

SOUND & COMMUNICATIONS

FOR CONTRACTORS, SYSTEM MANAGERS AND SPECIFIERS

JUNE 1988

Fiberoptics: Hear At Last!

Coca-Cola's
Traveling Nightclub

Restoring
San Francisco's
Cow Palace

Test Equipment:
Part II

Ingenious.

You've waited 20 years for a paging projector with all these benefits.

The innovative PA430, a 30-watt paging projector, gives you easier, more economical installation than any other paging speaker...*plus* better sound and more controlled area coverage. And it fits a wider variety of applications.

The versatile PA430 mounts directly to all common electrical backboxes and is quickly clamped to posts or beams. An exclusive University-developed swivel assembly permits pinpoint orientation in any direction, at any angle.

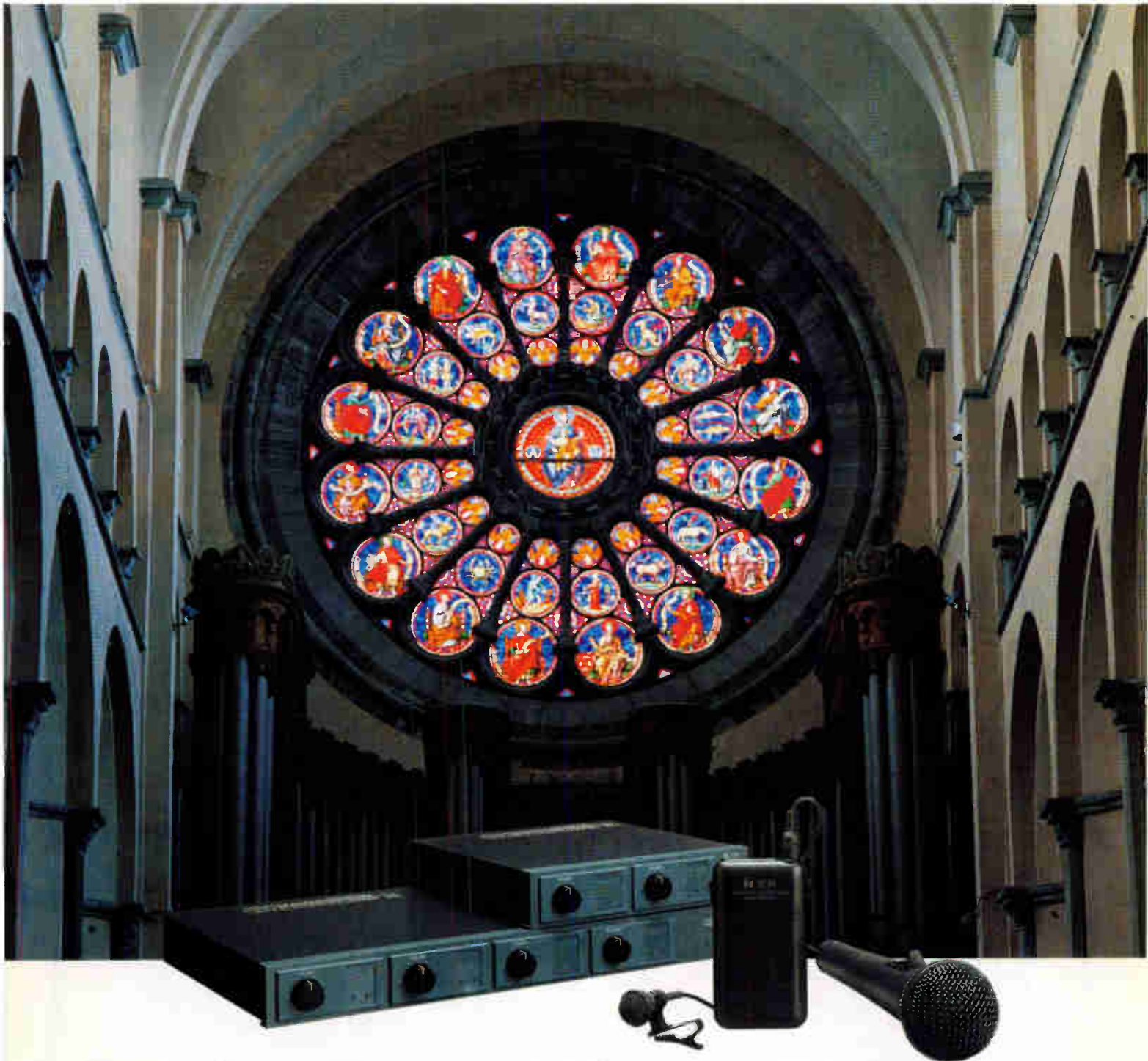
You won't find a paging projector with better speech intelligibility. As the first paging projector ever to feature our constant-directivity principle, it provides accurate 60° x 40° pattern control over the important 2 kHz to 10 kHz range. And its double-slit phasing plug—another “first” in paging projectors—boosts high frequencies for improved off-axis performance. Its durable, high-impact horn eliminates the hollow ringing common in metal horns.

Designing the PA430 for improved speech intelligibility was a major advance. Designing it to reduce total installed costs...*now, that was ingenious.* The PA430—**pro quality in commercial sound**—available only from:



Circle 201 on Reader Response Card





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

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

You asked for wireless microphone technology that delivers substantially longer battery life. Toa responded by incorporating the latest advancements in miniaturized surface mount components into our new wireless microphones. Battery life has been extended to over thirty hours during continuous use, utilizing one AA battery.

You needed extended dynamic range and superior signal-to-noise ratios. Toa responded by designing a unique new compander circuit that achieves wide dynamic range against a background of vanishing low noise.

You wanted a wireless system completely free from external

interference. Toa responded by introducing our fabulous new tone-key circuit design. This technological breakthrough virtually dispenses with the possibility of external interference.

Toa's new modular wireless systems are available in diversity and non diversity configurations.



Wireless Microphones from Toa Created to Reinforce the Spoken Word

Toa Electronics, Inc.

Commercial Products Group

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Toa Canada: (403) 489-5511 Edmonton,

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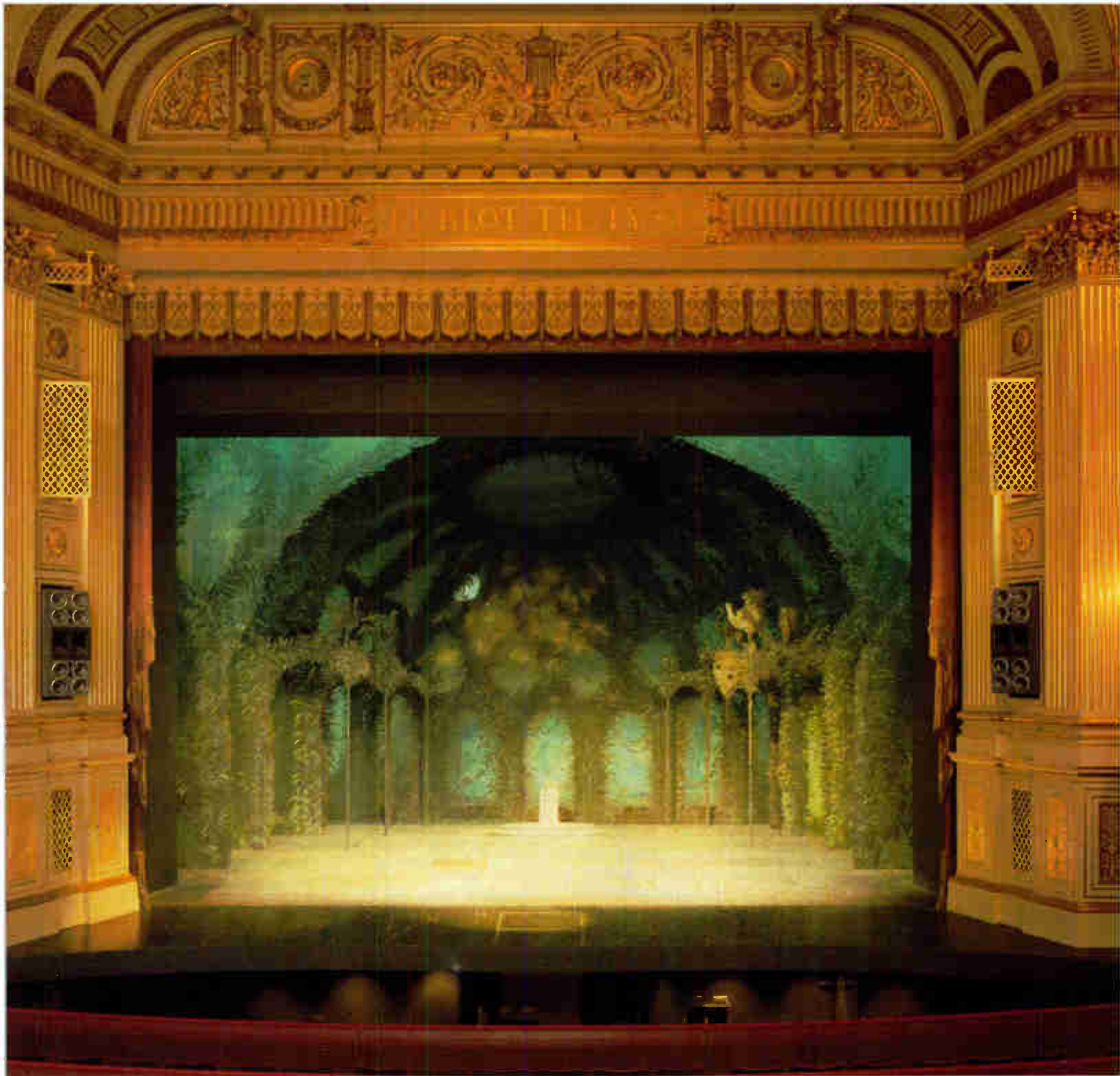
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ON THE COVER

A spray of fiberoptic cables that are changing the quality of communications. Story on page 26.



THERE'S MORE TO OUR PERFORMANCE THAN MEETS THE EYE.

When the historic Royal Danish Theater in Copenhagen underwent modernization in 1983, plans called for a new sound reinforcement and stage monitor system. The designers found themselves faced with critically tight acoustical, spatial and visual requirements. Flexibility was essential: the theater needed a sound system that could deliver the full range of audio frequencies under all manner of theatrical applications, from ballet to musicals to pre-recorded accompaniment. At the same time, sight lines from every seat had to be maintained and leakage between the house and stage had to be controlled. The solution was an innovative custom design centered around standard JBL components.

JBL's exclusive Central Array Design Program (CADP) was employed to aid in designing and aiming the loudspeaker arrays. Coupled with extensive on-site testing, this resulted in a highly individualized sound

system that specifically addresses the needs and requirements of the theater. Meticulous selection of components and professional installation are reflected in the system's superior performance, which has received consistently positive reactions from the public and performers alike, ensuring that the Royal Danish Theater will go on thrilling audiences for another 100 years.

To find out how JBL can be a part of the solution to your sound problems, contact your JBL sound contractor. Whatever your loudspeaker and electronics needs, there's more to our performance. JBL.



