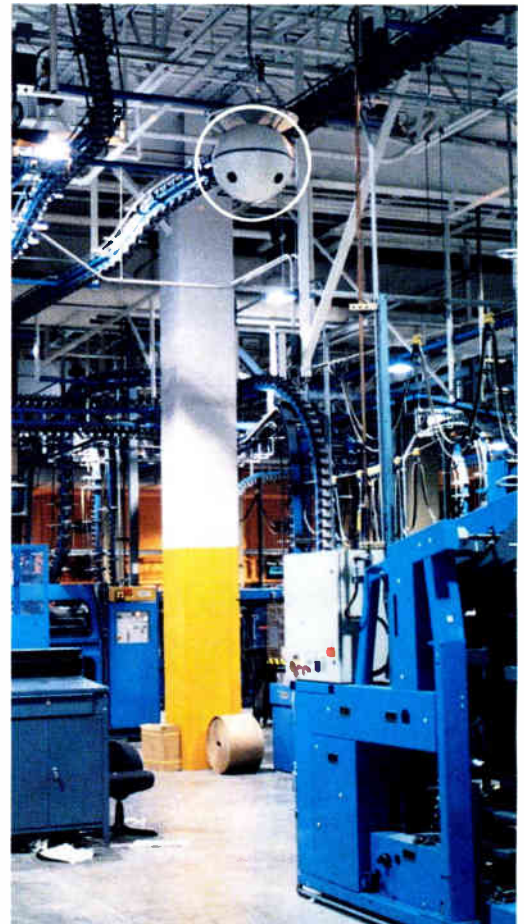
The installer, Bernie Lory has also put two Soundsphere #2212-2 speakers in the stacker area to improve the efficiency of that portion of the operation. He is planning to use more Soundsphere loudspeakers at this site to solve other operational problems.

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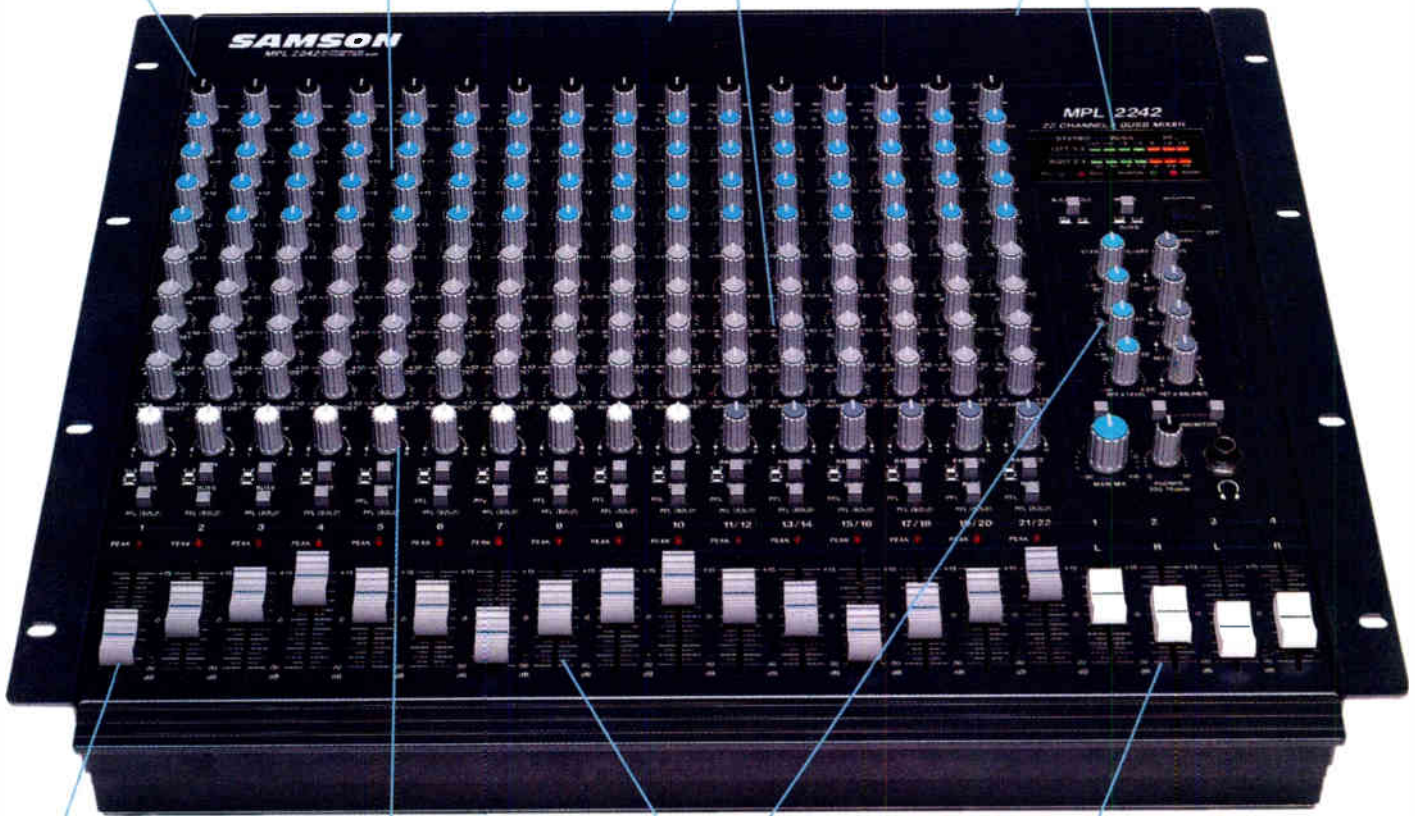
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Digital Delays, Part One

Reviewing the Basics

BY NEIL SHAW

Digital delays are electronic signal processing devices that are used to delay a signal in time. (They, unfortunately, cannot delay time.) When used to delay a signal with respect to time, the digital delay line has found many applications in modern sound system design. This first part of a three part article will briefly review the basic sub-block parts that are common to many of the delay units that are now available. We will also look at the three main ways in which delay units are currently used.

The major portion of this first installment will describe what may be considered ideal characteristics of a delay unit. Reality will then be observed when one looks at the current manner in which manufacturers present these specifications.

DESCRIPTION OF A DELAY UNIT

A delay unit can generally be described as consisting of an input buffer amplifier/attenuator, an input low-pass filter, sample-hold circuitry, an analog-to-digital (A/D) converter, a write to digital memory block, digital memory, a read from digital memory

unit, a digital-to-analog converter, an output low-pass filter and an output buffer amplifier. A delay unit can more simply be described as a two port electronic device in which a signal goes in, and, some time later, as determined by the delay time set, a reasonable facsimile of the signal that went in, well, comes out.

The way in which the manufacturer implements the delay should be trans-

parent to the use to which the delay is put. Every manufacturer uses the techniques that enable the delay unit to meet certain design criteria, whether it be price, marketing zing, technical perfection, etc. The buzz words, like oversampled, one bit conversion, etc., don't really concern us. We really just care about how suitable the delay unit's performance is for the needs of the system in which it is to be used.

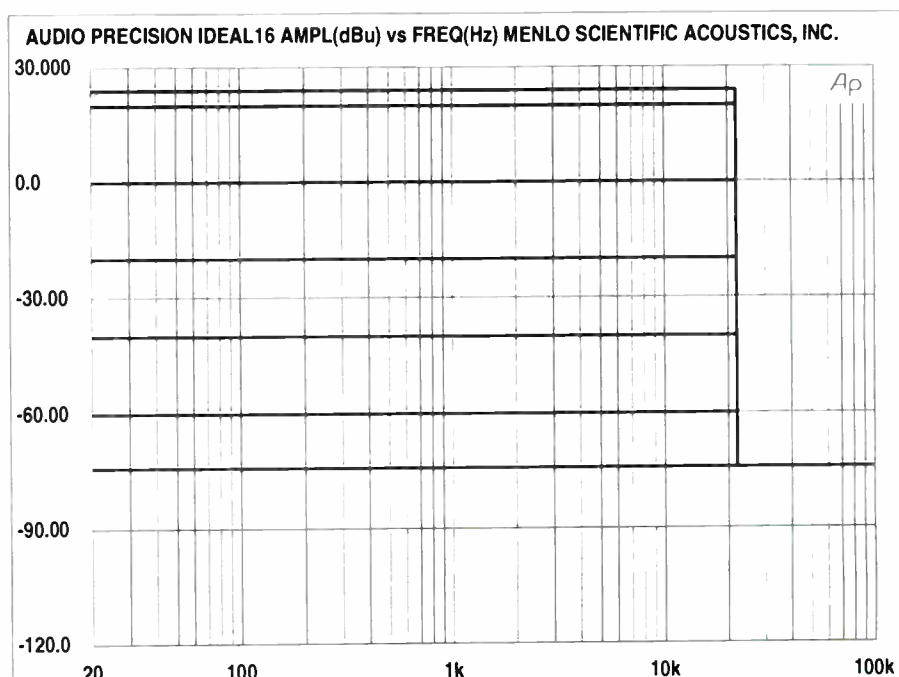


Figure 1 - Frequency Response of an Ideal 16-bit Delay Unit

Neil Shaw is a partner at Menlo Scientific Acoustics.

DELAY UNIT APPLICATIONS

There are three principle ways in which I use delay units in sound reinforcement systems:

1. To make small adjustments in the arrival time of the electronic signals presented to multi-way loudspeaker systems, i.e., the so-called "time-alignment" of two-way and three-way loudspeaker systems. Note that the two-way case generally yields better results using this procedure.

2. To make relatively large adjustments in the timing of the electronic signals presented to widely spaced loudspeaker systems, i.e. to prevent perception of echoes from delay towers and bank delay type distributed ceiling loudspeaker systems (such as underbalcony speakers). In this situation, a system designer is able, due to various psychoacoustic perceptual

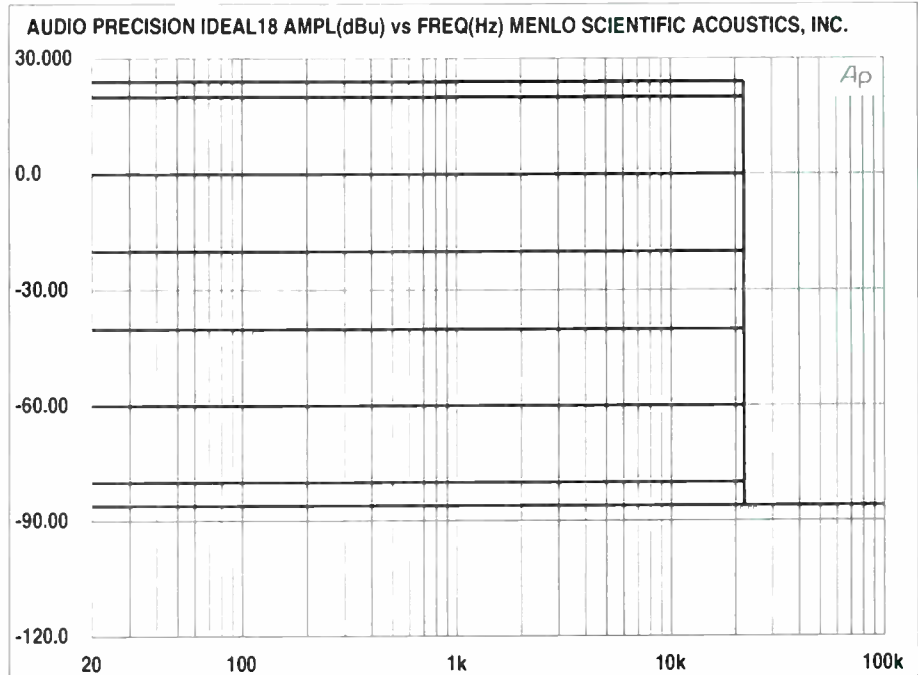


Figure 2 - Frequency Response of an Ideal 18-bit Delay Unit

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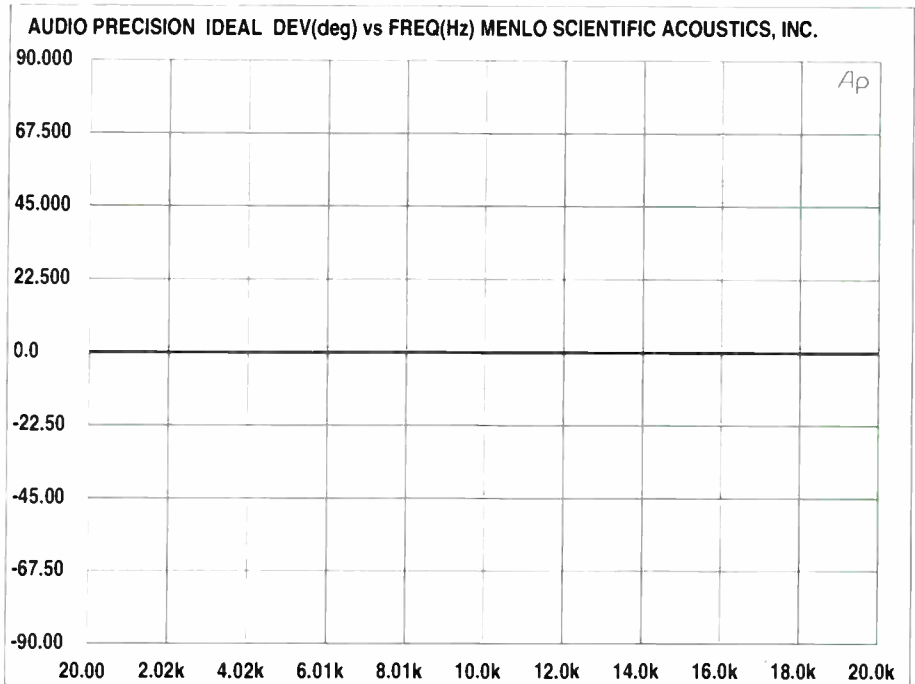


Figure 3 - Deviation from Linear Phase of an Ideal Delay Unit

phenomena, to make it appear that the apparent position of the sound is from the performer on stage, in the first case, and from a precedence loudspeaker, in the second case.

A system designer is able, due to various psychoacoustic perceptual phenomena, to make it appear that the apparent position of the sound is from the performer on stage.

3. To electronically aim a collinear columnar type loudspeaker system. Here the delay unit is used to vary the timing of the electronic signals presented to each transducer in a column loudspeaker system, to vary the position in space/time of each transducer

relative to other transducers. This effectively changes the "shape" of the sound, and thereby the dispersion characteristics of the loudspeaker system. Note that other techniques can also be utilized with this third delay unit implementation to enhance the aiming of the loudspeaker system. These other techniques include, but are not limited to, frequency shaping and signal level attenuation shaping.

IDEAL CHARACTERISTICS FOR A DELAY UNIT

Among the objective measures that can be used to describe the performance characteristics of any two port electronic device include:

- Frequency response of the unit (output voltage amplitude versus frequency for various input signal levels).
- Phase response ("degrees from 'zero'" versus frequency for various delay settings).
- Residual noise (output noise voltage versus frequency).
- Distortion (percent or dB distortion versus frequency, as a function of input level).