JBL Professional
8500 Balboa Boulevard
Northridge, CA 91329

Look Into It

Changes have been taking place. If you haven't noticed, this is a perfect time to take a good look. Sound & Communications magazine is, as we see it, a service magazine and a networking outlet, a communications vehicle for all of you working in this industry.

It is also a venerable magazine. It was around thirty years ago, when no one else was. And it carried on as the industry's vehicle for all those years. When our company purchased it, we vowed that we would invest more energy and more personnel into making the book more immediate and closer to the business.

And we think we succeeded. We owe thanks to Jerry Brookman and his original concept of a magazine called Sound & Communications. We owe special thanks to Chris Foreman for his invaluable insight at the start of our tenure. And of course Jesse Klapholz, our Associate Editor/Technical, has been and continues to be a constant mover and shaker in our offices and in the business in general.

But there's more. Although we have succeeded in our preliminary aims, we all know that nothing stands still. We are now poised to enter our next plan. You will see new design, new types of articles, and a closer involvement with you, our readers.

To make that happen, we have already brought in Bill Intemann as the new managing editor of Sound & Communications magazine. The next issue is Bill's first, and we think you'll see some changes immediately.

One week into the job, Bill was presented with tickets to Reno, where many of you met him. And we were proud and pleased by some of the comments we received from so many of you that Bill is "personable," "knowledgeable," and "very sharp."

Bill is sharp. He is a professional musician, a professional journalist, and a professional publishing manager. He cares about this business. And he cares about the people in it. He will be implementing some exciting new concepts. And we trust you will let him know what you think when you think it. Sound & Communications is, in our view, the industry communicator. And communications is the name of the business.

Backing Bill up is Steph Paynes, who came on board several months ago as Assistant Editor. Steph is also a professional journalist who brings to her work a clear head and a creative voice.

Jesse Klapholz, Vinny Testa, Bill Intemann, Steph Paynes and I are all excited about the year to come for S&C. NSCA was a remarkable time for us. We're on a high and we're aimed for higher things.

The magazine in your hands is S&C—Sound and Communications. That's always been its name, and it never changed it, never added a "v" or an extra word to its title. The changes will come in presentation. Watch out. Sound & Communications magazine is going to get even better.



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SOUND & COMMUNICATIONS

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BPA MEMBERSHIP
APPLIED FOR MAY 1988



Sound & Communications • Music & Sound Output
The Music & Sound Buyer's Guide • Post
NSCA-TV News • NAMM-TV News • CES-TV News
The Music & Sound Retailer
Home Entertainment

LETTERS

Dear Editor:

This note is to thank Ted Uzzle for his very kind review of my book, *Introduction to Professional Recording Techniques*, in the Jan. '88 *Sound & Communications*. I'm glad the intent and special emphasis of the book was appreciated.

Mr. Uzzle pointed out an error about connecting console ground to a metallic cold water pipe. Although several of my sources recommended this practice, if it goes against Code or is dangerous, it shouldn't be done. I will change the next edition of the book.

The equation to calculate how loud a loudspeaker can play was taken from John Woram's *Recording Studio Handbook*. As my book states, 10 dB was added for 10 dB peaks in the music, not for a 10 dB peak-to-average ratio in a sine wave.

The bi-amplification example was taken from *Modern Recording Techniques* by Runstein and Huber. It stated that a 100 watt amplifier and a 25 watt amplifier in a bi-amplification configuration produce the same peak power as a 225 W amplifier with a passive crossover. I checked that source's match and found an error (based on adding voltages rather than powers). I will make this correction.

Mr. Uzzle also mentioned that the effect of speaker cables on damping factor was much more significant than power loss. I also mentioned damping factor in the book.

Again, thank you for a favorable review; I appreciate the suggestions.

Bruce Bartlett
Senior Microphone Development
Engineer, Technical Writer
Crown International

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information,
please call

(516)767-2500



Nady 101/201 Wireless Systems: The ultimate price/performance breakthrough in VHF Wireless Systems, 120 dB Dynamic Range, 250 foot operation. True Diversity and single-channel; Lavalier, Hand-Held, and Instrument Transmitters available. Receivers rack mount. List prices start at \$279.

The Systems Approach. Nady Wireless. Nady Infrared.

Maybe the problem is a small facility with an even smaller budget - but you need wireless microphones.

Your requirements may be for a very complicated multi-channel wireless installation. It has to sound great and work flawlessly.

Or your plans call for a Large-Area Infrared installation. Complete coverage, user-friendly receivers - the works. And you don't want to break the bank.

Only one resource provides a total, integrated solution: The Nady Professional Audio Line.

We give you choices - systems solutions - that no one else can. Our 101/201 VHF Wireless Systems start at \$279 list for a Nady 101 LT lavalier system. Wireless doesn't get more affordable than that.

And the Nady 1200 Series Wireless sets the industry standard for full-feature, top-end wireless performance.

Wireless manufacturers make many confusing claims regarding system specifications. Take our suggestion: listen to a Nady 101/201 or a Nady 1200 side-by-side with any other wireless on the market - regardless of the claimed specs - and you'll be impressed with the extra 15 dB dynamic range you get with Nady Wireless.

The Nady IR-300 is a Large-Area Infrared system with a unique modular design for easy, efficient installation in any size facility. You don't have to run AC to power the emitters. And you can add to the system as needed in the future. Best of all, you can have a Nady IR-300 infrared package for one-third to one-half less than the competition gets for the same area coverage.

So, the next time you need wireless or infrared, try the systems approach. The Nady Systems Professional Audio Line.

Nady Systems, Inc., 1145 65th St.,
Oakland, CA. Phone 415/652-2411



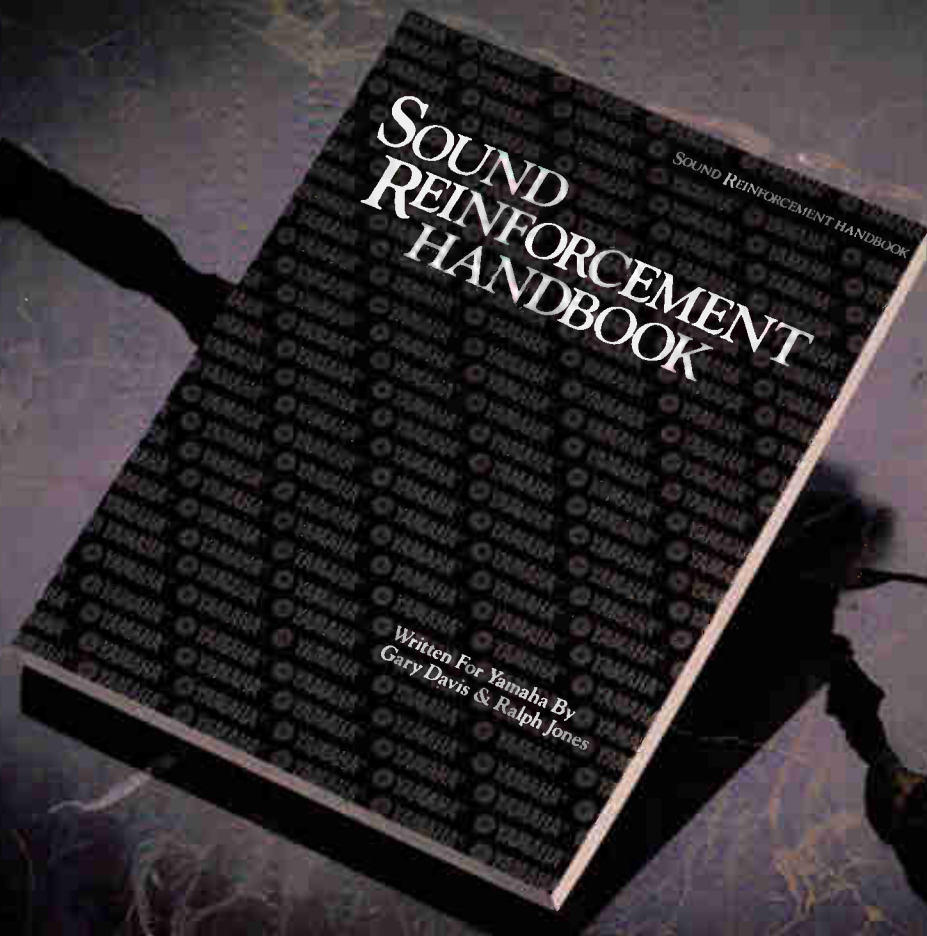
Nady 1200 Wireless System. The newest generation of top-end Nady Wireless Systems, with the best specs in the business. Full output features for total flexibility. Sophisticated front-end circuitry for maximum multi-channel capability, and True Diversity for drop-out free performance. Features a completely redesigned Hand-Held Transmitter with user-switchable elements. Receiver rack-mounts. List price from \$1,599.



Nady IR-300 Large-Area Infrared Systems. Unique modular design for easy, efficient installation in any size facility. You don't have to run AC to power the emitters. And you can add to the system as needed in the future. Choice of user-friendly receivers. Best of all, you can have a Nady IR-300 infrared package for one-third to one-half less than the competition gets for the same area coverage.

See us at NSCA booth 308

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Here's the only plug you'll see on our new product.

At Yamaha, we've been putting all our sound reinforcement expertise into our equipment for years. Now we've put it all into words.

Presenting the Yamaha Sound Reinforcement Handbook. Without a doubt the only volume of its kind.

In it you'll find nearly 400 pages of explanations, definitions, diagrams and answers about sound. Covering everything from "What is a sound System?" to "Putting it all Together," plus every component and variable in between.

Which makes it perfect for the newcomer to audio. And a welcome refresher for the seasoned professional.

The Yamaha Sound Reinforcement Handbook. Available at your nearby Yamaha Professional Audio Dealer, college, university and technical bookstores. Published by Hal Leonard Publishing Corporation, P.O. Box 13819, Milwaukee, WI 53213.

Pick one up today. It just may be the best source material you ever get to work with.

Yamaha Music Corporation, Professional Audio Division, P.O. Box 6600, Buena Park, CA 90622. In Canada, Yamaha Canada Music Ltd., 135 Milner Avenue, Scarborough, Ontario M1S 3R1.

YAMAHA

Engineering Imagination™

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CETEC CORPORATION REPORTS RESULTS

Cetec Corporation has announced operating results for the first quarter ended March 31, 1988. Net income from continuing operations was \$125,000 or \$.07 per share, as compared to \$188,000, or \$.10 per share in the same period a year ago. Robert A. Nelson, President and Chief Executive Officer said that January orders booked were not as great as had been expected. He looks forward to an improved second quarter.

SYN-AUD-CON DATES SET

Synergetic Audio Concepts (Syn-Aud-Con), now in its 16th year of training, has announced the schedule for the balance of 1988 for their two-day audio engineering seminars and three-day workshops. Seminars will be held in the following cities: Toronto (June 23-24); Syracuse (June 28-29); Chicago (September 22-23); Minneapolis (September 27-28); St. Louis (October 6-7); Anaheim (November 1-2). Workshops will be held as follows: Sound Reproduction, Syn-Aud-Con Farm, Indiana (July 15-17); Grounding and Shielding, Los Angeles area (November 17-19); Concert Sound Reinforcement, Los Angeles area (January 17-19, 1989).

COMMUNITY ADDS EUROPEAN DISTRIBUTION

The entire line of Community loudspeakers and related products is being distributed throughout Sweden by the audio sales firm HBL AB. The firm is located in Uppsala, Sweden. The new distributor of Community products throughout France is Paris-based Simplex Electronique.

EXECUTONE EXPANDS HEALTH CARE INVOLVEMENT

Executone plans to expand into other segments of the health care industry, in addition to hospital communications systems. The company has established a separate health care group. Executone, which was formerly Contel Executone, was acquired by Vodavi Technology and Isoetec Communications. Jerry Kaufman, Vice President of Marketing for Vodavi, has been named Vice President of Sales and Marketing for the new group. The company reports that combined revenues for Vodavi, Isoetec and Executone in 1987 was approximately \$375 million.

SEEBURG LAUNCHES SATELLITE SERVICE

A direct-by-satellite commercial music service has been launched by the Seeburg unit of Capitol Broadcasting Company. Named Seeburg Direct, the new service delivers multiple channels of music programs simultaneously via Ku band transmission to subscriber dishes measuring 30 inches across. The company claims 300 percent greater fidelity over traditional means of transmission.

DAT DUPLICATION ANNOUNCED

Custom Duplication, Inc. has announced that it has installed professional real time DAT duplication, labeling and packaging in their headquarters in Inglewood, California. Bob Hively, President and Chief Executive Officer, said the company is currently running orders for domestic record labels.

RELAY CONFERENCE HELD

The 36th Annual National Relay Conference, co-sponsored by Oklahoma State University's School of Electrical and Computer Engineering and the National Association of Relay Manufacturers, is reportedly the only conference devoted to the study of the relay. Papers included "Evaluation of the Influence of Organic Vapors on Relay Contacts," "Development of a Highly Efficient Ultra-Miniature SMD Relay," and "Systematization for Controlled Relays."

JOHNSON AND PHILIPS REACH AGREEMENT

Under a long-term agreement, E.F. Johnson Company and Philips Radio Communication Ssystems will begin joint development of mobile radio communications technologies, products, and systems. According to the companies, this agreement is a major expansion of an initial product marketing and distribution agreement signed in 1987.

VOICE STANDARDS TASK FORCE SET

The Information Industry Association has announced the formation of a Voice Information Services Technical Standards Committee. Four task forces have been "identified": The Voice Processing System Switch Specification Task Force; The VPS Interoperability Task Force; The VPS/Database Access Specifications Task Force; and The Human Interface Specifications Task Force.

TIE/COMMUNICATIONS REPORTS FIRST QUARTER RESULTS

TIE/Communications, Inc. reported a first quarter 1988 loss of \$1,323,000 before accretion and dividends on preferred stock issued in the third quarter of 1987. Sales for the first quarter of 1988 were \$62,164,000 versus sales of \$63,206,000 for the first quarter of 1987. However, TIE's first quarter performance showed improvement over its fourth quarter 1987 results.

HOSPITAL INFORMATION SYSTEMS REPORT

The hospital information systems industry will diversify and have revenues of \$6.2 billion by 1992, according to a report by Frost & Sullivan, "The Market for Hospital Information Systems." Hospitals will make use of voice recognition data entry and other information-system technical developments to a great degree. The report sees a 12 percent annual rate from a 1987 base of \$3.5 billion, with especially strong growth over the next five years in patient-care applications. The price of the report is \$2,000.

SECURE TELECONFERENCING SYSTEM ANNOUNCED

ConferTech International, Inc. has announced the introduction of an automatic, full duplex, secure audio teleconferencing system, which combines "a proprietary call-processing algorithm with the company's patented full duplex digital bridging technology."

PORTABLE SATELLITE COMMUNICATIONS

A portable satellite communications center is available on a turnkey basis from Magnavox. The turnkey package is based on a Magnavox transportable satcom terminal introduced last year. The equipment may be purchased or leased. All components, including the parabolic dish antenna, are packaged in two carrying cases which can be carried as checked luggage on airline flights.

SAMSON TO MARKET SOUNDTRACS

Soundtracs plc of Surrey, England, has made an agreement with the wireless mic maker, Samson Technologies, that allows Samson to replace AKG as the distributor of Soundtracs' mixing consoles to the American market. The agreement comes after four months of discussion and a test-market set up by Samson at Sam Ash in New York City, said Todd Wells, managing director of Soundtracs. Billed as a "joint venture," the agreement became effective June 1.

THE SINGLE BOX SOLUTION:

BGW SPA-3 Signal Processing Amplifier

About two years ago, BGW decided to take a long look at the then-current state of the art in amplifying systems. And when we did, we saw room for improvement. The typical installation included several channels of amplification, of course, along with quite an accumulation of add-in and add-on boxes: An electronic crossover or two, a couple of time alignment delays, plus assorted EQ's, filters and more.

What's wrong with that? Well, all those separate boxes wired together require lots of rack space, cause inevitable installation hassles, and create an ongoing potential for reliability problems. Not to mention the cost of all those boxes.

That's why we created

ever need for virtually any application. It's a *complete amplifying system* in a single 5¼" rack cabinet—completely self-contained, completely flexible and completely reliable.

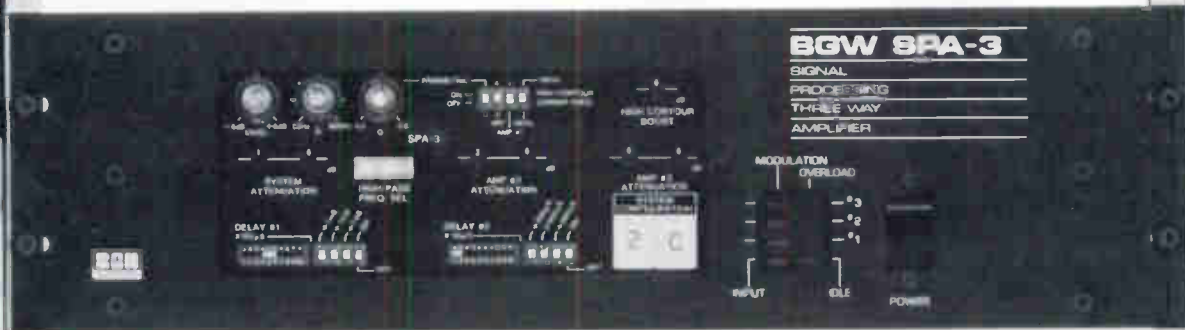
At the heart of the SPA-3 are not-two-but three 200 Watt (@ 8 ohms) channels of BGW-quality power amplification. Among the signal processing elements included are Low Frequency Parametric EQ and a High Frequency Contour Filter, a Switch-set™ High Pass Filter, a 3-way Electronic Crossover Network, two adjustable high-quality Delays for time alignment, even a full complement of Buffer Amps and Digitized Level Attenuators.

In minutes, the SPA-3's multi-pin "jumper header" plugs-in to let you set up the unit for dozens of different

wouldn't build it any other way!

The superior design, reliability and performance of the BGW SPA-3 has already proven itself in major installations from the Orange County (CA) Performing Arts Center to the OMNIMAX theatre in Australia. By the way, there's also a two channel Model SPA-1 with signal processing capabilities tailored to make it an ideal subwoofer amplifier. It's a time, space, aggravation and money saver too.

The logic of the SPA approach speaks for itself. But there's lots more to know about all the incredible capabilities of the BGW Signal Processing Amplifiers. For a full info pack, call us Toll-Free at 1-800-252-4800 (in CA 213-973-8090), or see your BGW dealer.



the BGW SPA-3 Signal Processing Amplifier—the single box solution that restates the state of the art. It's much more than just an amplifier, because the SPA-3 includes all the signal processing elements you'll

configurations, in the shop or in the field. The design is so flexible, you can even change the location of the attenuators, delays, etc. within the signal flow. And every processing function offers superb quality. BGW



BGW SYSTEMS INC.
13130 SOUTH YUKON AVE.
HAWTHORNE, CA 90250

**ENGINEERED
TO BE THE BEST**

SPECIAL INDUSTRY GLOSSARY

ACOUSTICAL CONSULTANT (Species: *Soundus reboundus*) Quite adept with their vocal facilities, Acoustical Consultants have the ability to look at a situation and explain why it has happened, what will happen in the future and what can be done to make it do whatever it is anybody wants it to do. Of course, depending on the patience of the employer (as well as the time), these explanations can last anywhere from 15

Although the sales manager spends much of the time in the wild, he is still very close to his family and will be found frequently with pictures and mementos to remind himself of them.

minutes to several days. It is thought this feature was adapted through years of evolution to enable the Acoustical Consultant to survive in an otherwise noisy world. The drawback to this wonderful adaptation, however, comes when two Acoustical Consultants meet in the same place. Because they are headstrong and often feel they are right, two Acoustical Consultants will discuss these possibilities for hours on end until one admits defeat or they both drop dead from exhaustion. As with most species, the diet of the Acoustical Consultant consists mainly of caffeine and fast food.

ACOUSTICAL TRANSDUCER RECONSTRUCTION ENGINEER (Species: *Recona americanis*) Found normally in the wilds of North America and Europe, this species is

able to exist in other electronically related habitats. Although they look tame, they are essentially wild creatures and are prone to loud outbursts when cornered (or overworked). The diet of the Acoustical Transducer Reconstruction Engineer is hot dogs.

SALES MANAGER (Species: *Spenda moneyhere*) Known to be found all over the civilized world, the sales manager is a unique species. He is able not only to gain the attention of every living thing with his patented "sales call," but he is able to juggle simultaneously phone calls, sales reports and demonstrations, usually without the benefit of breaks or lunch. Although the sales manager spends much of the time in the wild, he is still very close to his family and will be found frequently with pictures and mementos to remind himself of them. When in captivity, he should be treated with respect and occasional "applause" to insure proper growth and prosperity.

OWNER (Species not yet determined) Although it is not known exactly where this breed originated, they are now common everywhere that there is civilization. Their favorite habitat is that of an office where they are usually found engaging in activities concerning the use of a small communications device (see telephone). Their favorite food is fast (although reports are currently being compiled to confirm that) and their favorite color is green (see money). Considered a deity by some (and most often by themselves), the owner is often surrounded by a multitude of worshippers (sometimes known as employees) who must compete in ritual games for his attention. Reports are currently being compiled on this subject which will be filled out in triplicate, turned in, considered, returned, lost, found, re-typed, turned in again and filed (see trashed).

SALESMAN (Species: *Spenda moneyheretoo*) A more common version of the Sales Manager is the Salesman. Although they appear to be a totally different species, the Salesman can and will at times assume many of the same attributes that Sales Managers possess including the "sales call." Although in most cases Salesmen are found in the wild, they have been known to be domesticated and often appear in the vicinity of their

Technicians can be very high strung, and constant interruptions will often lead to petulant fits which can usually only be reversed with a two week vacation in the Bahamas.

own kind. Occasionally great groups of salesmen will be seen gathered together in what experts call "conventions." Little is known about these "conventions" outside the circle of the species although experts are studying the phenomenon and hope to have further information in the future.