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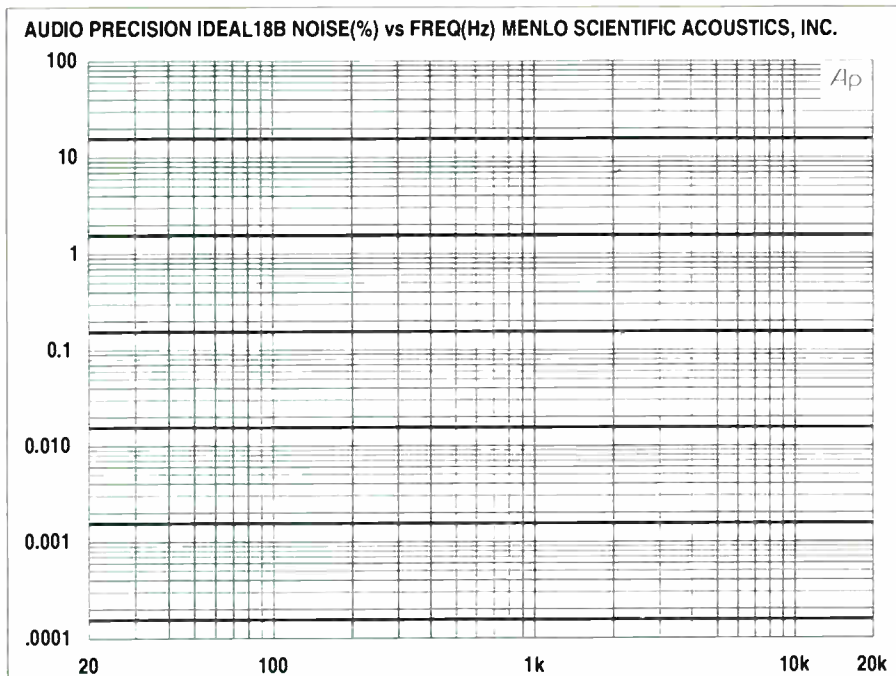


Figure 5 - Distortion of an Ideal 18-bit Delay Unit

or steering is not constant with frequency.

DISTORTION

Figures 4 and 5 show the idealized distortion measurement from ideal 16 bit and 18 bit delay units. For an ideal delay unit, there is no harmonic distortion; therefore the total harmonic distortion (THD) is zero. In fact, for an ideal delay unit, the only distortion is due to the noise component of the output. This noise component is con-

For an ideal delay unit, the only distortion is due to the noise component of the output.

stant and, therefore, the distortion at the output can be calculated by taking the residual noise and dividing this noise by the output voltage.

We see that for an ideal delay unit the noise is -98.08 dB re FRO (full rated output) for a 16 bit unit and

-110.12 dB re FRO for the 18 bit unit. Now, without getting too deep into the math, if we assume that the noise is Gaussian in nature, then the noise is approximately equal to $q \pm \frac{1}{2}$ LSB ($\pm \frac{1}{2}$ least significant bit). This means that the noise is $\frac{1}{2}$ part in 80,167.81 for the 16 bit unit and $\frac{1}{2}$ part in 320,626.93 for the 18 bit units. Then the distortion can be calculated as the quotient of the noise divided by the output. Table 1 shows the calculated percent distortion for both the 16 bit and 18 bit units as a function of output level. In our fig-

ures that show the distortion, we have equal distortion across the frequency band. This doesn't happen in the real world.

SUMMARY

We have briefly discussed what delay units are, how they are used and what an ideal unit's performance

In our figures that show the distortion, we have equal distortion across the frequency band. This doesn't happen in the real world.

should be. Next time we'll look at commercially available units and talk about where and how each unit may be used, along with some caveats and cautions.

ACKNOWLEDGEMENTS

I'd like to thank Mr. John Lawson of N-T Audio, Mr. Steven Selberg of BGW, Mr. Steven Bartlett of JBL and Mr. Dennis Fink of MSD for the use of their Audio Precision System One test equipment, and special thanks to Ms. Debra Brimacombe of Audio Precision for her help and assistance regarding the use and limits of the Audio Precision equipment. ■

	16 Bit	18 Bit
FRO	0.000623%	0.000156%
-20 dB	0.006230%	0.001560%
-40 dB	0.062300%	0.015600%
-60 dB	0.623000%	0.156000%
-80 dB	6.230000%	1.560000%
-100 dB	60.2630%*	15.560000%

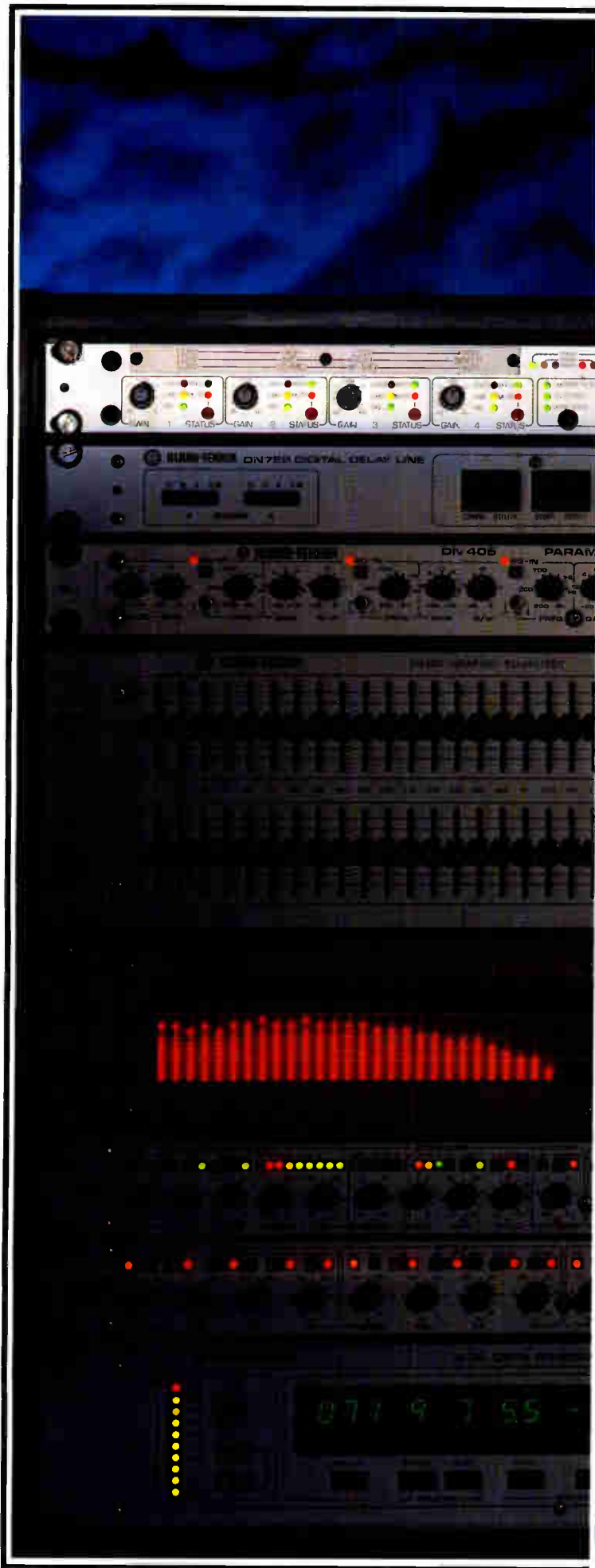
* Note - a -100 dB re FRO signal is hard to accomplish in a system in which the dynamic range is only 98.08 dB!

Table 1 — Distortion vs. Level

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How you use them is your choice. Stereo 4-way, stereo 3-way or four-input 2-way; you can re-configure the DN800 in seconds to suit any type of installation or touring task.

Plug-in frequency cards provide 12, 18 or 24dB/Oct slopes plus the three industry-standard response curves. A Mono Bass function caters for subwoofer systems. And plug-in cards add optional fixed equalisation for system matching and advanced VCA limiters.

Further refinements in built as standard include inter-band phase adjustment – and for each output, phase reverse, gain and mute controls.

It's an unrivalled combination of features, facilities and sound quality.

Naturally, the DN800 adds to the heritage of the rest of our rack. The DN300 Series of industry-standard Equalisers. The renowned DN60/RT60 Spectrum Analyser. The DN500 Series of unique, innovative Dynamic Processors. And the DN700 Series of comprehensively specified Delay Lines.

So, now you can equip your rack with *total* Klark Teknik control. To give every show the edge.

Because with the advanced DN800 Configurable Active Crossover, we guarantee your reputation will never crack on the rack.



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a MARK IV company
The first name with sound system designers

Klark Teknik PLC, Klark Industrial Park, Walter Nash Road, Kidderminster, Worcestershire DY11 2JL, England.
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Digital Goes to Worship

Specifying a Sound System for a 218 Year Old Church

BY GORDON HOFFMAN

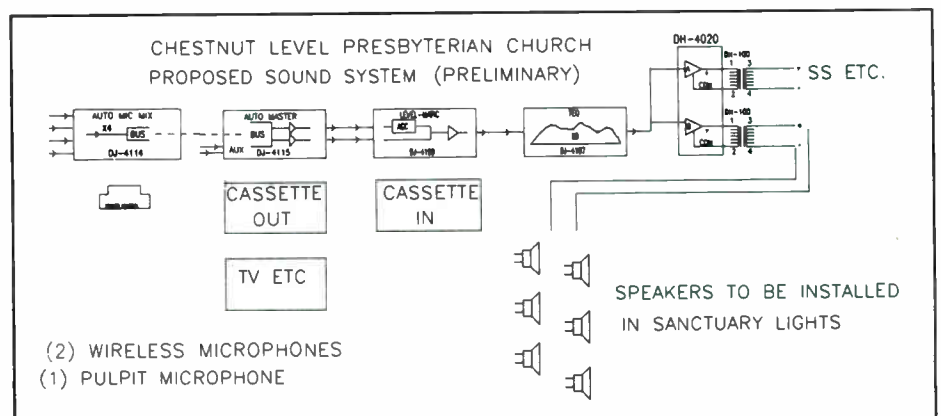
Chestnut Level Presbyterian in rural Lancaster County, Pennsylvania, is a beautiful and well-maintained stone edifice that has stood for 218 years. Its congregation has been in existence since 1711, outliving even the designation "Chestnut Level" itself.

My chore this day was to design a sound system for the sanctuary that had functioned for over a century without one. A new minister had recently come to Chestnut Level, and some of the congregation experienced difficulty in understanding the dynamic but velvety, dulcet tones of his delivery.

HOW PAINT BROUGHT THE JOB TO MY DOOR

I am fairly well known in this area as an acoustical consultant, which is in part why the Trustee President of the Church Council turned to me for help. However, he also turned to me because I had turned to him so many times in the past for his help. Let me explain.

Gordon Hoffman, owner of Gordon Associates (Akron, Pennsylvania) has been an acoustical consultant for 36 years. Though he claims to be semi-retired, Hoffman is as busy as ever working in his chosen field.



The preliminary proposed sound system for Chestnut Level Presbyterian Church, as designed by Gordon Hoffman.

The Trustee President works for a local paint manufacturer, and I have gone to him several times with special paint problems. Not too long ago, I redesigned the sound system of a church whose walls had an almost fiber board feel and soaked up sound as if they actually were fiber board. I turned to my friend who came up with specially mixed sealant paint which, when applied with a 3/4-inch nap roller, changed the acoustic of the church entirely.

So on this occasion, my friend the Church Trustee President was able to turn to me and say, "I've helped you out a few times, now how about help-

ing me out by taking a look at my church." Our agreement, arrived at over the phone, went something like this: "Considering the state-of-the-art, perhaps we could design a system that would not offend those opposed to adding sound."

LIGHTENING THE LOAD

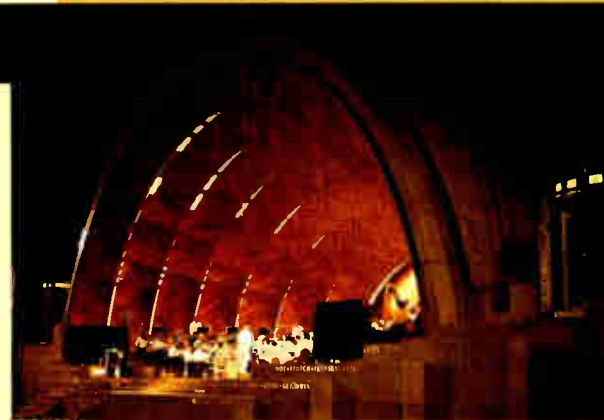
As I drove past the old cemetery and into the snow covered, tree lined church parking lot, I realized there was something funny about this job — I was only carrying one device. Normally, it would take two men and a boy to carry what I would need: perhaps a VOM, 1/3 octave realtime analyzer,

Redefining the Architecture of Acoustic Design



Around the world and across the

spectrum of professional applications, EAW Virtual Array™ loudspeaker systems are defining the leading edge of performance. Audiences in arenas and concert halls are enjoying high definition reproduction without coloration or distortion. Stadiums can enhance intelligibility and gain musical fidelity. Performing artists are incorporating dramatic music and sound effects without diminishing visual impact. Leading acoustical consultants and system designers can work with unprecedented confidence and precision using the comprehensive performance data and design tools of EAW's Acoustical Performance Partnership program.



Virtual Array™ Technology has established itself as a powerful springboard for innovation in permanent and portable system design. As EAW engineers under the direction of Kenton Forsythe apply VA™ Technology to new design problems, this evolving architecture continues to redefine the sound of sound reinforcement.



The World Touring Standard

The KF850, the world's first Virtual Array™ system, proved that flat power response and integrated arrayability could eliminate problems that had plagued large sound systems for years. On the road with leading artists from London to Rio and from Manhattan to LA, 850 Series systems set the standards for predictable performance and

An Evolving Architecture

Not so long ago, speaker stacks were loud but inconsistent and often unpleasantly harsh or hollow. For the mix engineer, predictable results were an unattainable dream. Frequency response was flattened, phase response aligned. Yet improving electronics only highlighted persistent speaker system anomalies. Why 48 boxes that measured flat on-axis and sounded fine individually worked so poorly together remained a mystery.

coherent low distortion output in large arrays. While rock acts like Eric Clapton, The Cult and Kiss rely on the physical impact of 850 Series systems, world-class orchestras like the Boston Symphony also choose them for their natural sound quality.



load-rated flying hardware. SM Series monitors apply the concept of optimized power response to applications from low-profile video systems to high-level drum monitors.

A Permanent Shift In Installation Design

VA™ Technology's touring success caught the ear of acoustical consultants looking for advanced design tools. KF Series systems are now permanently installed worldwide.

Concert



Recalibrating Performance Parameters

Kenton Forsythe, co-founder and Vice President of Engineering at EAW, approached the problem from a 360° perspective. He analyzed the total acoustic energy radiated by his designs, known as "power response" to distinguish it from on-axis frequency response.

The scope of this revolutionary design now extends from 200 seats to 70,000 and more, with high-efficiency 600 Series and compact 300 Series systems as well as ultra-long-throw KF1000's, designed to serve as the top row of extra-deep arrays with high-capacity



Major theme parks in California and Florida, houses of worship such as Chicago's 15,000 member Willow Creek Community Church, nightspots like the Troubadour in Los Angeles and prestigious performance spaces such as the Wang Center, home of the Boston Ballet, all use VA™ systems every day.

Industrial

VA™ design principles—optimized power response, consistent pattern control, wide bandwidth, compact and efficient packaging, integrated electronics—have proven their effectiveness in reducing distortion compared to traditional two-way central clusters, while improving output capacity and musical coherence. The consistent directionality of VA™ systems also enhances stereo and distributed configurations.

EAW engineers work closely with innovative acoustical consultants on the design of custom systems. Many of these have evolved into new products. To meet the diverse needs of mid-size venues, the 600 Series is now available in passive, bi-amp, tri-amp, and quad-amp configurations, with 60° or 90° horizontal coverage, and with either extended-bandwidth 1-inch compression drivers or 2-inch compression drivers for maximum output.



True Three-Way Design

The laws of physics can't be evaded, but they can be intelligently applied. The uniform power response of a cone or driver/horn is physically constrained to three octaves. With musically useful frequencies spanning nine octaves, a three-way system is the minimum for flat power response. A single subsystem must cover the vocal range:

The typical two-way system's crossover is located in the middle of this critical frequency band, causing power response peaks and dips. True three-way Virtual Array™ systems with purpose-designed midrange subsystems are consistently preferred in listener comparisons.