TECHNICIAN (Species: *electronus fixus*) Found primarily in the electronic jungles of Asia, Europe and North America, technicians appear domesticated at first glance but are generally free spirits. Because of their unique chameleon-like abilities, they can successfully blend in with any equipment (which makes them hard to capture in the wild). Technicians can be very high strung, and constant interruptions will often lead to petulant fits which can usually only be reversed with a two week vacation in the Bahamas.

How to make your best church sound systems disappear from sight!

Actual Size
Model AT853 Unidirectional
Condenser Choir Microphone

Install Audio-Technica UniPoint® miniature studio-quality microphones

Every congregation deserves the best possible sound, whether at the service or listening to broadcasts or tape. Now you can install superior sound without bulky microphones and awkward microphone stands that intrude on the services.

New Directional Choir Microphone

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

Directional models for altar, lectern, pulpit, plus lavaliers

Four other UniPoint models for use at the lectern or pulpit offer the same clarity, full range, and directional pickup control. Our comprehensive approach to church sound also includes a surface-mounted directional microphone that lies flat on altar, table, or floor. We round out the selection with directional lavalier microphones that solve acoustic problems other lavaliers can't handle. The entire line provides



Model AT871
UniPlate Boundary Cardioid



Model AT857AM
Podium Cardioid

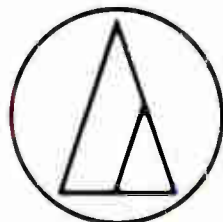
full freedom of movement to the participants, yet the microphone is almost unseen.

Better sound is now smaller, lighter, less visible

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

Our experts are ready to help

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



audio-technica.

1221 Commerce Drive, Stow, OH 44224
(216) 686-2600

Circle 209 on Reader Response Card

The Design Process: Who's the Center of Attention?

by Steven J. Orfield

In the fifteen years that I have practiced as a professional consultant, there has been a constant and ongoing controversy within the design professions with regard to the relative parts played by different members of the design team. A recently completed project for the Minnesota World Trade Center illustrates a project and process that I refer to as "client centered" rather than "designer centered." It is illustrative of what I believe points to the future of one form of design process.

Before providing a background on this project, let me provide a background to the set of issues.

When designing large, specialized facilities, such as conference centers or meeting spaces, there are a large number of players involved, with varying degrees of experience in the type of project under consideration. The design team is normally made up of:

1. Client
2. Architect
3. Interior Designer
4. Mechanical Engineer
5. Electrical Engineer
6. Structural Engineer
7. A-V Consultant
8. Acoustic Consultant
9. Lighting Consultant
10. Construction Manager.

On larger and more important projects, there is a tendency to retain larger architectural firms, which may have many of these players in-house and often have some of the best general talent. It is often true that architectural firms retained to perform these services attempt to provide both the general and the specialized services, but seldom are they equipped to perform the specialized services adequately; thus the specialized consultants are usually independent of the principal design firm and often report to the owner.

Interestingly, it is also generally true that the client's staff is often inexperienced in the type of project under

design. Like the architect, the client will probably not be involved with the same type of project more than once during his or her career.

Thus, this type of project often begins with an inexperienced client relying on an inexperienced architect. The architect expects the client to define the needs of the facility and the client expects the same from the architect. In addition, the less experience the architect has in working with the specific type of project the more reluctant he is to accept specialized consulting, as he does not know the process well enough to interface with the consultant. The potential for professional conflict and embarrassment is high.

While the facilities departments of major corporations have the opportunity to gain experience in the same types of projects, other clients who do not have the benefit of facilities planning departments have more trouble coordinating this type of project. Some signs of this problem are: specifications without performance criteria, an emphasis on interior design over performance, and the opinions that conference facilities are not that difficult to design.

While there is a prevalent view in the design field that the quality of a project is proportionate to the quality of the design firm, the emerging view among in-house facilities specialists is that the success of a project is determined by the quality of the client definition and interaction. One such successful project was illustrated by the Minnesota World Trade Board in building their new Conference Center.

Over a period of years, the State of Minnesota authorized the establishment of the trade board and the development of a local world trade center. The project moved through many preliminary phases, including establishment of a Task Force, Study Committee, Site Selection Board, Governing Board and a Public Corporation.

As part of the push to encourage

trade, the Minnesota World Trade Board determined that an international conferencing facility would be essential to the education and service mission of this board. A decision was made to dedicate a 20,000 square foot area to that purpose. A space was set aside within the largest and newest high rise building in St. Paul, the new World Trade Center. The WTC was developed by the Legislature and Governor Perpich as a vehicle for the expansion of international trade by the small and medium size companies of Minnesota.

Having made the decision to establish this Conference Center, the board retained a large and reputable architectural and engineering firm to provide the architectural and interior design of the conference facility. Many months and many plans later, the board was presented with a number of options and then a "final" interior plan of the facility for approval. Orfield Associates was called in by the board to discuss the plan from the standpoint of acoustical, lighting and A-V design. This informal review was opposed by the architect.

During meetings with the Boards, the architect's written program was requested, to determine the suitability of the design to the requirements and purpose of the facility.

The architect informed the client that no program had been developed to define the facility's use or its potential market. Rather, the architect had been busy attempting to provide a "fit plan" of how an undefined conference facility might be converted into an interior layout within the idiosyncrasies of the building floor plan.

After a brief examination of the plans, it was apparent to the Board and its staff that they did not correspond to a defined view of how the facility would be used or what kind of a facility was needed. It was also apparent that no one had surveyed possi-

(continued on page 63)



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World Radio History

by Steven J. Orfield

PLANIMETERS

In the field of audio system design, there have been many recent innovations in technology, including the increasing use of the CADD system, special calculational and mapping software and constant publication of new design approaches. Interestingly, a small device used principally in the field of Civil Engineering has not yet found its way into the audio design field, even though its utility in the take-off and analysis of architectural plans for sound system and acoustic analysis is quite high.

A planimeter is a small (typically 10" x 10") measuring device which is used for the take-off and calculation of areas on a plan. It is usually rolled around the perimeter of an area in question, and the device then calculates the area via its set of rolling wheels and their changing coordinates. Normally, the planimeter is limited

on one axis, so that it covers a long horizontal axis (or vertical axis) and a short vertical axis (for example 118" x 11"). Thus, the device is sometimes used in a segmented take-off of an area larger than its single pass coverage format.

Planimeters come in two general types, with many variations available in each. The first is a polar planimeter, which measures by the relationship between a fixed point and the area coordinate take-off of the device. The second is a roller planimeter, which allows movement of the entire device in the measurement process. While the first is considered more accurate for some take-offs, the second is far more common and more useful, due to its larger area of coverage.

While planimeters have been available for many years with mechanical operation and user conversion of data

into the appropriate scale the more recently introduced versions include digital read-outs, programmable vertical and horizontal scale and capability to take-off a reduced or enlarged drawing via the determination of the scale by a single reference. Inherent in these capabilities are a number of advantages.

On one hand, the planimeter can be used to analyze free-form room shapes in a fraction of the time required for a more detailed take-off, and the user does not have to be familiar with the process of take-off geometry, such as triangulation and circumference calculation. As the shape becomes more free-form, the planimeter is far more accurate than approximation take-offs. (It even allows for multiple averages of the take-off process.)

On the other hand, many of the standard geometric shapes can be

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taken-off more quickly with the planimeter, if they are more complex than a simple rectangle. In addition, a reduced plan can be sent on a standard 8½" format, such as FAX transmission, and the scale of the plan can be determined by the planimeter for the execution of a reasonably accurate take-off on a non-standard scale size.

In an attempt to quantify the advantage of a planimeter, I selected two plans for take-off, one being a standard rectangular plan and one being an eccentric shaped plan. The comparative times (in minutes) that we came up with in this informal test are noted below:

	Manual	Planimeter
Standard		
Rectangular Plan	22	14
Eccentric Plan	25	6

In addition to the standard take-off uses, planimeters can also provide these functions in many cases:

- Line measurement

While planimeters have been available for many years with mechanical operation and user conversion of data into the appropriate scale, the more recently introduced versions include digital read-outs, programmable vertical and horizontal scale and capability to take-off a reduced or enlarged drawing via the determination of the scale by a single reference.

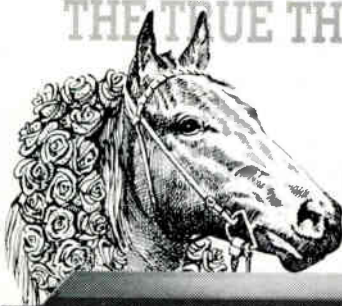
- Non-tracing point-line take-offs
- Transmission of information to computers
- Subtraction of interior areas

Planimeters come in a variety of sizes, and the prices of the Lietz units range from \$335 for a mechanical version up to \$1,995 for a fully computerized, printing planimeter.

The most popular unit supplied for

general use by Lietz is the Planix 7, which retails for \$769. In addition, these devices can be ordered from drafting supply houses such as DATA-PRINT at substantial discounts. For further information, contact a local drafting supply house or Lietz Corporation, 9111st Barton, Box 2934, Overland Park, Kansas, 66201 (913) 492-4900.

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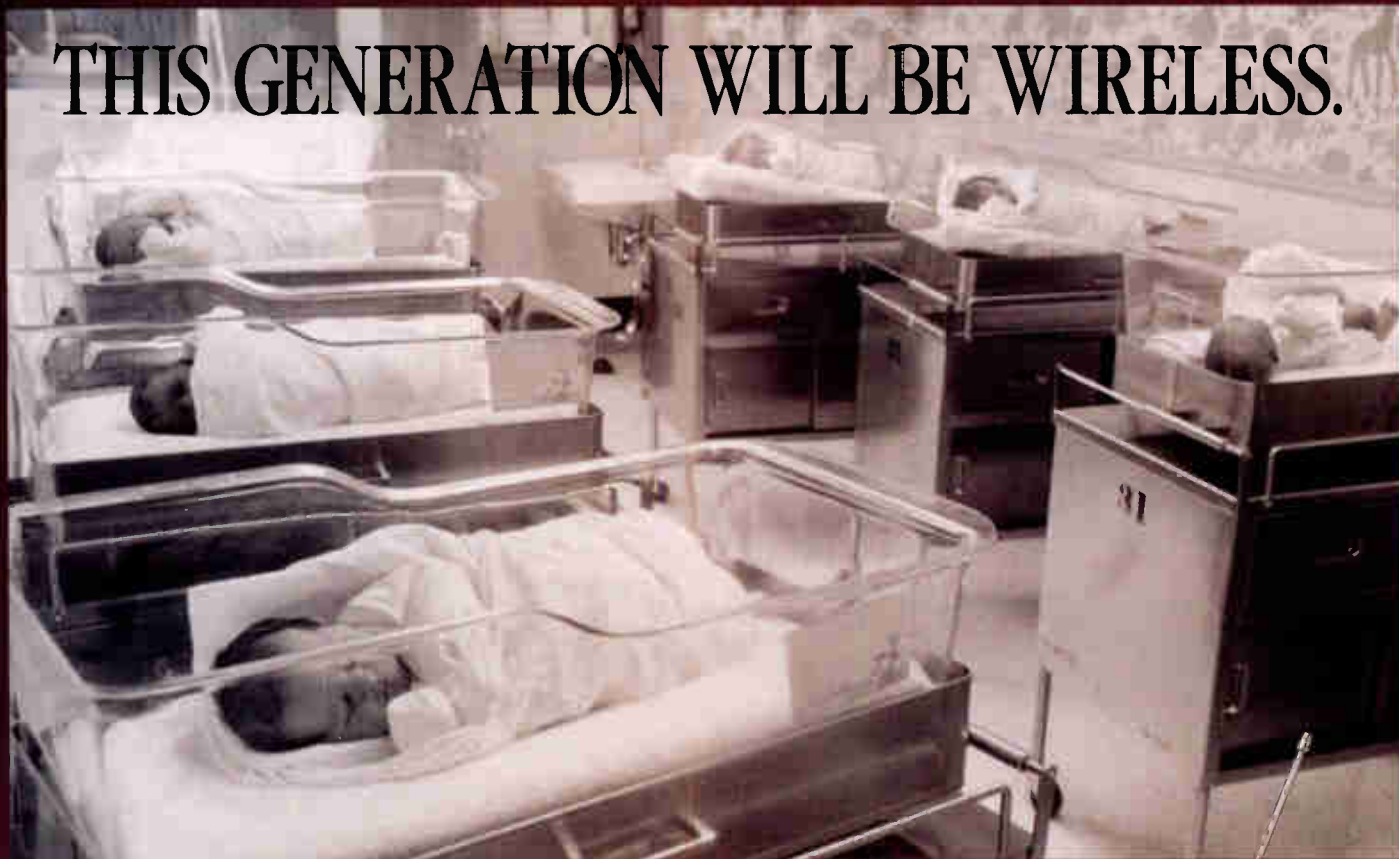
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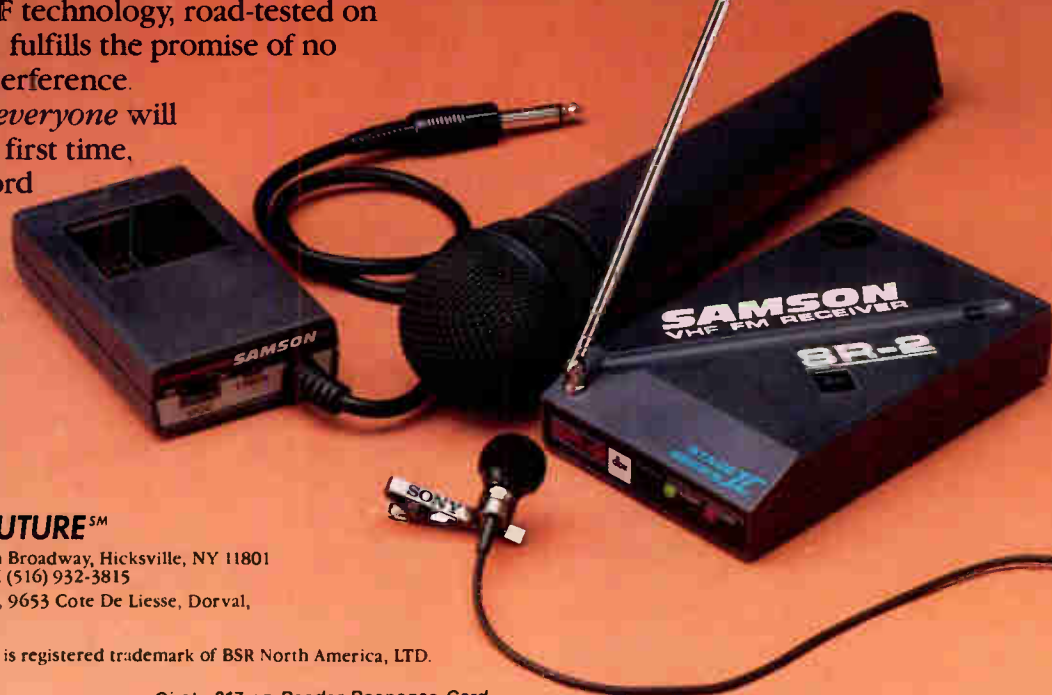
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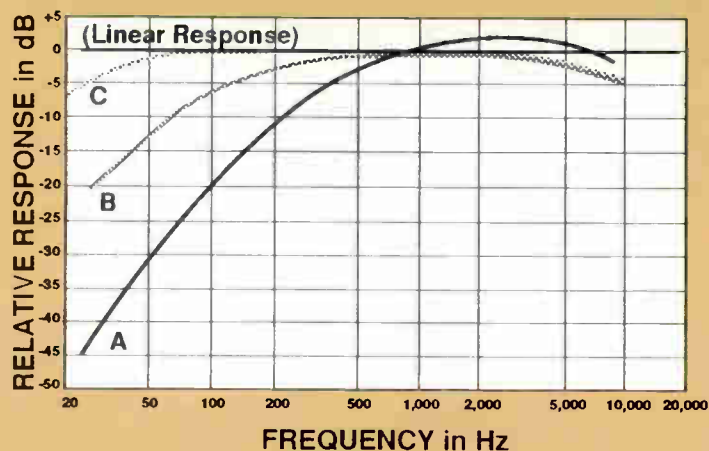


Figure 13. Frequency Response Curves Corresponding to Sound Pressure Level Meter Weighting Characteristics

This installment describes the most common types of test equipment used in setting up and operating sound systems.

A full course in measurement and instrumentation is clearly far beyond the scope of this article. The examples given here represent only a small sample of the possible uses for audio test equipment, and are intended to provide an introduction to the basic prin-

ciples of sound system measurement.

The Sound Pressure Level Meter

The SPL meter is a fairly simple instrument consisting of a calibrated microphone, amplifying circuitry, and a meter movement. Generally, SPL meters employ both switchable ranges and selectable “weighting” curves. As its name implies, the SPL meter is used for measuring

SOUND SYSTEM TEST

by Gary Davis
(A reprint from the Yamaha Sound Reinforcement Handbook)

Editor's Note: The Sound Reinforcement Handbook was written for Yamaha by Gary Davis and Ralph Jones and published by Hal Leonard Publishing Corporation at the end of 1987. The dedication reads: "This handbook is dedicated to the sound reinforcement industry, and to all those people who have worked so hard to bring better sound and music to the world." Sound and Communications magazine is pleased to reprint, by permission, Part II, Section 7, "Sound System Test Equipment." The Sound Reinforcement Handbook is copyright 1987 by Yamaha Music Corporation and Gary Davis & Associates.

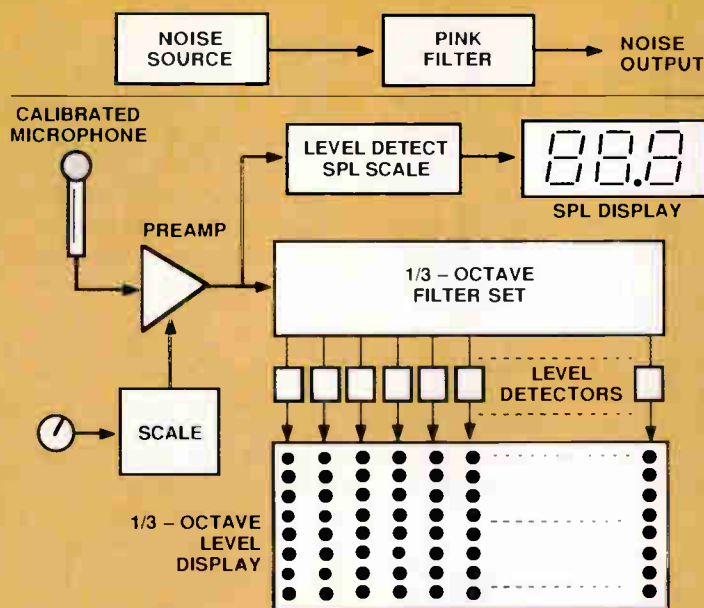


Figure 14. Simplified Block Diagram of a Real Time Analyzer, as Used for Sound System Tests

sound pressure levels in dB.

Four standard weighting curves are used in SPL meters, as shown in Figure 13. The function of these curves is to shape the sensitivity of the meter at different frequencies.

Of the four weighting curves, the two that are most useful in sound reinforcement are the "linear" (or flat) curve,

cher and Munson. SPL measured using "A" weighting is given in dB(A) (or dBA). Likewise, linear-weighted measurements are given in dB(lin).

Most SPL meters offer both "fast" and "slow" response, switch-selected. "Slow" response is achieved by damping the meter move-

T EQUIPMENT

PART II

and the "A" weighting curve. Inexpensive SPL meters may not give a linear curve, substituting instead the "C" weighting curve.

Note that the "A" weighting curve rolls off drastically in the low frequencies. This curve is used to give an approximation of the actual response of the human ear, as determined by Flet-

ment to give an indication of the average sound pressure level. "Fast" response is used to obtain an indication of the peak SPL. More expensive SPL meters may also provide a "peak hold" function, whereby the meter will hold and continuously display the maximum peak reading that it obtains during the measurement. "Peak hold" mode

makes the reading and recording of peak SPL much easier.

The most reliable readings are normally obtained by holding the SPL meter at right angles to the sound source, as far away from the body as possible. Outdoors, the microphone should be pointed upwards. If the microphone is detachable, it may be placed on a stand and aimed directly at the signal source or, outdoors, aimed upwards. These methods are used to minimize the effect of reflections from boundary surfaces and from the body of the observer.

It is important to use an appropriate weighting curve. Often the "A" curve is used, for example, when measuring the road noise in an automobile, which, unfortunately, rolls off a lot of the low-frequency rumble and vibration. This makes some cars which are noisy at low frequencies appear to be quieter. Similarly, the "A" curve is not ap-

propriate for measuring sound levels in the 100 dB SPL range at a concert...the Fletcher-Munson curves indicate the ear is more linear at high sound levels, so the "C" or linear scales would be more appropriate here...though many people incorrectly use the "A" scale for high level sound measurement. "A" weighting is more appropriate for low level sounds, where the curve approximates the insensitivity of the human ear to low frequencies at low levels.

The Real-Time Analyzer

The real-time analyzer (or RTA) may be the most elaborate and sophisticated piece of equipment in the sound man's tool kit. It is used to obtain an instantaneous display of the frequency response of a sound system or signal processor.

The RTA is basically a form of spectrum analyzer, optimized for audio use. It consists of a specified signal source, a calibrated microphone and

preamplifier, signal amplifying and filtering circuitry, and a display. The most common type of display used in RTAs is an array of LEDs, although small, built-in CRT (oscilloscope-like) displays or a video output to a monitor are also found. The signal source normally used is a pink noise generator, although most RTAs will also respond to program material, too.