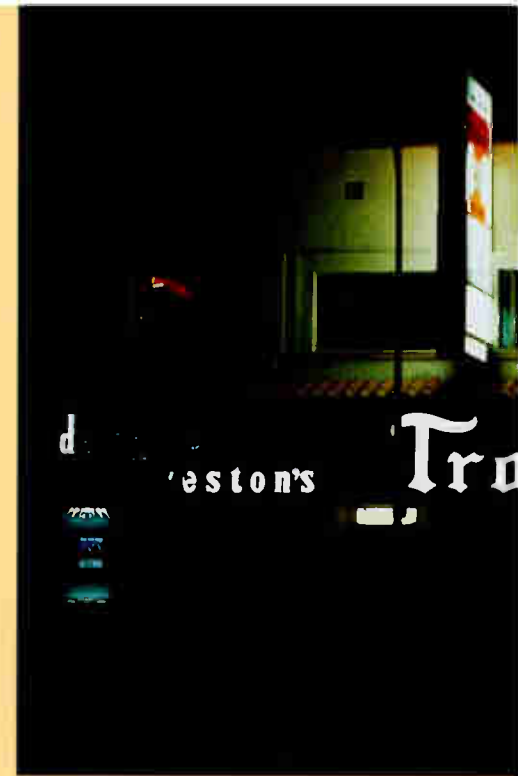
Redesigning The Loudspeaker System

VA™ Technology encompasses every component of the loudspeaker system. Massive compound flare mid-bass horns, large and small constant coverage HF horns and circular waveguides maintain consistent directivity. Proprietary construction techniques turn mathematical models into production models. These unique pattern control devices are mated to an array of purpose-designed drivers using carbon fiber, PVA damping compounds, etc. Computerized saws and routers fabricate complex enclosures precisely.

The AS300i, developed for high output distributed stadium systems, is a horizontal version of the KF300i. The UB22 and UB42 fringe area systems were also first created as custom designs.

MH Series: Modular Systems for Demanding Venues

Designed from the ground up for permanent array use, the MH Series is the fullest expression of Kenton Forsythe's Virtual Array™ concept. Without the constraints of portability, MH Series horn flares can expand, extending effective vertical and horizontal pattern control into the lower mid-bass region.



The designer has maximum flexibility in choosing crossover points. As in the KF Series, MH Series cabinet angles match the horizontal coverage patterns of the high frequency and mid-bass horns. From Manhattan's Times Square Church to the Fiesta Texas theme park, MH Series systems combine with EAW low-frequency systems and subwoofers in true three-way designs that provide excellent intelligibility and unprecedented musicality.





Madour

Stadiums around the world have adopted revolutionary proposals based on the MH Series iteration of the VA™ architecture.

JF Series: Ultra-Compact Systems Of Astonishing Capability

Arrayability is seldom high on the list of requirements for audio-visual applications. But other VA™ criteria—flat power response, compact, unobtrusive packaging and exceptional power handling—are necessities. For theatrical sound, video

foldback and foreground/background music, ultra-compact JF Series systems combine high output with minimal distortion and consistent dispersion. Proprietary waveguides and purpose-designed woofers optimize power response across the operating bandwidth. JF Series crossovers incorporate driver protection and up to five bands of parametric equalization for linear response in both passive and bi-amped operation. Wide conical coverage allows vertical or horizontal mounting. A comprehensive hardware system facilitates stand-mounting, flying or hanging.

Integrated Electronics

Closely Coupled Electronic Processing™ optimizes total system performance without introducing tonal shifts as power levels increase. Crossover transfer functions, phase compensation, parametric equalization and driver/amplifier protection are integrated into a specific VA™ system for maximum SPL, linear response and phase-coherent high definition output. Complex passive crossovers have parametric EQ, asymmetrical filters and driver protection.



Unprecedented Performance On Any Scale

Acoustical designers looking for new answers to old problems find that Virtual Array™ systems provide highly evolved solutions for venues of all sizes. Portable or permanent reinforcement for 200 to over 70,000 may consist of a few virtually invisible JF Series systems—or multiple arrays encompassing scores of KF or MH Series systems. On any scale from intimate to intimidating, VA™ Technology optimizes total acoustic output to provide superior intelligibility, transparent musicality and outstanding predictability.



EAW's ongoing research and development of VA™ Technology has created a global architecture for advanced system design. By evaluating acoustic output as spherical propagation rather than linear amplitude, Kenton Forsythe and the EAW engineering team have formulated new techniques of loudspeaker system design, testing and construction. As sophisticated measurement technology improves our ability to quantify power response, EAW systems approach Kenton Forsythe's original concept more precisely. Close collaboration with acoustical design innovators ensures that the VA™ architecture evolves to meet tomorrow's demands as successfully as it solves today's problems.

A Global Architecture For Advanced System Design

Touring Sound

Royal Albert Hall *Eric Clapton*
Concert Sound (Photo p. 2)

850 Series Systems are on tour worldwide. Eric Clapton called on Concert Sound's EAW system while recording *24 Nights* live at London's notoriously difficult Royal Albert Hall.

Madison Square Garden *Kiss*
A-1 TASC0 (Photo p. 6)

With a KF1000 top row, 850 Series arrays can be hung deeper for greater output. Ultra-long-throw KF1000's project direct sound into the upper balconies. Trapezoidal enclosures matched to horn coverage angles make construction of idealized horizontal arrays automatic.

Industrial Applications

Anaheim Stadium *Los Angeles, California*
Joiner Consulting Group/
Maryland Sound Industries (Photo p. 2)

Stadium system designers in growing numbers are relying on EAW's knowledgeable engineers and agile manufacturing capability to adapt the Virtual Array™ architecture to the unique needs of large scale projects.

Swindell Lounge *Northwestern University*
PCF, Inc. (Photo p. 6)

UB22's, originally a custom design, are now standard EAW products. These compact high-output systems are ideal for distributed installations.



Concert Halls and Pavilions

Carlos Moseley Pavilion
New York Philharmonic
Jaffe, Holden, Scarbrough Acoustics Inc./
Maryland Sound Industries (Photo p. 7)

The Carlos Moseley Pavilion is used for outdoor summer concerts by the New York Philharmonic and the Metropolitan Opera. The custom VA™ systems developed for this critically acclaimed sound system evolved into the DS223.

Wang Center *Boston Ballet*
Jaffe, Holden, Scarbrough Acoustics Inc./
Boston Light & Sound (Photo p. 7)

Touring groups are pleased to see EAW 850 Series and 600 Series VA™ systems installed at Boston's Wang Center. Many engineers use the house system to replace or supplement their traveling rigs.

Hatch Shell *Boston Symphony*
Jaffe, Holden, Scarbrough Acoustics Inc.
(Photo, front cover)

The Hatch Shell on the Charles River Esplanade, outdoor summer home to the Boston Symphony, is one of many permanent installations employing EAW KF850's. Jaffe, Holden, Scarbrough and architects Notter Finegold + Alexander Inc. were honored by the Massachusetts Historical Commission and the AIA's New England Regional Council for this project.

Theme Parks

Fiesta Texas *San Antonio*
Ford Audio (Photo p. 6)

The fundamental Virtual Array™ architecture is flexible enough to accommodate specialized requirements like the ultra-high-output MH242/SB1000 system designed as part of a pyrotechnics display.



Houses of Worship

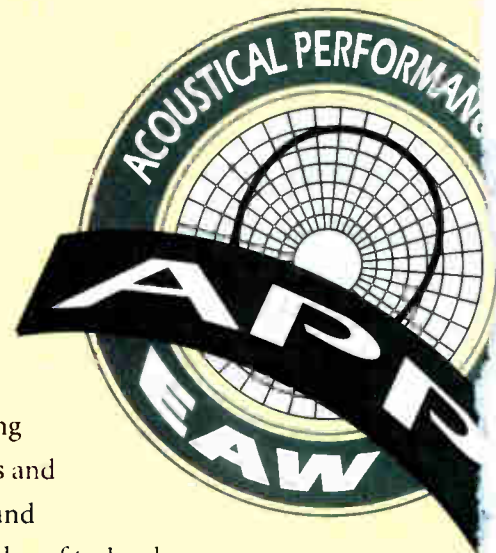
Trinity Baptist Church *Lubbock, Texas*
Acoustic Dimensions/Broadway Sound
(Photo p. 3)

Originally designed for arenas and stadiums, MH Series systems are solving system design problems in a wide range of venues. VA™ Technology has redefined the traditional two-way central cluster as a high-performance true three-way system that eliminates trade-offs between vocal intelligibility and musical fidelity.

Willow Creek Community Church
Chicago, Illinois
Acoustic Dimensions (Photo p. 6)

VA™ Technology delivers high output and excellent intelligibility without obstructing sightlines or detracting from architectural features. The 600 Series offers system designers a wide range of compact, highly efficient systems, with powering configurations, horizontal coverage angles and output capability to suit almost any application.

A Partnership For Acoustical Performance



For over two decades, Kenton Forsythe, EAW's Vice President of Engineering, has collaborated with leading acoustical consultants, sound contractors and touring engineers to develop sound systems that define the cutting edge of technology.

The Acoustical Performance Partnership program expands this network of acoustical innovators and provides them with all the information they need to use EAW systems most effectively.

Data is gathered in our computerized test facility, where custom software links a Brüel and Kjær 2012 Audio Analyzer with our in-house computer network. Performance can be characterized with extraordinary precision—horizontal and vertical polar plots are produced from a database of over 77,000 points per system.

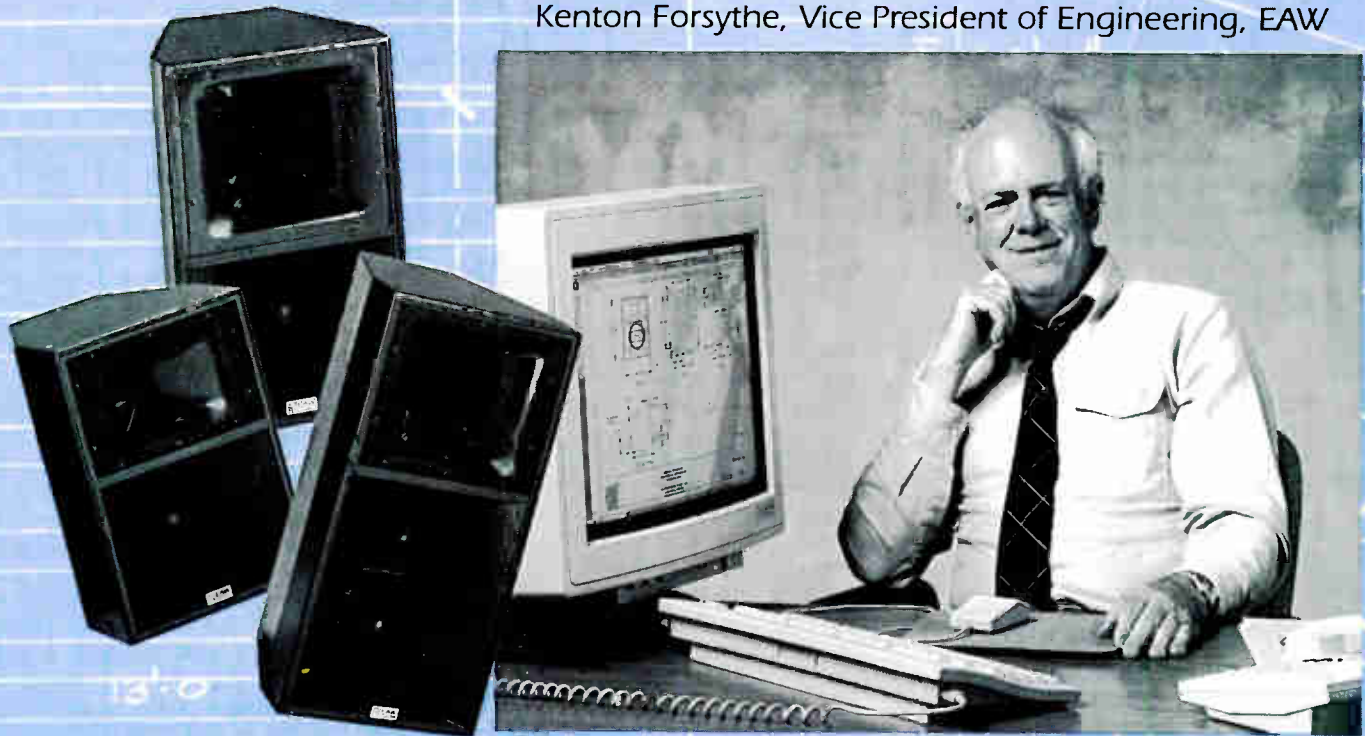
EAW engineers use this facility to evaluate prototypes and pinpoint areas for refinement. Registered members of the APP program have instant access to comprehensive performance data on production systems along with mechanical drawings, architects' specifications, etc. in printed form and on floppy disk in several formats.



One Main Street
Whitinsville, MA 01588
Tel 508-234-6158
Fax 508-234-8251

"It's no longer necessary to sacrifice musical fidelity for vocal intelligibility."

Kenton Forsythe, Vice President of Engineering, EAW



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

Effective pattern control:60° or 90° horizontal by 40° vertical.

Consistent power response:±3 dB from 160 Hz to 19 kHz.

High peak output:.....140 dB peak SPL—extremely low distortion.

Predictable arrayability:.....Trapezoidal cabinets match horn coverage angles.

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

Consistent pattern control is central to VA™ design. The horn-loaded MH Series controls dispersion precisely in both horizontal and vertical dimensions, over a much wider frequency range than previous devices. Acoustic energy goes where you aim it, not onto reflective surfaces. Minimal cabinet interaction allows accurate, predictable arrayability.

MH Series horn-loaded midbass cone drivers are the centerpiece of a true three-way design. Add EAW low-frequency systems to build a high out-

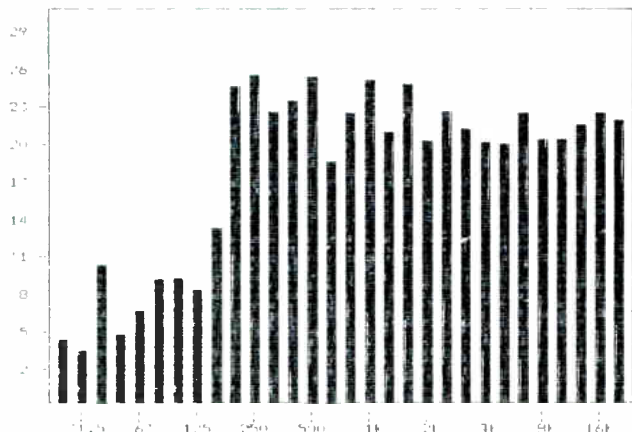
put, low distortion system that handles everything from lectures to a full spectrum of music.

Standard MH Series configurations solve the problems of typical engineered sound systems. For unusual applications, you can call on EAW's advanced engineering and manufacturing capabilities to ensure success.

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

EAW
EASTERN ACOUSTIC WORKS

Eastern Acoustic Works, Inc.
One Main Street, Whitinsville, MA 01588
(800) 992-5013 • (508) 234-6158 • Fax (508) 234-8251
Circle 221 on Reader Response Card



Measurements from the altar table.

pink noise generator, ACVTVM, THD meter, audio oscillator, polarity tester, a reverberation time tester, a TEF to time the delayed loudspeakers, the frequency counter, strip chart recorder, impedance bridge, power supplies and batteries, an outlet strip to plug it all in . . . \$15,000 to \$20,000 worth of test equipment in cases, all to support one \$15,000 church sound system installation. But this time, in a small shoulder bag, I was carrying a Gold Line DSP-30.

Until very recently, almost all test equipment was based on analog circuitry. This meant, by and large, that for every test measurement to be made, dedicated analog circuitry had to be designed and put in a separate box. This resulted in test equipment that you needed both help to transport and help to pay for. But it looks like the industry is now beginning to use digital signal processing technology in many areas that were analog strongholds from the beginning.

DSP technology rather than analog circuitry presents many advantages, and of course some disadvantages. One major advantage that I see is that once a piece of test equipment is capable of making one type of measurement under DSP software, it frequently requires only additional software for that piece of test equipment to be capable of a second type of measurement.

The task of writing the additional software is not trivial, and certainly not without cost. But that additional software typically does not add weight or additional size to that piece of equipment. This means that one piece of digitally-based equipment can replace, in a very cost efficient manner, multiple pieces of test equipment based on analog circuitry.

IN CHURCH

My first exploration in the sanctuary prompted me to think, "Oh, no! Not wall-to-wall carpeting." But as my ears perked up and I ventured further down



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Has Adopted At Least
One Sound Policy.**



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the left aisle, the acoustic ambient was so keen that I needed to know exactly why. So I used the DSP-30.

The 72' x 40' x 21' sanctuary contains a 60,500 cubic foot volume. The walls and ceiling have an absorption coefficient of 0.20. Approximately 15 memories and four nonvolatile blocks

The sound propagation from the pulpit is enhanced by the magnificent stained glass windows.

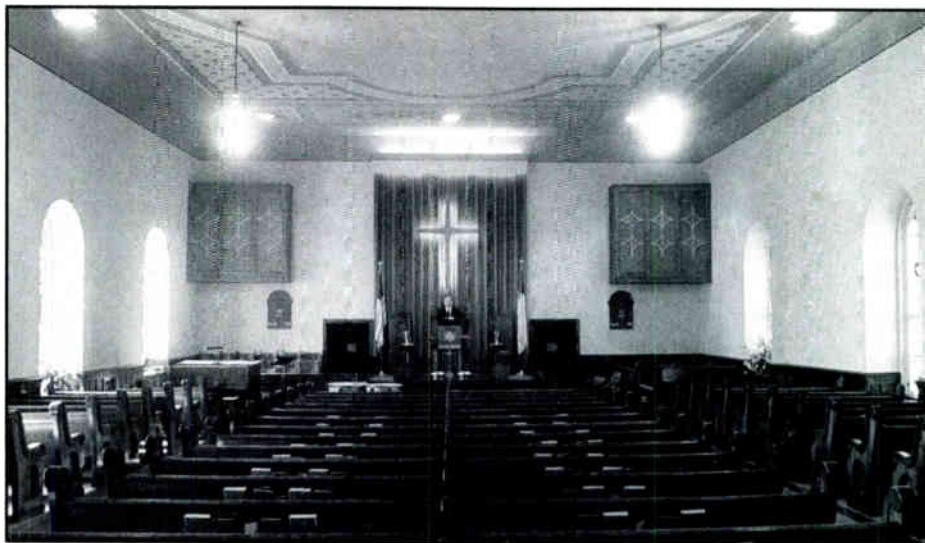
later, the envelope provided an RT60 of 1.60 with no standing waves, almost a flat spectrum with a slight bass roll-off. The high SPL was 37 dB, amazing considering that there are two rural but trafficked roads in close proximity. I was also able to ascertain that with a distributed speaker system, no delay would be needed.

The sound propagation from the pulpit is enhanced by the magnificent

Four feet behind the pulpit a large heavy velour drape was absorbing too much speech and needed to be replaced with a wood diffuser.

stained glass windows, due to the fact that they are recessed an average of 22 inches, and staggered rather than opposing. (This arrangement came about not through careful architectural planning, but through a later generation's addition of a wall.) One problem did emerge, however: four feet behind the pulpit a large heavy velour drape was absorbing too much speech and needed to be replaced with a wood diffuser.

In a preliminary presentation, I am recommending an automatic IRP system
(continued on page 141)



Interior shot of Chestnut Level Presbyterian.

I asked our dealer
“How do we install a 209 lb. monitor?”



“Your best bet is the Jumbo Mount from Peerless,” he told me.

Now that we've got it installed, I see what he meant. We really like the Jumbo's innovative features. Its unique “arm in arm” design gives it plenty of strength, even for our 35” monitor. This also provides extra rigidity and prevents excessive tilt.

Special adjustment slots help the installer find the set's balance point, so it's the most stable mount we've ever put up. It's even UL listed, and I like knowing that.

The optional patented security package is also important to us. It makes our installation theft-resistant.

But the biggest challenge we threw at our dealer was getting the job completed in one week. He said he could do it. “The Jumbo® Mount is American made and Peerless will ship within 48 hours,” he told us.

Quality engineered, UL Listed, American made, and promptly shipped. Now that's the way I like to do business!

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peerless

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A LOOK AT SMPTE AUDIO SERVING THE VISUAL

By Neil Shaw

The 134th Society of Motion Picture and Television Engineers Technical Conference and Equipment Exhibit was held in Toronto at the Metro Toronto Convention Center from November 10-13, 1992.

The conference, "Images in Motion — The Second Century," was another example of how audio follows the visual realm, and how both are improved.

The conference, one of the preeminent technical gatherings for television, motion pictures and related imaging technologies, featured technical paper sessions, equipment exhibits by over 179 manufacturers, clinic, workshops, demonstrations, facility tours, and two special tutorial sessions. As the name of the society implies, visual technologies, and the equipment that implement them, were paramount at the conference, audio, when it was addressed, was done so only as it related to, and as a part of, a visual presentation. An example of this was the paper "New Factors in Cinema Sound Systems" by Tomlinson Holman of the USC School of Cinema-Television (and of Lucasfilm/THX fame).

Although audio seemed to have a minor role here at the conference, there were many ways in which audio was affected by new technologies. For example, some of the non-linear off-line video

editing stations, like the Lightworks editor, included a sophisticated audio workstation as part of the video editor. Similarly, the audio portion of Advanced TeleVision (ATV) systems was discussed at some technical sessions, and multichannel audio for ATV was demonstrated by several manufacturers, one being Vision 1250. In the film world, Dolby Labs showed its digital film sound system, SR D.

A quick look at a few of the displays

Audio Precision featured its Portable One and Portable One Plus test equipment, with the Plus adding sweeps, graphs, and a standard printer port. (I am currently doing a series of tests on delay lines using the Portable One's big brother, the wonderful and powerful Precision One, for an upcoming article for *Sound & Communications*.)

AMEK/TAC, the British manufacturer with a branch in Southern California, showed its consoles, which are not only fine for film sound, but popular for permanent sound reinforcement and touring sound applications.

Dan Dugan Sound Design displayed its Model D automatic mixing controller, an eight-channel rack mounted VCA controller that patches into the insert points of any console. The Model D is the ultimate automatic mic mixer, and it makes crossfades between mics transparent, even if the activity on stage is unpredictable.

Dolby Laboratories showed its cinema processors, spectral recording, surround and digital coding equipment, as well as a new product a bit out of character for Dolby, the Spectral Processor. This de-

vice is a multiband processor that is sort of an adjustable Dolby encoder, but without the decoder. The idea is to be able to bring up the low level signals in selectable frequency ranges, without altering the high level signals. Oddly enough, Dolby has been warning us not to do this for the last 25 years. I guess someone at Dolby realized that if you can't beat them, join them and sell more processors at the same time!

Fostex showed its cost-effective time code equipment, along with a new digitally controlled mixer.

Optical Disc Corp. (ODC) was displaying its unique "one-off" laser disc recorder. ODC is still the only supplier of the laser disc equivalent of CD-R (CD-recorder). All the other so-called laser disc recorders make discs that do not play on consumer or conventional laser disc players. ODC also makes a powerful CD analyzer system and CD and laserdisc pressing factories.

Other audio equipment manufacturers who had exhibits were Mark IV Audio Canada (Vega, DDA, Electro-Voice and Klark-Teknik equipment), Jensen Transformers (high performance electronics and transformers), and Siemens Audio (AMS and Neve equipment).

Lastly, there was a meeting of the Committee on Audio Recording and Reproduction at which the draft of the standards for Recommended Practices for the Acoustics of Television Monitoring Studios, the Performance of Television Studio Monitoring Loudspeakers, and Measurement of Television Studio Measuring Loudspeakers were discussed. ■

Neil Shaw is a Senior Consultant and a Principle at Menlo Scientific, Acoustics.

Serious High Frequency Protection?



We use this illustration to shed some light on a superior design and introduce the new Tannoy CPA5 (ICT)TM loudspeaker - a small, contractor-specific loudspeaker from our new Contractor Series.

Designed and engineered with contractor requirements in mind, our new CPA5 offers controlled directivity and throw characteristics, uncommonly superior vocal articulation and strong vocal midrange presence from a loudspeaker promising failure-free operation from its HF unit. How? "Inductive Coupling Technology" (ICT)TM makes it so.

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

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

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

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

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

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

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Circle 208 on Reader Response Card

World Radio History

HDTV-Ready, 16:9 Aspect Monitor; Allied Acquires VCA Teletronics

Philips' 16:9 HDTV Monitor/Receiver

Philips Consumer Electronics Company has announced that it will begin producing a 16:9 aspect ratio HDTV-ready color monitor/receiver.

The Philips 34P560-C101 is a 34-inch diagonal view monitor/receiver that handles letterbox movie formats, standard broadcast material (NTSC), standard VGA display from personal computers, and High Definition Television broadcasting.

It is capable of displaying HDTV signals in the 16:9 aspect ratio through a wideband RGB input for a future HDTV decoder box. Progressive 2H scanning makes it ready for carrying the U.S. HDTV broadcast standard (Philips is a member of the Advanced Television Research Consortium, a proponent of the Advanced Digital-High Definition Television system for HDTV broadcasting in the U.S.). Developed by PCEC's in-house design and engineering department for consumers already seeking out letterboxed films, the Philips widescreen set presents cinema productions in their original format.

"This is the monitor/receiver for the transition period from current television pictures, through letterbox movies into the HDTV broadcast era," says Ron Mersiglio, PCEC's senior vice president and general manager, color TV.

Allied Film & Video Acquires VCA Teletronics

Officials of Allied Film & Video and VCA Teletronics (Video Corporation of America) have announced the acquisition by Allied of all the VCA Teletronics assets and ongoing business activities. Included in the purchase are the VCA operations in Leonia, NJ, Elk Grove Village (near Chicago), Dallas

and Houston. Allied currently also has plants in Detroit, San Francisco, Orlando, Chicago, Dallas, Washington, D.C. and Clinton, Tennessee.

In making the announcement, Allied's president, William H. Smith said, "Joining these two excellent companies together creates a special opportunity to reinforce and expand our commitment to providing the finest possible products and services to these important and growing markets." VCA clients will now have access to the high-speed duplication capabilities offered by Allied, as well as representation through the company's plants in the southeast and west coast. "This unique business combination translates into more capability and flexibility for the customers and prospects of both organizations," says Jim Merkle, senior vice president and general manager of Allied.

Valcom Paging Goes the Extra Mile

Valcom paging is now being used at the Waheap Resort and Marina on Lake Powell, on the border of Utah and Arizona, to expedite boat rentals to its customers. When ARA Leisure Services was contracted to provide recreational facilities on the lake, they needed a paging system in the resort and marina.

They considered both 70 volt and Valcom Distributed Amplified Paging. Clay Olvey, project manager of BLS Communications, the installation company on this project, commented, "The length of the dock area alone is about one mile. It just was not practical to do this job with a 70 volt paging system. This job required very long cable runs that were best accomplished with Valcom Paging equipment." Valcom Paging systems can use telephone wire for all connections making it less expensive than the heavier gauge wire required for 70 volt systems.

The equipment used for this installation include one V02003 three Zone Control Interface, two VP-4024B Power Supplies, 19 V-1030C One-Way 5 Watt Horns, one V-1036C One-Way 15 Watt Horn. The PBX is located in the main office. By being installed at the marina, the power supplies for this job provide remote power to the system.

Kurzweil Introduces MASS

Kurzweil has introduced the Multimedia Audio Sample-playback System (MASS). MASS, a General MIDI Level II sound synthesis system, features custom designed ASIC, driver software and sound ROM. Sixteen separate MIDI channels can be accessed and played simultaneously and the user can assign any of the 128 General MIDI compatible sounds in ROM to any channel.

In addition, Kurzweil offers an

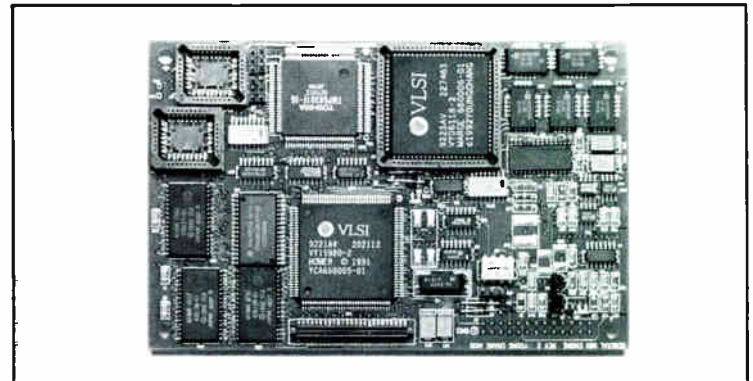
kHz; simultaneous 16-channel multitimbral operation; ½ cent tuning resolution; and 96 kHz 2X oversampled dithered digital output. Kurzweil's reverb/delay effects chip, the KM-1, features several algorithms including reverb, chorus, flanging, delay and echo.

For software, Kurzweil supplies a Toshiba 68301 (M68000 compatible) software sound engine that will receive MIDI events and drive the KH-1 and KM-1 to produce analog audio. Prototype boards encompassing a system reference design are available in small quantities for OEM evaluation purposes. These boards provide a complete General MIDI tone generation system.

REP NEWS

Allsop Announces Rep of the Year

Allsop, Inc.'s Consumer Electronics Division has named WMD



Kurzweil Multimedia Audio Sample-playback System.

optional, single chip digital effects co-processor that adds natural ambiance with hall and room reverbs, as well as creative echo, flanging and chorusing effects. No additional CPU bandwidth is required so the effects chip can be integrated into the base system.

The heart of Kurzweil's ASIC sound technology is a single chip DSP sound engine called the KH-1. Some of its features include: support for up to 32 voices at 20

of Northern California its 1992 manufacturer's representative of the year. John Walstad, Allsop CE national sales manager, said WMD's professionalism and dedication in promoting Allsop's products deserved attention, adding, "By combining those two important qualities, WMD succeeded in contributing to an outstanding sales year for Allsop's CE division."

Other Allsop manufacturer's representatives receiving awards

were: Bob Garmisa of Garmisa Sales from Southern, California, Allsop's 1992 Individual Achievement Award; A & M Marketing of New York and New Jersey, 1992 Most Improved Territory; Presti Sales representing the North East, 1992 Rookie of the Year; and Kaylene Seeley of John Axtell and Associates, 1992 Most Miles Traveled in a Territory, covering Colorado, Wyoming, Utah, Montana, and Idaho.

Allsop has also announced the addition of Pro Sales Marketing of Pennsylvania and Ohio to its Consumer Electronics' manufacturer's representative sales force. Pro Sales Marketing will be responsible for distributing Allsop's entire line of audio, video, digital maintenance systems and ac-

cessories throughout the Ohio, Western Pennsylvania, West Virginia, Indiana, and Kentucky territories.

Atlas/Soundolier Appoints Palmieri Associates

Palmieri Associates of Fairfield, NJ, has been appointed the Atlas/Soundolier representative for the entire New York City/Northern New Jersey territory. The company will offer both the Atlas Sound and Soundolier product lines.

University Names Sales Rep

University Sound has appointed Radon Associates in Sacramento,



(L to R) Aiphone president Jun Matsumoto, Western Regional Sales Manager Nancy Lein; Silver Peaks Sales Coordinator, Cyndy Kemp, vice president Gary Scheffer; Aiphone vice president sales & marketing Clyde Phifer.

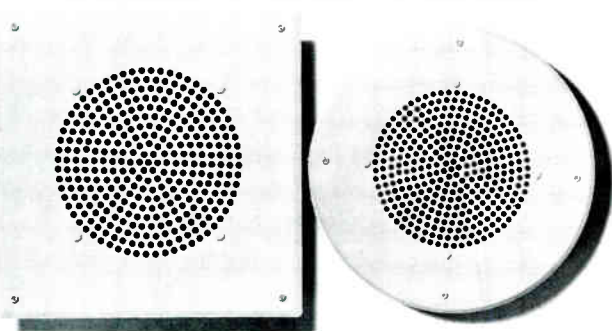
CA, as its sales representative of professional and commercial sound products in Northern California.