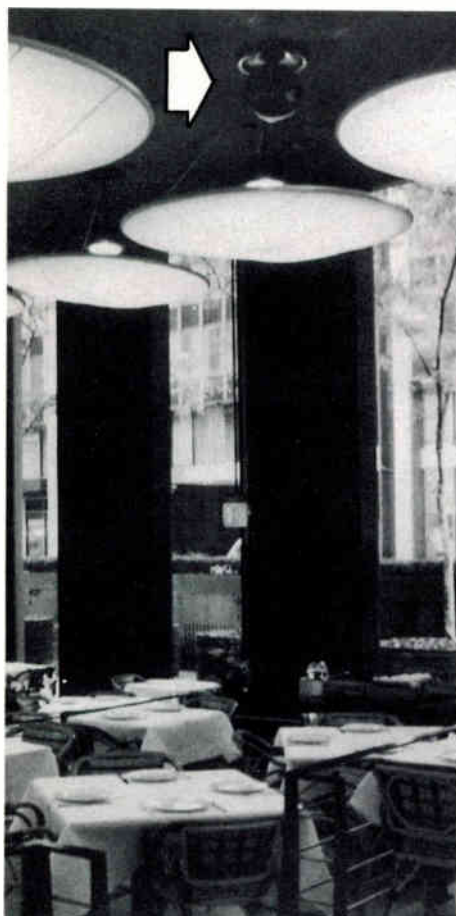
A simplified block diagram of an RTA is shown in Figure 14. The pink noise source is used to excite the system under test at all audio frequencies, with equal amplitude per octave. The output of the system is filtered in bands, usually one-third octave wide, and the signal amplitude in each band is determined electronically. The display is arranged to indicate the amount of energy in each band, as detected at the output of each filter.

When used to evaluate a sound system, with a calibrated test microphone, the RTA is treated in much the same

way as the SPL meter, and the same microphone-handling procedures apply to it. It may be used to measure the frequency response of sound systems at any point in a room or outdoors, to determine the dispersion characteristics of a system. The RTA typically has a line-level input as well, and may be used to measure the characteristics of an individual signal processor or an entire chain through the preamp, mixer, signal processor and power amp (with appropriate padding after the power amp output).

The Loudness Monitor

The classical VU meter, devised some 50 years ago, is a quasi-average reading device which almost completely fails to respond to brief peaks. It was never intended to provide acoustical comparisons between processed and unprocessed program material. About ten years after it was developed, a standard emerged for



"THE SETTING IS A KNOCKOUT"

The New York Times, Friday, October 23, 1987

DINER'S JOURNAL

The forbidding Black Rock, as the CBS Building on Avenue of the Americas at 53rd Street is dubbed, has sprouted an exotic flower called China Grill, an offshoot of Chinoise on Main in Santa Monica, California.

The setting is a knockout—a soaring block-long space with pale jade-colored walls, huge eggshell-colored light shades suspended from the ceiling and a gleaming open kitchen.

This restaurant originally had forty twelve-inch coaxial speakers in its 30 ft. high ceiling. They have been replaced with six #168 black Soundsphere loudspeakers which are deftly hidden between the eggshell light shades. The manager and staff state that the background music is even and "delightful."

Steven M. Rosstad of United States Communications, New York City, is impressed by the sound quality and cost-saving installation. Steven looks forward to using Soundspheres as a "problem solver" in future challenging situations.

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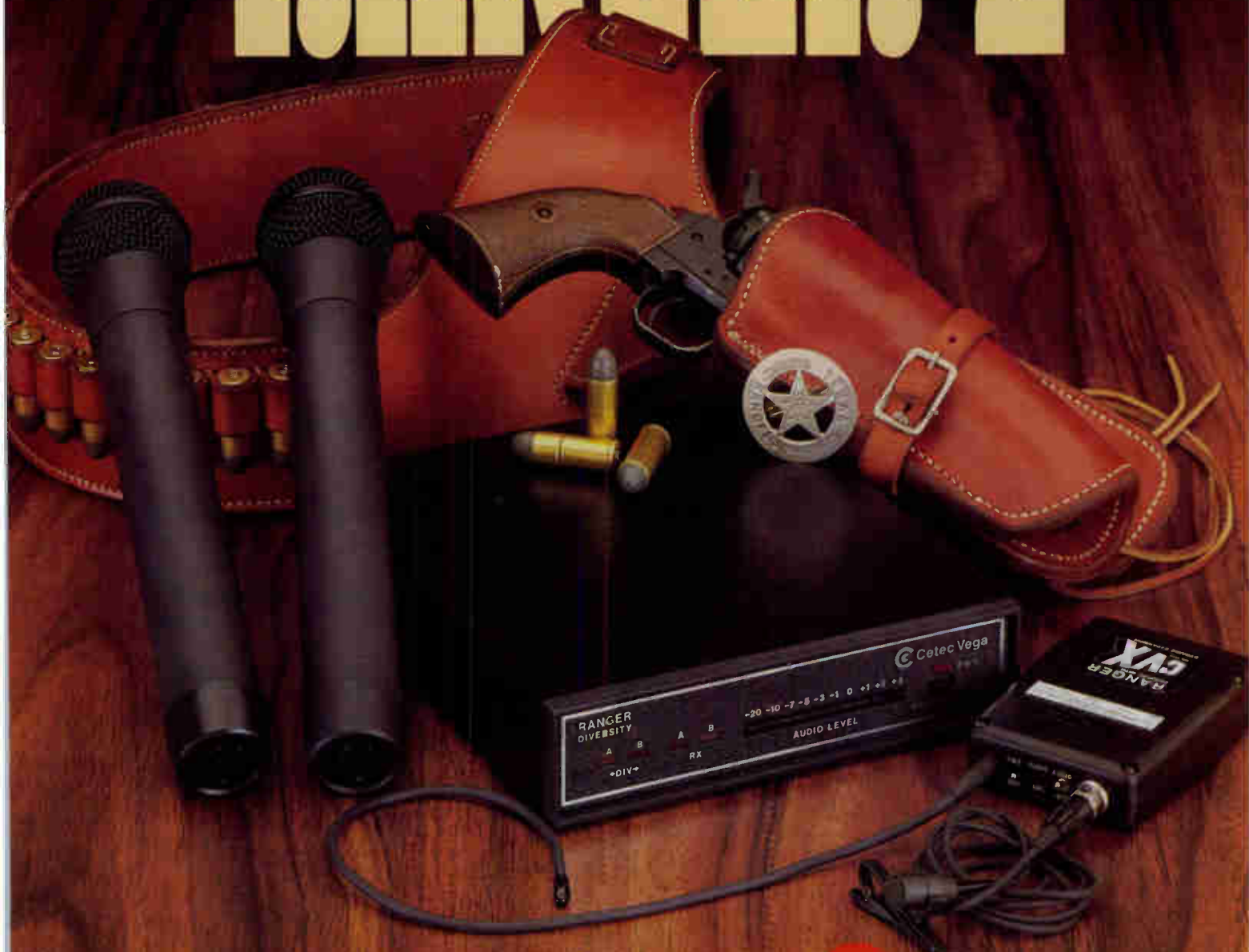
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the PPM, or Peak Program Meter. It displays and holds only the peak level of the waveforms, giving no indication of the average level. In an attempt to provide both peak and average (VU) information to the engineer, some meters have been made which include a peak-responding LED that turns on when the peak level reaches or exceeds a certain threshold, usually from 3 dB to 10 dB below the maximum output level capability of the circuit. The difficulty here is that one never really knows how much headroom exists until the peak LED turns on, and, at that point, the average level may be too high. It is all but impossible to evaluate the results of compression using such meters.

In response to the need for a meter which shows both RMS (average) and peak level, Dorough Electronics of Woodland Hills, California developed a special "loudness monitor." This device vaguely resembles a VU meter, except

the scale is comprised of numerous LED segments. Special driver circuitry activates a continuous bar of the LEDs to show the RMS level, and another single LED to show the peak level. Peak sensitivity is even faster than a standard PPM. This meter thus provides a continuous readout of peak and average levels, and one can visually see the difference (the distance on the scale) between the two, which constitutes a direct readout of the crest factor of the program. You may begin to see more such meters as engineers realize the value of accurate monitoring of both the average and peak levels.

Summary

We have presented here the basic attributes and uses of standard test equipment for sound reinforcement use. To employ such test equipment effectively and obtain reliable results, however, requires far more knowledge than we can

convey here. It is important that those who wish to make sound system measurements carefully study the manuals that are provided with the equipment that they wish to use.

No individual piece of test equipment will yield accurate results under all circumstances. Often the source and load impedances used for measurements have a significant impact on levels, noise and distortion measurements. For example, measuring the clipping level of an unterminated graphic equalizer by connecting it to the 100 kohm input of an oscilloscope may yield an apparent error of as much as 6 dB or more compared to the results if a 600 ohm or 1200 ohm terminating resistor (assuming such a termination were specified for the device) were shunted across the EQ's output.

The frequency or frequencies at which measurements are made can have a major impact on the measured result;

using a simple VOM that is accurate for 120 volt RMS, 60 Hz power mains voltage measurements may yield wildly inaccurate results when measuring 10 kHz audio signals at 1 volt levels. Even the temperature can be a significant factor, particularly when equipment is used in extremely hot or cold environments.

One must know the tolerances of the test equipment; for example, specifying the total harmonic distortion at 0.001% is meaningless when the distortion analyzer has a noise floor that limits meaningful readings to 0.005% THD. And when measuring noise, the bandwidth of the test equipment is significant; usually some sort of filter or corrective equation must be applied or else one will end up with a measurement that includes thermal noise well beyond the meaningful audio spectrum. These are but a few of the factors to be considered when testing sound equipment. ■

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World Radio History

WHO'S DOING FIBEROPTICS?

Fiber optics is still for the most part a technology for the big guys — telephone systems and heavy industrial uses.

Some things are starting to change however. Some consumer electronics companies are beginning to use fiber optics as connections between audio components for purer sound reproduction (the Electronic Industry Association in Japan recently standardized interconnections for this).

At the other end of the technology spectrum, Bellcore (Bell Communications Research) has announced a prototype of an all-optical device capable of switching laser pulses between channels inside a strand of optical fiber at speeds of one tenth of a picosecond.

According to Bellcore, "The speed comes from the elimination of electronic control. In this device, the light signal can be made to switch from one optical channel to another simply by varying the intensity of the light itself. Because light pulses can be generated that are thousands of times faster than electronic signals, this all-optical switch can operate thousands of times faster than any electronic counterpart."

Amidst daily reports of fiber optic video transport systems, submarine cables and other contracts awarded, we see the day approaching when signal transmission via light is the common method of choice.

TECHNICALLY SPEAKING...

by Jesse Klapholz

Handling data with very wide bandwidths translates to lots of data very quickly. The primary consideration is maintaining data I/O operations in both the A/D and D/A domains. Optics come into play when a digital signal is converted into light. The optic chain is basically a path which allows modulated light beams to travel uninterrupted by the environment through which they travel.

The optic cable provides this "conduit" with a manageable loss and deformation of the spectral light balance. In installing these systems we are, therefore, primarily concerned with the cable selection, its installation, and the connector system used. The connectors are the most vital physical link in the optic chain, and are commensurately the most expensive in terms of parts costs and labor. Maintaining the integrity of the light path while allowing for simple field installation present design issues that are still being worked out and improved.