Silver Peak Receives Bent Oar

Aiphone Communications has

announced Silver Peak Marketing, Denver, Colorado, as the 1992 recipient of the Bent Oar Award. This award is given to Aiphone sales representatives who show outstanding achievement in sales and customer service.

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When *Sound and Video Contractor* magazine asked its subscribers which company comes to mind *first* when they specify or purchase wire and cable, more respondents answered *West Penn Wire* than any other. There are some very good reasons for that.



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Crown Amps in Pittsburgh; IQ in Denver

More than 120 Crown Com-Tech power amplifiers were recently installed to power two large-scale audio systems at the new Pittsburgh International Airport. The 1.7-million square-foot Midfield terminal has both a Landside and an Airside building, each with its own audio system. The two systems are linked by an Announcement Control System.

A combination of Crown Com-Tech 200 (CT-200) and Com-Tech 400 (CT-400) amplifiers are used to power the systems in both buildings. The Landside building features 18 speaker clusters, and the Airside building has six clusters. The CT-200's and CT-400's also power more than 3,500 ceiling speakers located throughout both buildings.

A new audio system has also been installed at Denver's Boettcher Concert Hall and it features a Crown IQ computer-control system. The concert hall is part of the Denver Performing Arts Complex and was intended for symphonic music performance. A desire to

make the hall suitable as a multi-purpose venue prompted installation of a new audio system featuring more compatibility than the old system. Besides the IQ System, a total of 15 Crown Com-Tech and Macro Tech amplifiers were also installed. They power a combination of EAW KF600i and KF691i speaker systems used in the main clusters.

DOD Mixers Installed at Puerto Rico's Senate

Four DOD 1222RM stereo 12-channel mixers and one 822RM stereo eight-channel mixer have been installed at the Commonwealth Senate in the Capitol building in Puerto Rico. The installation was performed by Villa Piano of Puerto Rico.

The mixers were installed as part of the Senate's system update. "The Puerto Rico Senate replaced its system, because the equipment was obsolete and needed to be updated. It chose the DOD 1222RM and 822RM because of flexibility, performance and the price," says Hector Rivera, manager of Villa Piano.



Mesa Media co-founder Les Jones at work with three Panasonic AG-7750 S-VHS editing recorder/players.

Panasonic MII at Mesa Media

Mesa Media Productions is now using Panasonic MII-format for broadcast and corporate projects. "I was sold on S-VHS five years ago," says vice president Les Jones. "We have three Panasonic AG-7750s in our edit suite and were looking for a component output at a good dollar value. Because the AU-65 MII

studio VCR takes Y/C in, it seemed the natural way to go."

At Mesa Media a pair of AG-7750s feed a NewTek Video Toaster that operates in the composite mode. I-Den's Jazz transcodes the composite signal back into Y/C and feeds the AU-65. "Once we're on MII, we can do multi-layering and all kinds of things we can't do on S-VHS," Jones adds.

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gested retail price of \$229.95.

The V-6315 Audio Mixer/Video Enhancer creates fades in black or white for smooth, simple video editing. A built-in enhancer boosts video signals for optimum quality, and users can compare original with enhanced images on a split screen. The mixer allows a combination of music with narration, a mic is included for \$119.95 suggested retail.

Columbia College Chicago's Audio Technology Center

Columbia College Chicago has acquired more than \$1 million in production and recording equipment from the Zenith/dB recording complex in Chicago. The college has also agreed to a long-term lease of the entire recording facil-

ity and will convert it into classroom and lab space for the college's sound program, according to Doug Jones, program director.

The 14,000 square foot facility, which will be renamed Columbia College Audio Technology Center, houses two complete film mix suites, a video post-production suite, a 24-track music recording studio, two voice-over and production rooms, and full transfer and dubbing facilities. Jones said that with the edition of lab space, the department will now be able to house all of its sound classes under one roof.

Yamaha's New Product Line

Yamaha Electronics Corp. has introduced several new products. Home Theater products, includ-

Axxis Announces Zagat-Axxis CityGuide

Axxis Software has announced Zagat-Axxis CityGuide for the Sony Multimedia CD-ROM Player. The \$69.95 Zagat-Axxis CityGuide is Axxis Software's first entry into the CD-ROM market. The preliminary disk, entitled Major Cities, will ship with data for New York, Chicago, Los Angeles, Washington D.C. and San Francisco. Other discs shipping in 1993 will include East, Central and West. "Together, Zagat-Axxis CityGuide and the Multimedia player provide a portable, affordable and easy-to-use resource for finding and getting to the right hotels, restaurants and services in dozens of cities around the country," says Bob Nell, director of Sony's Personal Information Products Division.

Ambico Introduces New Line

Ambico, Inc., a subsidiary of Recoton Corp., has introduced new audio/video products and

accessories. These include: the V-6350 Video Title Writer; the V-6325 A/V Editing Effects Processor; the V-6320 Audio Mixer/Video Processor; and the V-6315 Audio Mixer/Video Enhancer.

The V-6350 Video Title Writer can make titles appear over live video or on internally generated color backgrounds, cut in and out, wipe, and scroll. Options include two fonts in four sizes, three borders and eight colors. The titler can be used in English, Spanish or French. Suggested retail is \$299.95.

The V-6325 A/V Editing Effects Processor allows users to combine elements of two videos and includes an A/V fader, video enhancer, one color processor, special effects generator and stereo audio mixer with inputs for two audio sources. A narration microphone is included for \$379.95 suggested retail.

Ambico's model V-6320 Audio Mixer/Video Processor is an audio mixer, A/V fader, video enhancer, color processor, and special effects generator for a sug-

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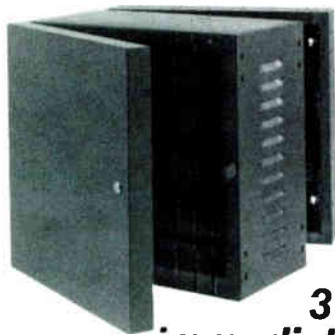
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Yamaha DSP-A2070 Digital Sound Field Processor/Amplifier.

ing a new and advanced seven-channel Digital Sound Field Processing amplifier and a new line of four Home Theater receivers, are the cornerstone of the new product introductions.

The new DSP-A2070 is an upgraded version of the DSP-A1000. The major differences in the two seven-channel Digital Sound Field Processing amplifiers is a new chip set feature on the DSP-A2070 that has three times the processing power. It provides greater dialogue and effects resolution and makes possible the addition of several new Cinema DSP sound fields. Yamaha has also introduced a new line of upgraded five-channel A/V receivers. The top two, RX-V1070 and RX-V870, use the same processing found on Yamaha's DSP-A1000 and provide 70mm Cinema DSP. The new RX-V670 provides 70 watts RMS to all three front channels and the RX-V470, a new entry, provides 50 watts across the front array.

In addition to its new DSP-A2070 processing amplifier and four new A/V receivers, Yamaha has introduced a new video product. The CDV-870 combi-player uses S-Bit Plus D/A processing to deliver improved performance over the CDV-1700, which it replaces.

The company has also introduced three cassette decks including a new three-head dual-capstan model, a single-well auto-reverse unit, and an entry level dual-well deck.

S-Bit Plus DAC technology is also a new feature of the company's new entry level five-disc CD changer. PlayXchange and a high signal-to-noise ratio are

also features of the new CDC-635.

Yamaha's new YST-SW500 powered subwoofer uses Active Servo Technology amplifier/speaker design and features a 10-inch driver, air woofer, and 120 watt amplifier. In addition, the unit's high cut, volume, phasing, and output can be adjusted through front panel switches or a remote control keypad.

Concept 92 Projector Challenge

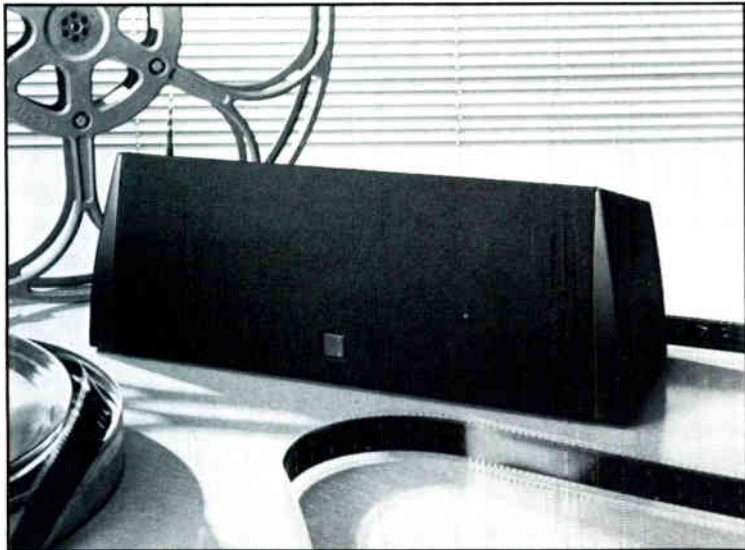
Inline, Inc., provided the signal processing, routing, switching, and distribution equipment and all of the high resolution RGB and VGA cabling for the Video Projector/LCD Panel Challenge, held in conjunction with Concepts 92 and the Canadian Computer Show.

Using the IN60000 Pathfinder Re-configurable Routing Switcher to provide multiple format, frequency and resolution signals, Inline was able to present real world evaluation and comparison. All of the projectors received only one input, but that input carried multiple frequency, resolution, and types of signals.

There were five categories of projectors displayed and one special display. These were: LCD panels, Video Projectors (both LCD and CRT), Data Projectors, the Light Canon, Graphics projectors and RetroGraphics projectors, and the special display, of a true HDTV.

KEF Reference Series Models 90 & 100

The new KEF Reference Series Model 90 (suggested retail price



KEF Reference Series Model 100.

\$380) and Model 100 (suggested retail price \$500) audio-for-video loudspeakers can be used in any position: left, center, right or rear.

The Model 90 and Model 100 use KEF's 6-12-inch Uni-Q driver and are center speakers when used with left and right KEF Reference Series 101/3, 102/2 or 10%. Model 90 best matches 101/3 and 102/2 and the Model 100 works best with the 10%.

KEF also introduced shielded versions of Model 101/3 at \$800/pr., Model 102/2 at \$1,200/pr. and Model 10% at \$1,800/pr. The magnetic shielding helps avoid TV picture disturbance.

NRK Chooses Screen-Sound and SoundNet

Norwegian Broadcasting (NRK), the national broadcast organization of Norway, has purchased two SoundScreen digital audio editing systems and a SoundNet digital audio network for use on its video and film post-production work.

ScreenSound's flexibility gives the production team the ability to work on eight tracks independently and 16 tracks in tandem with two systems synchronized. The addition of SoundNet enables two shifts to be worked without any change of hard disk, while

the back-up can be done off-line at high speed. ScreenSounds four serial machine control ports, and its synchronization capabilities, were also important considerations when Norwegian Broadcasting purchased the systems.

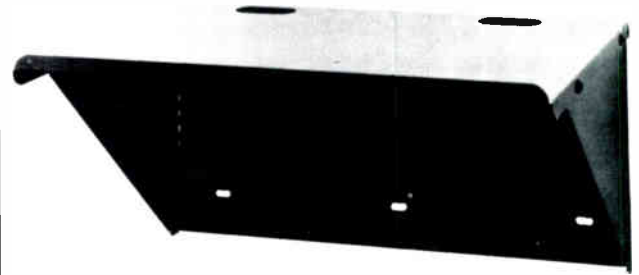
Chaplin Patents Holding Suing Lotus

Chaplin Patents Holding Company has announced that it has filed suit against Lotus Cars Limited and Group Lotus PLC in the Patents County Court in the United Kingdom for infringement of its patents in active noise cancellation.

The suit alleges that Lotus is infringing the patents by reason of its development and marketing of a cabin quieting system for automobiles. The suit requests an injunction against further infringement and damages. Lotus has denied infringement and has indicated that it intends to contest the suit.

Thomas Scott, a patent attorney at the Washington, D.C. law firm of Howrey & Simon, representing Chaplin Patents Holding Company, said "Active noise cancellation is a key technology for achieving a quiet environment. Protecting the development of this technology is crucial because

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in the near future, energy conservation needs will increase the demand for active quieting. This is our first action to enforce these patents, but we are investigating other potentially infringing activities."

Chaplin Patents Holding Company owns numerous active noise and vibration cancellation patents worldwide and is named after the principal inventor of many of the patents, George B.B. Chaplin. Active noise cancellation generally involves the generation of an antiwave signal that is used to cancel or attenuate existing noise or vibration.

AMTEC 93

The Association for Media and Technology in Education in

Canada (AMTEC), will hold its annual conference in June of 1993 in Windsor, Ontario. AMTEC 93, Bridging Learning Opportunities, will feature session presentations by: Joan Pennefather, government film commissioner, National Film Board of Canada; Peter Herrndorf, chairman and chief executive officer, TVOntario/Ontario Educational Communication Authority; and Robert Larson, chairman and chief executive officer, WTVS/Channel 56, Detroit Public Television.

A Media Awards Festival will highlight winning entries in the annual media production competition. Categories include: videotape, sound filmstrip, sound slide, 16 or 8 mm film, microcomputer and interactive media. There are awards



Hitachi 100-Inch Presentation Monitor.

for eight classes of entries: individual school, school system, post-secondary, government agency, student course project, commercial producer and business/industry.

Hitachi Debuts 100-Inch Presentation Monitor

The MultiMedia Systems Division of Hitachi Home Electronics has introduced a 100-inch color monitor with 900 lines of resolution, 500 foot lamberts of brightness and a depth of 27-inches. The CM-100 is composed of four 50-inch UltraVision cubes that provide wide viewing angles and built-in speakers for 80-watts of MTS stereo sound.

Dave Fukuda, MultiMedia Systems Division general manager, says, "Our new CM-100 is an extremely compact self-contained unit which uses very little floor space yet provides 100 inches of display. The huge display unit comes equipped with composite video, RGB and S-video inputs for convenient compatibility with such applications as retail outlets, theme parks, museums, night clubs and sports facilities, video conference systems, trade shows and wherever else there is a need to communicate graphically to a large audience."

Other features include: a handheld remote; video wall processor; and connecting cables and accessory racks for VCRs, laser disc

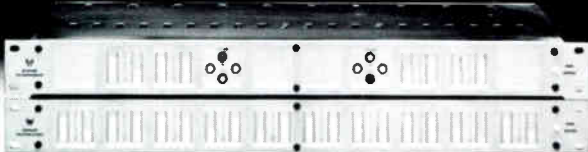
players and other video sources. The CM-100 also has optional software and an RS-232 interface which allows any IBM personal computer to control the unit's freeze, expand or normal processor functions, externally. Hitachi will market the CM-100 at a suggested retail of \$30,000.

Keith Forsey Purchased Allen & Heath SC Console

Producer Keith Forsey, who has worked with Billy Idol and the Pointer Sisters, recently purchased an Allen & Heath SC Plus 432 console. He is using the console in his home production studio for playback/monitoring applications.

Allen & Heath SC Plus consoles are available in both standard output and matrix output versions that provide a wide range of options. The standard output consoles offer four subgroup output modules with eight monitor sections for mixing live sources and tape tracks. Matrix output consoles provide four subgroups plus a 4 X 4 matrix. A sweep EQ module is also available, providing a sweepable four-band equalizer. In addition, an optional stereo input module provides stereo input, line input for stereo tape, CD and video sound.

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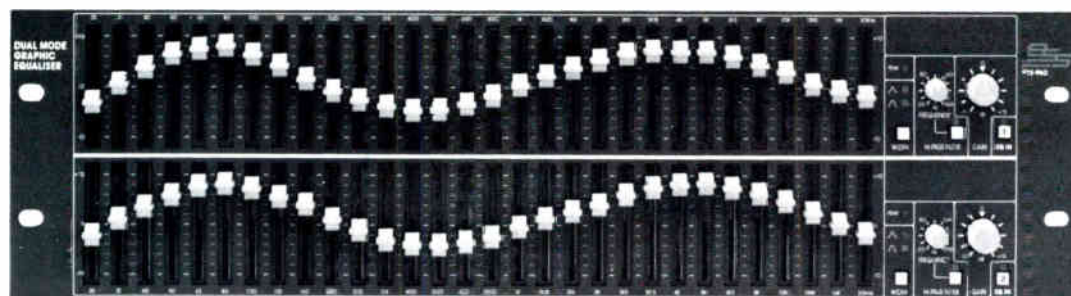
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TCS-803 Multi-Tap Time Corrector



TCS-804 Dual Time Corrector



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Truevision Supports Microsoft Video

Truevision, Inc., announced that two of its videographics engines have full compatibility with Microsoft Corporation's new Video for Windows digital video software. The two products that meet Microsoft Video for Windows standards are the TARGA+ videographics engine and the Bravado multimedia engine.

Truevision has been working very closely with Microsoft to make TARGA+ and Bravado among the first videographics engines that can be used to create Video for Windows-based presentations, says Dennis Collins, Truevision marketing manager. Video for Windows provides a

basis for the development of such ideas as video electronic mail and networked video on demand.

Microsoft's Video for Windows supports industry standards, including the Audio Video Interleaved format for video files. This allows video-related hardware and software from multiple third-parties to work together in the Windows environment. The TARGA+ enables PC users to capture full-color images from a video camera or VCR and enhance or retouch those images at the pixel level. The Bravado multimedia engine for the ISA platform provides on-board VGA, full-color video-in-a-window capabilities, plus audio pass-through with control.

Mics Make History

What do John F. Kennedy, Dinah Shore, General Douglas MacArthur, Red Skelton, Robin Williams, Axl Rose, and Elvis Presley have in common? They have all been pictured using a Shure Unidyne Microphone in their varied careers.

An original Shure Unidyne microphone, model 55C, was used by General MacArthur on the deck of the USS Missouri when accepting Japanese surrender in World War II. The Shure 55SH Series II starred with Robin Williams in his role as a radio jock in *Good Morning Vietnam*, and current performers such as Axl Rose of Guns N' Roses are using the 55SH Series II in countless music videos.

And now, perhaps the most visible illustration of the Shure Unidyne's popularity is found on the newly issued Elvis Presley U.S. postage stamp which features the Shure 556S microphone, first introduced in 1950 and popular through the early '60s.

The first Unidyne, Model 55 (technically the Unidyne I), was developed by Shure engineer Ben Bauer in 1938. This design

achieved a unidirectional pickup pattern using a single element. Until that point, this had only been possible using two separate elements mounted in one housing.

In 1941, Shure offered the first Broadcast Unidyne microphone, the Model 555, essentially a 55 with a shock mount built into the swivel base. This was replaced in 1942 by the Model 556 which featured a supercardioid directional pattern, improved frequency response, and the same built-in shock mount.

In 1950 Shure introduced the 55S (the Unidyne II), also available in a broadcast version, the 556S, with shock mount base. The S suffix denoted small, because a smaller size had become more desirable with the advent of television and other situations that demanded better visibility of the performers faces.

The 55 series continues today in the Model 55SH Series II. Although it retains the vintage appearance and feel of the 55S, it has been updated internally with a higher performance element. ■

PRODUCTS

JBL Gets Control; White Mics

JBL Loudspeaker

JBL has added a new member to the Control Series of loudspeaker systems and studio monitors, the JBL Control 8SR.

A 200 mm (8 inches) low frequency transducer generates solid bass output down to 70 Hz. The Flat-Front Bi-Radial horn and compression driver combination reproduces high frequencies with clarity and detail. The 100 x 80 horn pattern covers a wide area.

For distributed systems, the frequency dividing network is designed with mounting points and easy access solderless connections for the optional multi-tap transformer. Close tolerance components and bypass capacitors provide transducer summing and transient accuracy. A transducer protection circuit is also included as part of the standard crossover network design. A Speak-On connector provides reliability and current transfer.

Circle 1 on Reader Response Card

Miniature Condensers

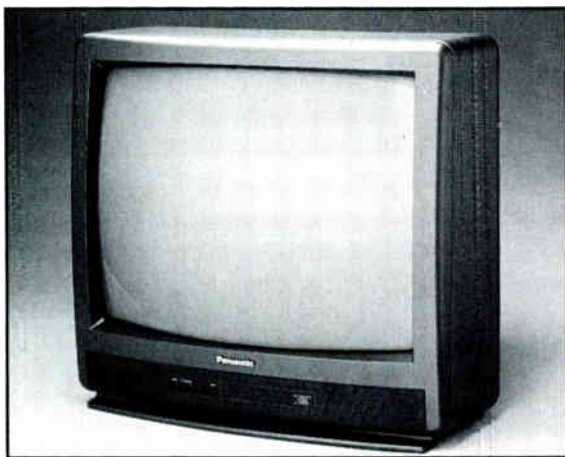
AKG has introduced non-reflective white versions of their line of miniature gooseneck condenser microphones for church and conference applications. Available in non-reflective white and non-reflective black are permanent-mount versions of the company's C580, C647 and new C621 micro-sized microphones. All models feature contemporary cosmetics suitable for close-up camera work.

Circle 2 on Reader Response Card

Panasonic CT Series

Panasonic Broadcast & Television Systems Company has introduced a new line of CT Series television monitors and monitor/receivers. The new series includes 25-inch, 20-inch, and 13-inch units.

The CT-2583VY monitor/receiver and CT-2583Y monitor feature 25-inch, 100-degree tint-face screens and the CT-2083VY moni-



tor receiver and CT-2083Y monitor feature 20-inch flat, square screens. They have 450 lines of horizontal resolution. The 13-inch monitors in the series, the CT-1383VY monitor/receiver and the CT-1383Y monitor, feature 420 lines of horizontal resolution.

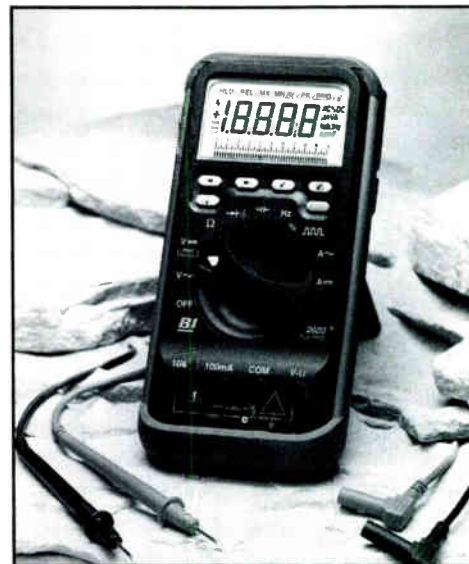
Other features include 155-channel tuning capability, 20-function wireless remote control, programmable channel scan, power auto on/off and on-screen display of monitor adjustment settings. The CT-2583 Series monitors have source selection for S-Video input/output or composite video, and the CT-2083 Series and CT-1383 Series are selectable for lines 1, 2, 3/S-Video/RF.

Circle 3 on Reader Response Card

Beckman Multimeters

Beckman Industrial has introduced the Model 2020 and Model 2030 Digital Multimeters (DMM). These new multimeters feature True RMS and Fault Finder. True RMS, which can be AC or AC + DC coupled, for both voltage or current can be used for measuring switching power supplies and nonsinusoidal waveforms with AC and DC components. Intermittents, bad contacts, and broken wires are easily located with the Fault Finder.

The Auto Max Min Avg feature of the 2020 and 2030 allows the user to record minimum and maximum readings while remain-



ing in the autoranging mode. This provides high resolution on both minimum and maximum. The

Avg mode permits smoothing of noisy or varying signals. Another feature, Probe Hold, captures the

“Are you sending
the right signals
to your building?”

last stable reading, bees to acknowledge, and holds it on display. The display is updated with each new reading. Peak Hold captures noise and fast events u to 1 millisecond. Both positive and negative peas can be measured. Both meters feature AC and DC voltage ranges of 100mV, 1V, 10V, 100V, and 1000V. Basic accuracy of the 2020 is 0.25% and the 2030 is 0.1%.

Circle 4 on Reader Response Card

CM Series DJ Mixers

DOD has introduced three new DJ mixers in their CM series, the CM300, CM750 and CM1400. The CM300 features four input channels which may be rack-mounted or used as a table-top mixer. The unit offers three stereo switchable phono/CD, line



level inputs and one balanced microphone input. Each music channel provides assignable crossfade capabilities and headphone cueing. A master cue selector allows the user to listen to stereo program output, stereo channel cue-

ing, or mono channel cue in right earcup and program output in left earcup. The list price is estimated to be \$299.95.

The CM750 and CM1400 are full-featured professional mixers offering six channels, four stereo

switchable phono/CD line level inputs and two balanced microphone inputs. These units also provide a master cue selector with a blend control to adjust the relative level of each earcup. A special "thump" circuit activates a 30 to 150Hz expander for low-end effect. Additional outputs are provided for control of lighting and monitoring. The CM1400 offers a delay/sampler section which features a nine position rotary delay, range/mode switch between six delay ranges with repeat hold, playback and record modes. Depth, speed, repeat, delay/sample times and level controls are also provided. The CXM750's list price is \$749.95 and the CM1400 will list for \$999.95.

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 3 Contractor—Fire/Alarm/Safety
 4 Electrical Contractor
 5 Pro Audio/Studio/Reinforcement
 6 Architect/Designer
 7 Engineering/Acoustical Consulting
 8 Maintenance/Service
 9 Dealer/Distributor/Rep
 M Manufacturer
 O Other _____

- (4) Your purchasing authority:
 A Final approval/Buyer
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 C No Direct Authority/User

- (5) Number of employees at your company:
 1-3 4-10 11-25
 26-100 Over 100

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 B Engineer/Technical Mgt.
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 D In-House Maintenance/Service
 E Field Installation/Maintenance
 F Consultant
 G Advertising/Promotion
 H Other _____

- (3) Primary business of company (only one):
 1 Contractor—Engineered Sound/Acoustical
 2 Contractor—Interconnect/Intercom
 3 Contractor—Fire/Alarm/Safety
 4 Electrical Contractor
 5 Pro Audio/Studio/Reinforcement
 6 Architect/Designer
 7 Engineering/Acoustical Consulting
 8 Maintenance/Service
 9 Dealer/Distributor/Rep
 M Manufacturer
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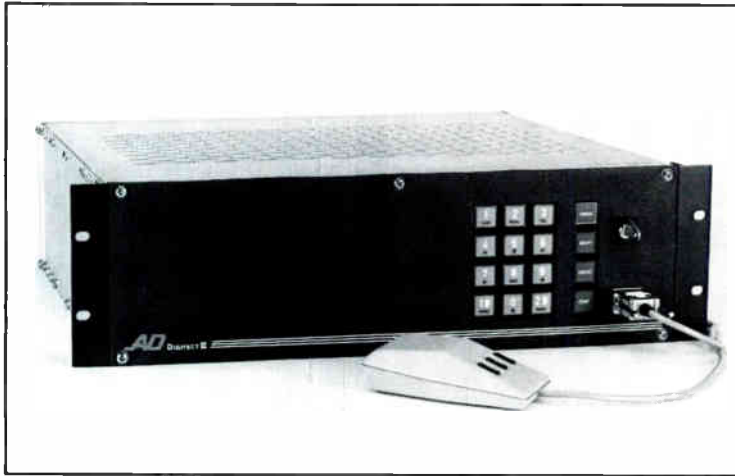
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Digital Video Motion Detector

American Dynamics has introduced the AD4500 DigiTect II, a modular 24-camera video motion detector system.

The DigiTect II provides three levels of control. The operator level allows the selection of cameras, adjustment of dwell times, silencing of audible alarms and resetting of certain relays. The second level requires a key to enable/disable internal alarm set-up and define detection zones. The third level, allowing access to set-up menus, is password rotated. The set-up menus are for channel parameters of sensitivity, response and perspective-compensation.

The DigiTect II's depth of field perspective-compensation makes allowance for situations where small objects in the foreground may appear larger than an intruder in the background. Five different perspective settings are provided, and the password holder can select the setting appropriate for the scene conditions. Each camera screen has over 2,000 detection zones which provide the information for analysis by the processor. These zones may be added or deleted to give the user flexibility in customizing the sensitized areas for each camera. Processor verified intrusions

initiate both audible and visual alarm signals and video from an alarmed camera is switched to an alarm monitor. Individual alarm closures can be used to control a switcher or other external devices.

Circle 6 on Reader Response Card

LED Tester

A compact, hand-held unit for testing, evaluation and quality control checks of discrete LED's has been introduced by Lumex Opto/Components, Inc. The LED Tester has single sockets with fixed current levels of 2, 5, 20 and 30 mA, and seven sockets at 10mA so similar LED's can be compared for color and/or brightness. A single 9-volt battery powers the tester. It is 2³/₈ x 3¹/₈ x 7¹/₈ inches thick. Suggested retail price is \$38.00, battery included.

Circle 7 on Reader Response Card



Eastman Presents The "Able" Cable

Eastman's New RISER Cable should have been called the "Able" Cable because. . .

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Circle 63 on Reader Response Card

Floor Cabinets

Atlas/Soundolier Standard Series 19-inch wide floor cabinets now feature right or left-hand hinging. New spring hinges eliminate the need to reconfigure any hardware. Invert the front or rear door with a 180-degree rotation to swing open either right or left-handed. This feature offers additional flexibility when designing cabinet installations for telecommunications, broadcasting, computer control, manufacturing or security.

The Standard Series includes knocked-down and welded cabinets with fixed or adjustable rails, as well as welded racks for multibay configurations. Racks range in overall height from 41⁵/₁₆ inches to 81⁵/₁₆ inches. All are 22⁵/₁₆ inches wide and 18¹/₂ inches deep with the exception of the WA202A and 502A Series which are 25¹/₂ inches deep.

Circle 8 on Reader Response Card

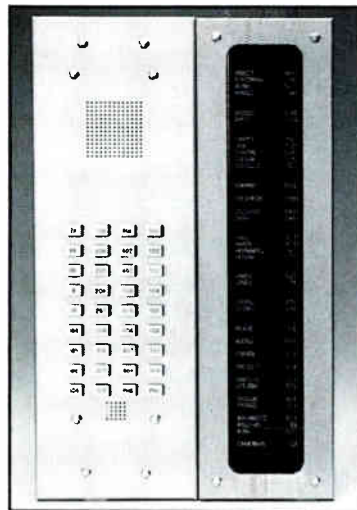


FIBERSCAN 1000

Fiberscan 1000 OTDR

Telecommunications Techniques Corporation has introduced the Fiberscan 1000, an optical fiber analyzer which functions as an Optical Time Domain Reflectometer, stable source, and power meter. The Fiberscan is able to operate in a pulsed OTDR mode or as a stable CW source. An optional power meter can be added. The Fiberscan 1000 is designed for the installation and maintenance of fiber optic carrier, telco and CATV systems.

Circle 9 on Reader Response Card



Lobby Panels

Alpha Communications has announced re-styled V.I.P. Series vandal-resistant lobby panels. Made from 16 gauge brushed stainless steel, V.I.P. Series panels feature: solid extruded aluminum engraved button plungers; weather-resistant mylar cone loudspeaker over stainless steel mesh and aluminum sub-plate; single-pole self-wiping momentary button switches with a protective collar to prevent the button from traveling full stroke when hit with force; tamper-resistant faceplate screws and polycarbonate to protect the directory strips. V.I.P. Series panels are available in multiples of four buttons, and can be custom made.

Circle 10 on Reader Response Card



APE Adapters

Bruel & Kjaer has introduced a new series of Acoustic Pressure Equalization adapters for their 4003 and 4006 omnidirectional microphones. The new APE Series consists of the APE 40, APE 30, and the APE CYL. The adapters function as both spatial and spectral equalizers. The APE adapters are passive acoustic processors, using diffraction technology to modify sound reception near the microphone diaphragm,

changing the microphone's frequency and polar response.