At first, connections were an art involving processes such as "cleaving." Connections have become more expedient to perform in the field. Polishing of fiber ends, preparation of solutions to apply, various resin setters, gels to apply to the fiber ends, alignment jigs, heat curing, etc., are all rapidly becoming simplified, and the total number of steps reduced. While we have

not quite come to the light analog of the XLR connector, recent improvements make the technology more readily applicable to a wider audience.

Besides the obvious use of a connector, amplifiers may be inserted on long lines to strengthen an otherwise lossy signal line. Connections may provide for tees, and other parallel side links too. At the digital end it is up to the sophistication of the software to provide the user with the signals he needs, whether it's data from a home office, a FAX, or a microphone routed to different locations, of course mixed with back-stage cues, and production intercom. The digital and active domains are again only limited by the software and available dedicated horsepower of the processing of the signal.

In this physical world where we are so used to being told there is no such thing as a free ride, light seems to bend the rules somewhat. Passive conditioning of the signal may be introduced with excellent results and a minimum of hardware. For example, lenses may be used to "amplify" the light beam, or—even slicker—a prism may be used to split up the light spectrum into various bandwidths, providing discrete links on one common cable. Multiplexing and finer bandwidth splitting may of course still be implemented in the digital domain.



by Greg Prince

"Let There Be Light," a Higher Authority was once heard to say. And it was good. Along came fiberoptics. For the professional sound business, it could be terrific.

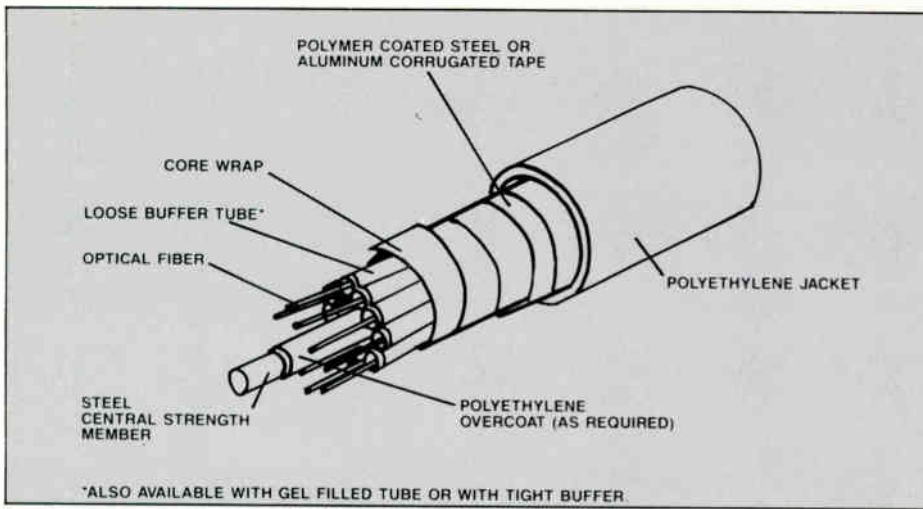
EROPTICS

Theology aside, fiberoptics, which literally refers to the transmission of light through optical fibers for communication or signaling, are sparking an evolution in the way this world gets wired. As new applications become apparent, more optical fiber cables are going to come into use on an everyday basis.

Plenty of people are taking the technology seriously. Fibronics International, the Massachusetts-based information management concern, has invested some \$6 million in an effort to position itself squarely in the growing communications marketplace for mainframe-based fiber-optic networking and related network management products. Intel Corp., a manufacturer of integrated circuit chips, is among the first corporate users of a private Integrated Services Digital Network (ISDN), an internal communications systems using fiberoptics for the transmission of voice and video. In that vein, AT&T recently introduced the Net-Partner Network Management System, specifically designed for ISDN applications at telephone operating companies.

Governments are getting into the act as well. The European Community announced it was willing to spend 550 million European Currency Units, or about \$670 million, to co-finance research projects in advanced telecommunications to help companies enter a world market estimated to be worth more than \$600 billion. The projects involve transmitting voice, data and images quickly and cheaply. On this side of the Atlantic, the Federal Government's engineers have designed the FTS-2000 network to replace an out-of-date phone system that will make bureaucratic chit-chat easier. The network's transmission circuits will carry voice, video and data; and fiber-optic cables are being strongly considered as the transmission conduit of choice.

In the broadcast arena, Capital Cities/ABC has experimented with an intercity



This "outside" cable design is suitable for aerial, duct or direct buried installation.

fiberoptic transmission line between New York and Washington, D.C., over which telecasts have been delivered. And the Grass Valley Group, maker of switching systems, is focusing on the fiber-based transport of video signals at a distance of one to 50 miles.

After following the development and progress of fiberoptic technology in general, Grass Valley's engineers decided to explore new avenues in the broadcasting field with regard to fiberoptics. Direct involvement began with the field test of an engineering unit at the 1980 Winter Olympics. Following the success of this trial, the model 3290 Fiber Optic Video System was established and became the company's first product in the fiberoptic area. Its success led to further research that was directed toward the development of a product family, resulting in the birth of Wavelink, a broadband fiberoptic communications system.

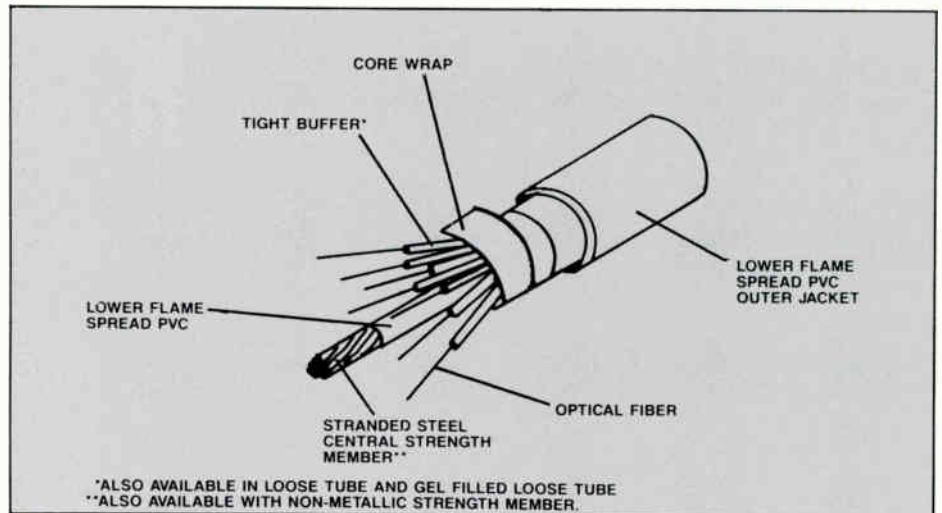
The Wavelink system incorporates the transmission of video, audio, voice channels and data signals using fiberoptic communications. The 3290 provides a 10 MHz channel for transmitting broadband video or other signals. Its successor, the 3291, transmits various combinations of video, audio, voice and/or data signals over a channel of the same 10 MHz bandwidth as that of the 3290. The basic system components of both products are similar: a transmitter, a receiver, a power supply, and a mounting frame. The standard 3291 has optional plug-in circuit boards to accommodate the audio, data and alarm features. The complete 3291 system has been designed to accept future enhancements in a modular arrangement.

Some applications figure to be more popular than the rest. Jack Brouhard, marketing manager of the communications division of Pirelli Cable, points to Local Area Networks (LANs), wherein,

"You essentially have a communications network that is maintained by the users, which could be a future university campus, an industrial park or an office building like the World Trade Center. The signals are not internal. They hook them up to their own local switch and hand that off to a carrier like MCI or whoever."

Businesses with an interest in security should also be interested in fiber, Brouhard explained. "An advantage fiber has is it makes it difficult for someone to tap into a signal," he said. "Light passes through the center of the hair and acts as a barrier. There isn't much there to begin with and the flow goes straight from point A to point B. That makes it useful for banks or companies worried about transmitting personal or private data. It's not foolproof, but it would be difficult to tap in because the system would likely come to a crashing halt."

There is a veritable laundry list of advantages fiberoptic cable has over the coaxial kind, not to mention satellites.



Prototype "inside" cable is more flexible and easier to handle.

Among the pluses are greater bandwidth, size and weight, signal loss, freedom from electromagnetic interference, time differential, confinement, safety and lower cost. Although the cost of a one-meter length of high-quality fiber is generally higher than the cost of an identical length of copper wire, comparing price tags is inconclusive.

The amount of data that can be transferred from one point to another via one fiber can be the equivalent in communications value to 900 strands of wire. Then there are additional advantages that tend to justify the higher initial cost, such as the increase in security and the elimination of cross-talk. And, as demonstrated in the past year, copper is susceptible to drastic inflation.

In calculating the overall costs of a fiber system versus a conventional wired system, the reduced handling costs brought by the smaller size and lighter weight of the fiber should be considered, as should the elimination of expensive shielding, the reduced number of repeaters and the reduced likelihood of having to repair or replace a building damaged by fire or explosion. The advantages of fiberoptics will often more than justify any added costs.

So why hasn't everybody and everything been converted to fiber? For one thing, Brouhard noted, there is a lack of an international standard for transmission, though that may be less than five years away. Also, there are still countless miles of coax wound around the land that are working pretty well, and the replacement process will be a slow one.

"Fiber is not quite a consumer product yet," Brouhard said. "But it is a kissing cousin." Time Inc.'s American Television & Communications is using optical fiber in its delivery of cable TV, for example. There is not yet a fiber cable

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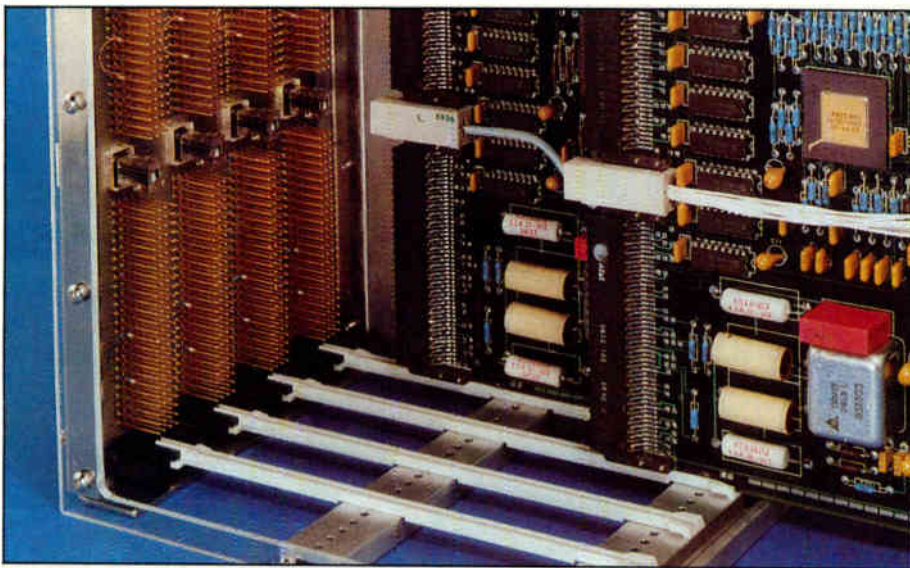
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Multi-fiber array connector connects circuits with optical fibers. (Reprinted by special permission from the AT&T Technical Journal. Copyright © AT&T 1987.)

that is practical enough to work with a microphone, but Brouhard estimated something like that is not far off. In half a decade, he said, fiberoptics should play a role in about 20 to 25 percent of the telecommunications industry.