The new APE 40 and APE 30 adapters increase directionality starting at 2 kHz. They also improve microphone response at selected frequencies. While the original APE 50 demonstrates increased frequency response in the range of 3.5 kHz., the APE 40 delivers enhanced response at 4-5 kHz., and the APE 30, at 5.5-6 kHz. Rounding the APE Series is the APE CYL with enhanced frequency response at 500 Hz., 2 kHz., and 4 kHz.

Circle 11 on Reader Response Card

CD51A from Rowe/Ami

Rowe/Ami is now shipping its new LaserStar CD51A compact disc jukebox. This smaller model, with 51 CD capacity, has



the same technology and features found in the LaserStar CD100 series; auto play, entire album play, calendar, time clock, track mode, optional wireless remote and data management information system.

Circle 12 on Reader Response Card

Intercom System and Headset

Clear-Com Intercom Systems has introduced two new products. A new single channel party-line intercom system, Que-Com, and the new Pro-40 series of commu-

nications headsets.

Que-Com is designed for use as a intercom in theater, sports coach-to-spotter, industrial, educational, and concert sound applications. Que-Com intercom stations are integrated combinations



of a noise-isolating headset with a metal belt pack, each featuring an individual microphone on/off switch and listen volume control, available in both single muff (SMQ-1) and double muff (DMQ-2) versions. The system power supply (PK-5) can power up to 40 stations and is UL & CSA listed. Que-Com connects with standard 3-pin XLR microphone cable, and is fully compatible with standard Clear-Com Party-Line intercom products.

The Pro-40 headsets feature a combination of broadcast quality audio in both microphone and earphones, balanced microphone output, individual "split-ear" earphone wiring, left or right ear mic boom operation, "mic off" switch in boom, noise isolating earphones, and complete field servicability. Pro-40 headsets are available in a single muff, double muff, and double muff "split-ear" versions, and are compatible with all dynamic mic based party-line and matrix intercoms, and sportscaster/commentator/announcer/conductor systems.

Circle 13 on Reader Response Card

VCA Automated Console

Allen & Heath recently introduced the GS3V, a new VCA automated version of the GS3. The layout of the GS3V is based on

the original GS3 studio console and integrates a fader automation system. The automation controls all the channel inputs, either 16, 24 or 32 depending on the frame size as well as the master LR signal path. An important feature of the GS3V is its internal computer. Although it can be driven from any MIDI source, it is its own sequencer and offers frame resolution on fader moves down to bit resolution on mute events.

Circle 14 on Reader Response Card

Crestron Remote Control System

Crestron Electronics, Inc., has released the Cresnet II MS, a packaged remote control system. The Mini System has the power and performance, plus all the software features found in the Cresnet II Modular System.

Its features include: built-in 50 or 100 watt power supply, two bi-directional RS-232/RS-422 communications ports, six IP/Serial/RS-232 ports, 16 relays, eight solid-state input/output ports, two expansion positions to accept Crestnet II control cards and an optional front local control panel. Using the Crestnet II network bus, the Mini System is compatible with the complete line of Crestnet II control panels, touch screens, wireless transmitters, interfaces and network devices.

Circle 15 on Reader Response Card



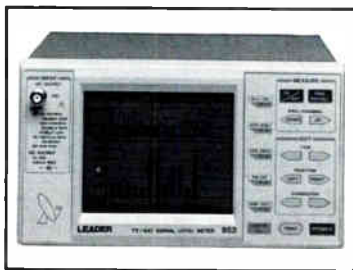
Eight-bus Mixing Consoles

Mackie Designs is now ship-

ping the 24-8, first in its series of 8-bus mixing consoles. The 8-Bus Series will consist of the 32-channel 32-8, 24-channel 24-8 and 16-channel 16-8 consoles.

Each console includes: in-line monitoring; 16 tape outputs; internal 116dB dynamic range; two completely-assignable headphone monitoring systems; studio quality, discrete low-noise, high-headroom mic preamps on all channels; 100mm network faders; sealed rotary potentiometers; BNC lamp connectors; and optional meter bridges.

Circle 16 on Reader Response Card



CATV/Satellite Signal Level Meter

The new multi-function CATV/Satellite signal level meter, Model 952, from Leader Instruments Corporation features a backlit LCD display. EPROM tables are included for worldwide VHF/UHF frequencies from 46 to 870 MHz. A satellite band covers the 950 to 2050 MHz range enabling IF frequency signal level measurement as well as carrier-to-noise measurements during antenna installation or alignment. Simultaneous measurement and on-screen display of up to 128 channels each for VHF/UHF and 16 programs of up to 32 channels each for satellite frequencies.

An RS-232C interface is standard enabling recording of measured data to a printer for hard copies or transferral to a PC for archiving. There are four standard selectable engineering units to choose from along with average, peak or max hold bar graph

ballistic choices. Changes in level caused by changes in either frequency or temperature are automatically compensated for. The 952 is complete with auto-channel search, auto-ranging and auto-scaling features to save operator time. An auto-selecting and auto-ranging digital voltmeter is included for measuring voltages superimposed on cable. The LCD display has an auto-contrast adjustment feature based on the current ambient temperature. Auto-sleep and battery check features are provided to conserve battery life.

Circle 17 on Reader Response Card

University 2000 Series PowerDocks

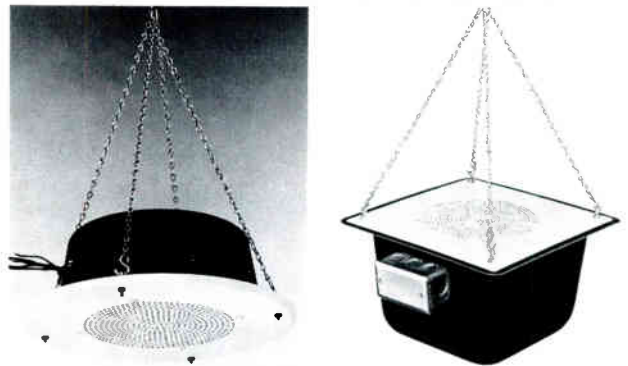
As part of its Unified Electron-

ics Line, University Sound has introduced the 2000 Series PowerDocks of three- and six-input integrated mixer/amplifiers with output capabilities of up to 120 watts. The 2000 Series PowerDocks include: the Models 2306 (3-channel, 60 watts) and 2312 (3-channel, 120 watts); the Models 2606 (6-channel, 60 watts) and 2612 (6-channel, 120 watts).

All PowerDocks are rack or shelf-mountable and are fully compatible with all of the Unified Electronics Line's expansion modules. All of the Unified Electronics expansion modules come on circuit cards that can be plugged into special docking ports on the 2306/2312 and the 2606/2612 front panels.

Circle 18 on Reader Response Card

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Circle 293 on Reader Response Card

Liquid Crystal Display Projector

A professional liquid crystal display (LCD) projector designed for use in educational and corporate environments has been introduced by the Professional/Commercial Sales Division of Philips Consumer Electronics Company.

The projector, Model LC2000, produces video images ranging in screen sizes off 23 to 184-inches. Containing 653,835 pixels arranged in a staggered delta configuration, the LC2000 provides high resolution and avoids grid or screen door effect. This model also features a 200-watt metal halide lamp system which provides approximately 2,000 life hours. An internal timer alerts the user with an on-screen prompt when bulb replacement is necessary.

A remote control operates the zoom and picture focus, as well as on-screen displays for picture, sound and source selection adjustments. The f4.5 lens has a 150-300mm focal length with a X2 zoom range. Other features include a built-in closed-caption decoder, 178 channel cable ready tuner, composite, S-Video and RGB video inputs, 10 watt stereo sound system with output for connection to separate speakers, a built-in 10 watt monaural loudspeaker, and built-in switch for reversing picture for front and rear screen applications.

Circle 19 on Reader Response Card

DigiTech DHP-55

DigiTech has introduced the DHP-55 five-part oversampled harmony processor. It features



oversampling analog-to-digital converter technology and its five-part harmony provides users with musically correct and natural sounding chordal, scalar and chromatic harmony. In addition, the unit features a special algorithm that also allows chordal pitch shifting. It will also recognize chords from a MIDI keyboard and allows full MIDI control of harmonies and effects.

The DHP-55's dual DSP design provides a number of effects that can be applied to each voice indi-

vidually. Additional effects provided by the unit include steel guitar harmony, 12-string/chordal shift, multiband chorus and multiband flanging. A 31-bands digital equalizer can appear anywhere in the effects chain, and the DHP-55 provides distortion, detune and sampling. Other features include digitally-controlled "wah" and other dynamic filtering, up to six seconds of delay, multitap delay, hold sample and repeat sample.

Circle 20 on Reader Response Card

Microphobia

(mī'krə·fō'bē·ə) n.

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WINNER

I used to suffer from chronic MICROPHOBIA. Every time I approached a microphone I would get unnerved by squealing feedback. Until I found the CURE... The FBX-900 FEEDBACK EXTERMINATOR. The FBX-900 is a fully automatic digital notch filter that controls feedback... automatically!

The fear of feedback.

THE FBX-900
CURES FEEDBACK!

I put the FBX-900 FEEDBACK EXTERMINATOR in the sound system on THE MAGIC OF DAVID COPPERFIELD tour as an experiment. As the show depends heavily on vocals, any thing that helps the tone or increases the volume is always in demand. I am happy to report that the FBX-900 did both. It works well while detracting very little from the tone, practically unnoticeable, and increased our gain by 3db. We had used a very expensive 5 band parametric equalizer until now, but find that the FBX-900 does it better. The unit also helps protect the speakers when David unexpectedly steps in front of a speaker stack by controlling feedback. Keep up the good work.

**Terry "T-Bone" McCauley, Sounds Great Enterprises
Athens, Oh**

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- d FACILITY MANAGER
- e CLUB OWNER
- f CONSULTANT
- g ARCHITECT
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- b SOUND
- c PRODUCTION
- d SPECIAL EFFECTS
- e other

3. My primary field is:

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- b CONCERTS
- c FILM
- d TELEVISION
- e THEATRE
- f THEME PARKS
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 Return this form to: LDI93, 135 Fifth Avenue, New York, New York 10010 USA
 For more information contact: Paula Millstone at Tel. 212•353•1951 Fax 212•677•3857.



Scan Do

Communications Specialties, Inc., is now shipping Scan Do Genlock, its newest computer-to-video scan converter product. The Genlock unit gives the Scan Do line of scan converters the ability to be slaved to a master reference. Additionally, Scan Do Genlock provides subcarrier and horizontal timing controls for both NYSC and PAL. The Genlock unit connects to the RGB/Expansion port of any Scan Do and is powered directly from the scan converter.

Circle 21 on Reader Response Card



CD Series and CRi Series

Celestion Industries has introduced a new line of sound reinforcement loudspeaker enclosures. The CR Series and CRi Series enclosures offer a full range of reinforcement loudspeakers starting at \$319.00 retail. The enclosures have a front curve styling allowing the forming of arched arrays. All enclosures are constructed, glued, and assembled with steel fasteners and have ridged internal bracing for durability. A protective 18-gauge

metal grille has been fitted to each enclosure to protect the drivers. Dual parallel 1/4-inch phone jacks and a high frequency level control are mounted into a recessed molded plate.

Circle 22 on Reader Response Card



Pioneer LD-V8000

The LD-V8000 from Pioneer Communications of America, now offers up to four hours of video play-time per disc side. Until now, CAV (Constant Angular Velocity) format offered a maximum of 30 minutes, and CLV (Constant Linear Velocity) format, a maximum of one hour play-time per side. The LD-V8000 player, which has frame and field interleave play capabilities, will quadruple the maximum play-time possible in each format through user selection of resolution and frame rate. It also provides freeze frame capability with CLV discs through a built-in digital video memory function.

Interleaved play is achieved when two or more programs are recorded simultaneously on a specially edited video tape, then mastered onto videodisc. Images from one program might be recorded only in the first of every four video fields, while images from completely different programs are recorded in all second, third and fourth fields respectively. During playback, the order is manipulated so that only every fourth field of source video is displayed. This qua-

druples the total available play time on a disc.

The LD-V8000 gives designers the option to select between play-time and resolution or frame rate. Trade-off decisions can be made selectively, segment by segment, so when resolution is not as important, the LD-V8000 can be switched into field interleave mode. Using interleaved frame playback mode, a designer can achieve full resolution playback and two hours play-time of 15 images per second by interleaving two programs on alternating frames rather than alternating fields.

Circle 23 on Reader Response Card



Solo 8 Live

Soundtracs has recently announced the introduction of the Solo 8 Live sound reinforcement console. It is available in 24 and 32 input frame sizes. The Solo 8 Live provides the user with: four assignable mute groups for scene muting; four stereo effects returns with EQ on 60mm faders; a full meterbridge with mechanical VU's and eight discrete group Buss + L/R and Mono Outputs.

Circle 24 on Reader Response Card

Dust Filtration System

Pace, Inc. has announced its new Dust-Evac system designed to remove harmful and irritating dust from the work environment. The system contains a three-stage filtration process comprised of a first stage collection bag, cleanable cloth-filter, and a final HEPA filter with a removal efficiency of

99.997%. The Dust-Evac features a high operating air flow rate along with high static pressure. The Dust-Evac is available in either single inlet or a dual inlet version. Variable fume hose lengths and a variety of nozzles and endpiece accessories are available.

Circle 25 on Reader Response Card

ConferenceMaster at New Price

Coherent Systems Corporation has announced that the ConferenceMaster audio conferencing system will be available at \$1,495. The ConferenceMaster 300, for use in larger rooms, will be available at \$2,495. The prices have also been reduced in Canada to C\$1,995 and C\$3,395 respectively for the two models. Prices on Coherents Voicerafter line of products will remain unchanged.

Circle 26 on Reader Response Card



Chatterbox.

Wheelock VoiceLink record-playback communications systems can speak volumes for any type of business.

Offer your customers the last word in "real voice" automated messaging: VoiceLink from Wheelock. These uniquely versatile, microprocessor-based systems can store hundreds of spoken messages and/or tones, and deliver them instantly, in any language.

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VoiceLink is expandable. Both the DV-100 and DV-200 Series come with a 256-message capability built in, and hundreds of additional messages can be programmed into either series via RS-232 or RS-485 communications ports.

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wheelock INC.

Circle 201 on Reader Response Card

Templin Named E-V V.P.; B&K Sales

V.P. at E-V

Gary Templin has been named vice president of sales for Electro-Voice, Inc. Templin joined E-V in 1984 as regional sales manager. He helped introduced E-V's N/DYM microphones, and was promoted to national sales manager in 1987. In his new position, Templin will be responsible for OEM, U.S.-based export sales and the company's telemarketing effort.



Templin

Bruel & Kjaer Appoint Sales Manager

TGI North America, distributor of all Bruel & Kjaer microphones for North America, has recently appointed Bob Hofkamp as their new B & K sales manager. Hofkamp's new duties will include sales administration, sales training and promotional activities. He has been with TGI North America for nine years as customer services manager.

Yamaha Names Stange to New Position

Yamaha Corporation of America has announced that Roger E. Stange has been named senior vice president of finance and administration. Stange has been an executive at Yamaha Electronics Corporation, USA, since 1989, and was most recently that company's senior vice president and general manager. The new position at YCA consolidates administrative and financial functions of Yamaha Electronics and Yamaha Corporation of America. He will have overall responsibility for the credit, finance, information systems, and operations divisions of the two companies.

AccessLine Technologies V.P.

AccessLine Technologies, Inc., has announced the addition of Mark Louison as senior vice president of operations. Louison was formerly vice president and general manager of NYNEX Mobile Communications Company with responsibility for the New York metropolitan area.

Symetrix Adds Product Specialist

Symetrix Inc., has acquired Steve Kawasaki for the position of product specialist. His background includes live and studio engineering. His duties will include on location training for dealers and users of the Symetrix line, as well as researching new product lines.

John McGuire Retires from BICC

John F. McGuire has retired from BICC Cables Corporation after 46 years of service to the wire and cable company. McGuire is one of the principals who led the management buyout of the Phelps Dodge Cable and Wire Company that resulted in the creation of Cablec Corporation in 1984. Cablec was the predecessor to BICC Cables Corporation. He has served as a member of the board of directors, as well as in a number of senior positions including corporate vice president and most recently president of Cablec Trading Company.



McGuire

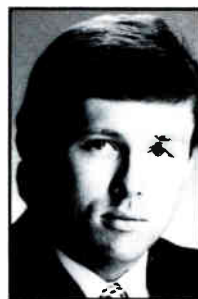
Intraplex Expands

Intraplex, Inc., has announced changes to its management team. Jack Kelly has joined the com-

pany as vice president of marketing. He will be responsible for the entire product marketing, product planning and marketing promotions activities for the company. Kelly has over 16 years of marketing and sales experience in the communications industry, with a background at New England Telephone, AT&T, National Semiconductor and Avanti Communications. He was most recently vice president of marketing at TyLink Corporation.

Briggs Joins ISL

Michael Briggs has joined International Sound & Lights, Inc. of Houston, as the vice president of marketing. "Michael is a welcome addition to our team and his vast experience and insights in the music marketing field will be a great compliment to our company," comments Don Ellis, president, International Sound & Lights, Inc.



Briggs

Konica Appoints Two V.P.s

Konica Business Machines U.S.A., Inc., has named Richard F. Clarke executive vice president, sales, reporting directly to Konica's Management Committee. In his new assignment, Clarke will assume overall sales management responsibility for Konica's complete line of copiers, facsimile and laser printer products for both direct and reseller channels of distribution. Harry J. Williams has been promoted to executive vice president of finance. He will be the senior financial officer for the company, directing and overseeing all corporate financial operations including financial analysis, credit, field accounting and accounting services and systems. Hewill report directly to Konica

president and chairman, Terry Kawaura. In this capacity, Williams will also serve on Konica's Management Committee.

Scharff Weisberg Make Additions

Scharff Weisberg Inc, has recently named Michael Halper director of staging productions. For the past 10 years Halper has worked for Rebo High Definition Studios as a producer. He will be responsible for overseeing the planning and preparation of staging projects.

Barry Grossman has also joined the staff of Scharff Weisberg as on-site technical manager. His background includes video systems engineering, microwave and satellite transmission engineering and location engineering for network news and sports productions.

Klein Tools Appoints National Sales Manager

Ronald J. Bost has been named national sales manager for Klein Tools, Inc. of Chicago. He will be responsible for sales to the company's network of U.S. and Canadian distributors. Bost joined the company in 1989, and most recently, served as director of market research.



Bost

University Sound Names New Sales Manager

Robert Allen has been named regional sales manager of University Sound, announced Doug MacCullum, president. Prior to his new position he was with Hill Audio, Inc., Tucker, Georgia, since 1983 as national sales manager.



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Circle 87 on Reader Response Card

World Radio History

CALENDAR

Upcoming Events

MARCH

Fiberoptic Splicing and Termination Workshop: Washington, D.C. Contact: (508) 347-8192. March 22-26.

Rigging Seminar (Syn-Aud-Con): Atlanta, Georgia. Contact: (812) 995-8212. March 23-25.

CeBIT: Hanover, Germany. Contact: (609) 987-1202. March 24-31.

Fiberoptic Splicing and Termination Workshop: Dallas, Texas. Contact: (508) 347-8192. March 29-April 2.

InterMedia: San Jose, California. Contact: (203) 352-8243. March 30-April 1.

Rigging Seminar (Syn-Aud-Con): Anaheim, California. Contact: (812) 995-8212. March 30-April 1.

APRIL

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

NAMM Sales Training Institute: St. Louis, Missouri. Contact: (800) 767-6266. April 15-18.

National Association of Broadcasters (NAB): Las Vegas, Nevada. Contact: (202) 429-5300. April 18-23.

MAY

Fiberoptic Splicing and Termination Workshop: Washington, D.C. Contact: (508) 347-8192. May 10-14.

American Jail Association's Annual Conference: Portland, Oregon. Contact: (301) 790-3930. May 16-20.

Multimedia '93: Toronto, Canada. Contact: (416) 660-2491. May 26-29.

JUNE

ShowTech '93: Berlin, Germany. Contact: 030/3038-0. June 8-10.

Enterprise '93: Boston, Massachusetts. Contact: (508) 879-6700. June 16-18.

AUGUST

Shure Applied Business Telecommunications, BASIC Seminars '93: Denver, Colorado. Contact: 303-987-2000. August 4-6.

OCTOBER

Media Summit '93: New York, New York. Contact: 203-352-8316. October 19-21.

HME's New Customer Service Manager

HM Electronics, Inc. has appointed Mr. James Edgerton to the position of customer service manager. Edgerton previously served with Gregg Communications Systems, Inc., as the operations and service manager. As the customer service manager, Edgerton will be based out of HME's corporate headquarters in San Diego, California.

Howard Schwartz Recording Adds Engineer

Howard Schwartz Recording has added Bill Higley to the facility's audio engineering team. Higley has been with Soundtrack, Ltd., for the past five years as senior engineer. He will be working in Howard Schwartz Recording's newly renovated Studio A on a SSL ScreenSound.

Magnavox Names V.P. for Commercial Satcoms

Magnavox Electronic Systems Company has named Neil Saldin vice president for the commercial satellite communications business unit. He replaces Larry Whitcomb, who has retired after many years of service with Magnavox. Previously, Saldin was vice president and general manager of Magnavox's Nav-Com subsidiary in Deer Park, New York.



Saldin

Barnes Named V.P. at PLP

Preformed Line Products has announced that Jon Barnes has been appointed to the newly created position of vice president of telecommunications. He was

previously national sales manager for telecommunications. He has been with PLP since 1977 serving in various sales management positions.

JLCooper Names V.P.

Chuck Thompson has been named vice president of sales and marketing at JLCooper Electronics. Thompson previously held the position of national sales and marketing manager, and has been with the company for four years. His responsibilities will include overseeing national sales, media and market planning and product development.



Thompson

Additions at TC Marketing

TC Marketing has announced the addition of Sue Jones and Tim Campbell to the Rep. Staff. Sue Jones was previously operations manager at Amek/TAC U.S. Operations. Campbell's experience is in retail audio sales.

Scharff Weisberg Make Additions

Scharff Weisberg Inc. has recently named Michael Halper director of staging productions. For the past 10 years Halper has worked for Rebo High Definition Studios as a producer. He will be responsible for overseeing the planning and preparation of staging projects.

Barry Grossman has also joined the staff of Scharff Weisberg as on-site technical manager. His background includes video systems engineering, microwave and satellite transmission engineering and location engineering for network news and sports productions.

COMING IN MAY

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DIGITAL CHURCH

(continued from page 115)

tem, one wired microphone on the pulpit, two cardioid lavalier microphones, and six speakers retrofitted into existing chandeliers. I arrived at this simple, even minimalist solution to the acoustic problem, in great part because the DSP-30 confirmed through consistent RT60 measurements, that nothing more was needed. (So much for the "by-the-numbers" solution proposed by a previous consultant who wanted to hang a huge speaker from inside the chandelier. A solution which, by the way, did not find favor with the Board of Trustees.)

I have laid out the system arrangement on my CAD system and presented it to the Board of Trustees who



Chestnut Level Presbyterian.

accepted it immediately. Instead of putting the job out to bid, the church has decided to do the install themselves, since the sanctuary presents no

Instead of putting the job out to bid, the church has decided to do the install themselves.

real problems for getting easily from point A to point B.

Next week I plan to haul my DSP-30 to Saint Leo the Great Catholic Church of Lancaster. I designed the sound system and the acoustic envelope of the sanctuary for David Lynch and Associates Architects, completing the project about a year ago. At this point in time, I always return to an installation to review all system functions. ■

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Circle 256 Reader Response Card

Fiber Optics; Printer/Terminal Tutorial

Fiber Optic Data Transmission Systems

Math Associates has announced the publication of a new catalog/designers guide for its line of fiber optic data transmission systems. The catalog contains a selection of point-to-point fiber optic transmission systems.

Transmission systems for video, audio, analog, RS-232, RS-422, RS-485, TTL, 4/20ma, DC Level, Bipolar, T-1, closures, Weigand, and MIL-STD-1553 are available for use with multimode or single mode fibers, and operate at wavelengths of 660nm to 1300nm. Simplex, duplex and multiplexed single and multifiber versions are available for operation over distances of 0 to 40Km. New bi-directional and multiplexed systems are also available. Test equipment, terminating sets, and cable connectors complete the systems.

Circle 27 on Reader Response Card

Intro to Terminal Servers

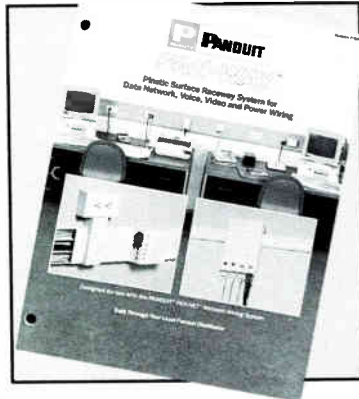
Subject matter in the brochure, Introduction to Terminal Servers, from Lantronix includes using printer/terminal servers for supporting peripherals, in multi-protocol networks, for modem pooling, and protocol conversion. Basic common features for status checking, automatic operation, workgroup support, security, and remote management are also covered.

Circle 28 on Reader Response Card

Panduit Catalogs

A 76-page catalog, P-Way-1, offered by Panduit Corp., Network Systems Division, describes the company's line of Pan-Way plastic surface raceway and accessories for data network, voice, video and power wiring. Fill capacities of the raceways are given in tabular form. In addition, the catalog shows the complete line of fittings.

Panduit has also released a 52-page condensed catalog covering



the full line of Panduit wiring products. Included is product selection and packaging information on Panduit cable ties, tooling and wiring accessories, insulation products, stainless steel products, identification products, terminals, power connectors, network wiring system, surface raceway, wiring duct, cleaners, coatings and lubricants, and OEM products.

Circle 29 on Reader Response Card

Prompt Publications

Prompt Publications has released several new do-it-yourself books. Making Sense of Sound: The Basics of Audio Theory and Technology, will aid readers in understanding audio theory and today's technology. Contents include: stereo components; distortion and system noise; sound transducers; recording and playback; and combinations of video and audio technology.

The Right Antenna instructs readers on how to select and install the right antenna to meet specific needs. Contents include: how antennas work; selection of antennas for specific devices and applications; installation instructions; fringe area and MATV antennas; and how to identify and eliminate interference.

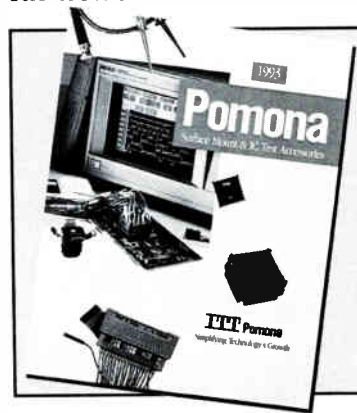
Technician No-Code Class is for those with an interest in amateur radio and who want to take the Technician Class test to become an operator. This book contains samples of questions from Element 2 and Element 3A question pools.

Speakers for Your Home and Automobile shows the do-it-yourselfer the hows and whys of building stereo speakers for home or automobile. It includes sections on: how speaker systems work; enclosures and their effect on sound quality; speaker types and design factors; construction of speakers; and design equation and conversion charts.

Circle 30 on Reader Response Card

IC Test Accessories

Pomona Electronics has introduced a 24-page Surface Mount and IC Test Accessory catalog. The brochure includes Pomona's



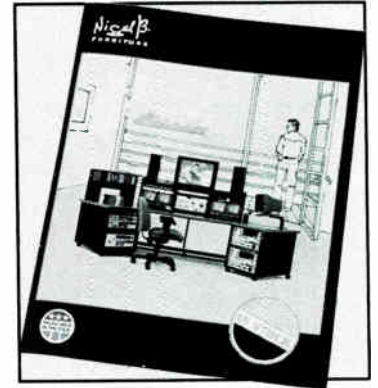
line of FIN clips and SMT-PGA converters and adaptors. It also introduces Pomona's new SSOP and SQPF test clips designed to access chips with lead densities of 0.5mm or less and heights of 1.4mm. A SMT/IC product selection guide allows the user to select a standard Pomona test clip by identifying various characteristics of the device. Over 100 SMT/IC test clips are listed.

Circle 31 on Reader Response Card

Furniture

Nigel B's new 32 page catalog shows modular pieces of audio/video furniture components. All the user has to do is choose pieces they need to create custom configurations. Nigel B furniture is available from about 70 dealers throughout the U.S. who are equipped with design tools to help layout a system for each individual facility.

Circle 32 on Reader Response Card



Broadcast Systems

Gentner Broadcast Systems has released its 1993 product catalog. Chapters include Total Quality, Digital Storage, Audio Processing, Telephone Interface, Frequency Extension, Audio Routing and Distribution, and Remote Control.

Circle 33 on Reader Response Card

Fume Extractors

Pace, Inc. has announced the release of the Arm-Evac Fume Extraction brochure illustrating the variety of fume extraction systems used to remove hazardous fumes from solder operations and other electronic assembly processes. The brochure also explains the benefits of local exhaust by removing harmful particulates and gases before they reach the workers breathing zone.

Circle 34 on Reader Response Card

Cable Preparation

Cablematic Division of Ripley Company has recently issued a new catalog on its CATV and telecommunication cable preparation tools. Operations from jacket or sheath stripping, to simultaneous coring and stripping with a single tool. Cablematic designs and manufactures all of its cable preparation tools at their facility in Cromwell, Connecticut. The catalog presents Cablematic's full line of products including information on tools for specific cables, such as Quantum Reach and TX cables.

Circle 35 on Reader Response Card

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Use the Reader Service Card
opposite page 34. Just circle the RS#
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ANNOUNCEMENT

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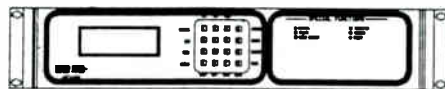
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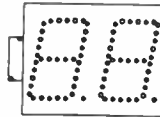
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Mixers	FIRST PLACE	SECOND PLACE	THIRD PLACE
Signal Processors	RANE	TASCAM	IRP
Amplifiers	LEXICON	PIONEER	RANE
Intercoms	CROWN	SONANCE	ELECTRO-VOICE
Audio Tape Players	TELEX	TOA	AIPHONE
Remote Control A/V	TASCAM	SONY	PIONEER
● Wire/Cable	AMX	CRESTRON	MITSUBISHI
● Loudspeakers	BELDEN	WEST PENN WIRE	SONANCE
Video Monitors	JBL	ELECTRO-VOICE	SONANCE
Screens	SONY	NEC	PANASONIC
Projectors	STEWART	DRAPER	DA-LITE
Microphones	SONY	HARMAN	VIDIKRON
Racks	AUDIO-TECHNICA	ELECTRO-VOICE	SHURE
Hearing Assistance	MIDDLE ATLANTIC	ATLAS/SOUNDOLIER	PREMIER
Cameras	WILLIAMS	PHONIC EAR	SENNHEISER
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* Indicates tie

... IN LAST SIX MONTHS

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Mixers	FIRST PLACE	SECOND PLACE	THIRD PLACE
Signal Processors	RANE	TASCAM	IRP
Amplifiers	LEXICON	IRP	RANE
Intercoms	CROWN	SONANCE	ELECTRO-VOICE
Audio Tape Players	TELEX	TOA	BOGEN
Remote Control A/V	TASCAM	SONY	PIONEER
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Hearing Assistance	MIDDLE ATLANTIC	ATLAS/SOUNDOLIER	PREMIER
Cameras	WILLIAMS	PHONIC EAR	TELEX
	JVC	SONY	JAVELIN

* Indicates tie

SURVEY METHODOLOGY

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

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