One of the keys to remember when handling fiber cables is you are handling something durable yet fragile. Long-

distance transmission systems use fibers with glass cores. Most long-distance fibers also have a glass cladding which is an integral part of the fiber construction. These are frequently referred to as "all-glass" fibers. "They're fairly robust," Brouhard said of the cables, "but you have to be careful. They're susceptible to tight bends and being crushed if some-

body is standing on them. Coax is a lot more forgiving."

"There are physical aspects, in terms of handling it, that make it different," said Ron Stier, marketing manager for Belden Wire and Cable. "As we are in a full fiberoptic modality, we are undertaking a major program for our distributors that includes training and the knowledge it takes to connectorize the cables.

"I liken it to the days when sound contractors were unique people to have on a job site," Stier continued. "They were the only people qualified to work with two-gauge electrical cable. The next stage with fiberoptics has to be handled differently as well."

Different but not difficult, if one takes time to learn and understand the vagaries of installation and connectorization. (Both Pirelli and Belden offer plenty of literature on the subject.)

One of the main differences is in the types of cable constructions. Tight-buffer cables are best suited for moveable or deployed applications. Tight-buffering uses the advantages of glass or plastic core flexibility to make compact resilient cables. Fiber structures are usually encased in jacket materials that are resilient and tough, such as polyurethane. The

(continued on page 66)

Interactive audio mixing technology has just taken an 8-second leap forward

Introducing Numark's DD-8000 and DD-4000 8- and 4-second samplers with built-in digital delay.

A two-second sampler by most standards is a small engineering feat. An 8-second sampler with better-than-CD quality sound and digital delay, is a major leap forward in technology. Numark has taken that giant leap forward with the new DD-8000 and DD-4000 samplers with digital delay.

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Coca-Cola

BECOMES CLUB SODA

By Greg Prince



One club soda with dry ice — coming up.

Soda and dancing have at least one thing in common. Some people can't get enough of both. So for the folks who have thirsts to quench and booties to shake, there is now Club Coca-Cola, a traveling audio and video extravaganza sponsored by the Atlanta-based soft drink giant to raise money for the Special Olympics. It's a project that involves serious stepping, serious sipping as well as a serious subject.

Club Coke, as it is chummily known, presented a serious challenge to Brian Winthrop International, a leading entertainment agency that books shows and lectures on college campuses all over the country. What Coke wanted were, in effect, several discos-on-wheels that would go out every weekend to high schools and colleges in the name of a worthy cause.

But just because they take place at schools (for the most part) doesn't mean the attendees have to be reminded of homework or lab. "When they walk into a high school gym for this, they shouldn't be able to tell it is a gym," Winthrop

What BWI president Brian Winthrop set out to deliver was the real thing.

"What we have is a total of six clubs, actually," said Winthrop. "Four small and two big. Coca-Cola came to us in August to talk about test marketing something like this and we had it together within three months."

CWI had previous experience in such undertakings when it produced the touring Wild Video Dance Party, similar in form to Club Coke. Winthrop believes the success of both projects stems from a continuing need for affordable and fun campus entertainment.

said. "And they don't."

Panasonic Ramsa equipment is at the heart of the Coke operation. BWT had good luck using Bose speakers during the Wild Video days, but Ramsa took a load off the backs of those assembling the system with 35-pound speakers. "The lightness is the beauty of these speakers, especially when you're talking about 150 dices a year and four amps in each rack," Winthrop said. "It makes things so much easier."

Since Winthrop viewed the opportunity to create six dance clubs as "a fantasy," he decided to cut loose. The smaller shows, geared for high schools and small colleges and military bases are video-oriented with the centerpiece being a JPT 301 screen. Winthrop noticeably lights up when describing it. "It is an incredible screen," he said. "At 300 square feet, most people have never seen anything like it, outside maybe the Ritz in New York or a major rock concert."

Also included in the 25,000-watt system are eight Ramsa 200 and 240 subwoofers and 12 ParCan 64 lights, each of them 500 watts strong. Gemini strobes add effects as do Roscoe ellipsoidal images—designer patterns and illusions which help perpetuate the feeling of an exciting new world. All that plus plenty of fog from Martin foggers.

The larger systems have been scaled down since their inception. "We carried around a five-ton floor and it was just too intense for people," Winthrop said. "We had 24 240s and 20 200s. It was all too powerful and wasn't necessary. We broke them down into two mid-size systems with 12 240s, 8 200s and 8 A70s. Instead of taking six to seven hours to set up, it now only takes about three." The smaller clubs, he noted, only take an hour and a half to put together.

Those two megaladiscos go to the larger colleges and military bases in addition to special event sites like Daytona Beach for spring break and, tentatively set, Seoul, for the Olympics in September. The emphasis at the big shows is on a DJ and not a VJ as it is at the junior productions.

Winthrop wants the sound to literally surround the partyers, so he set the height of the speakers at well below the club norm of nine feet. "Our speakers start at 5½ feet with the horn at 6½ feet. That's the size of most people and it's better than having the sound come down at you from way above your head."

Not to be underestimated in the scheme of Club Coke is how well the nightly setup and breakdown must flow—namely as smooth as an ice cold you-know-what. Winthrop saw to this with special scaffolding. "The basic shows tour with one lighting guy and a VJ," Winthrop

explained. "At every school there are supposed to be four students to assist in putting it all together. Sometimes, you'll get four sorority girls. No matter what, you gotta make it simple. The scaffolding is upright and erects into eight 15-foot towers in about four minutes each and folds in nothing flat. It has really nice rubber wheels." From these instant towers hang the lights and special effects that create the rainbows and such that envelop the dance floor.

"When the strobes, the foggers, the laser beams the moonflower effects and everything gets going, and the DJ, as the song says, pumps up the volume, it's really hot," Winthrop exclaimed.

Quality control is an essential, according to BWT's top gun. "That mainly consists of me yelling at the VJs and DJs," he joked. Generally, the biggest concern on a nightly basis is making sure light bulbs are replaced and the projectors work. Music and video playlists are updated regularly. Maintenance is an important part of the Coke project, which Winthrop estimates has cost in the "high hundred thousands" to produce. Sometimes, though, it's the little things that present the biggest problems.

"Universities have lots of power, but high schools don't," Winthrop explained. "Initially, we were plugging five different 100-foot extension cords into the gym's fuse box and popping fuses. All they had were 15-amp fuses. Now we plug the Spectrum supply board into the main electricity at the school."

Winthrop's goal of "hypnotizing" dancers with lights, sound and effects is not deterred by Coca-Cola's promotional efforts which are fairly unobtrusive despite the presence of an inflated 40-foot-high soda and the ubiquitous Max Headroom on monitors. "At every school we've played, the reaction's been, 'Wow, we weren't expecting this!,'" Winthrop said.

"We're getting over 30 percent of the student body attending in a lot of high schools, which is phenomenal," Winthrop said. "We're even outdrawing the proms in some places." He noted with pride that not a single fight has broken out at a Club Coke venue, a fact he attributes to the selection of the beverages on hand. "It's amazing what not having alcohol means," Winthrop added.

BWT has six people placing the shows nationwide and plans to call for two more Club Cokes to hit the road later this year. By turning high school gymnasiums into nocturnal hot spots, Winthrop has not only (as Mr. Headroom would say) caught the wave, but he has helped set it to music. ■



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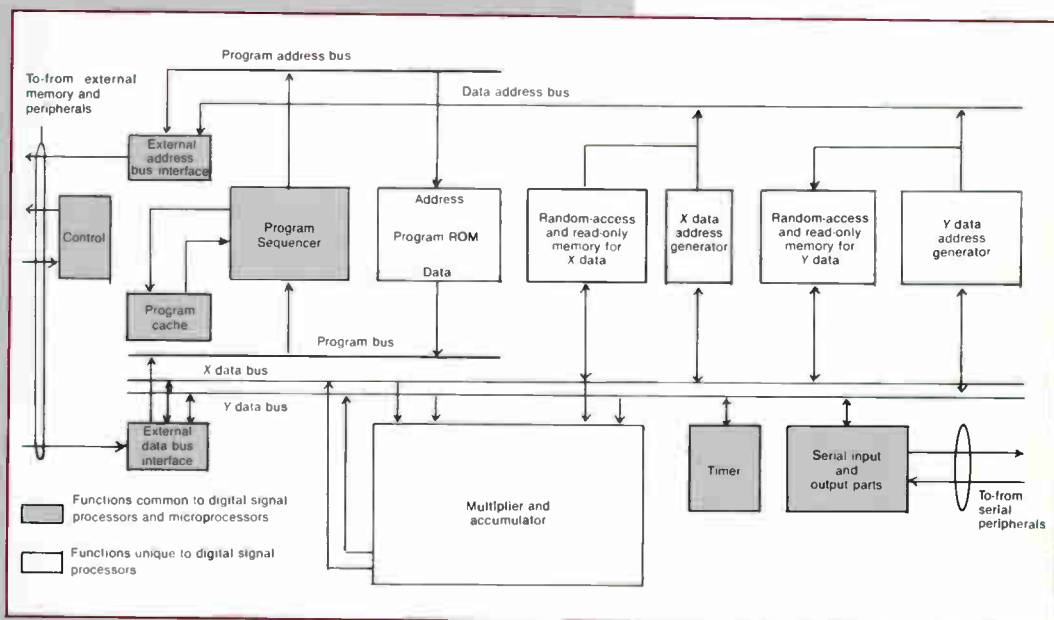
The message needs to be clear. Whether it is delivered by the singers in the choir, the gentle voices of the flutes in the orchestra, the crisp, clean notes of the piano or the spoken word. And the message must be just as clear in the back row of the balcony as it is in the front, without being loud, harsh or irritating. Tannoy loudspeakers possess a significant advantage. Their unique, world-renowned Dual Concentric drive units deliver sound which is smooth, pleasant and musical. Great sound makes all the difference in the world. And Tannoy is making that difference for the people at World Harvest Church, Bethany World Prayer Centers, Jimmy Swaggert Ministries and countless others worldwide. For natural, transparent sound reinforcement, from a whisper to a joyful noise — Tannoy.

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DSP: LOOKS INTO THE FUTURE

By Jesse Klapholz



Courtesy of IEEE SPECTRUM

DSP is now one of the most used buzz-words in audio, since the word digital itself has become so overused. By now everybody understands the basic ways in which an audio signal is transformed into a digital representation of an almost infinite number of slices of time-domain waveforms into corresponding sequential values in a series of representative numbers. Each point in the waveform has some value between 0-125 for a positive value, or between 126-256 if it is a negative point along the sampled waveform (for example in an 8-bit system).

Everybody knows by now that 16 bits is all you need for most musical and speech applications, and everybody

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*IEQ Video Monitor Features

- 19" rack mountable
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It Has To Be A Work Of . . .

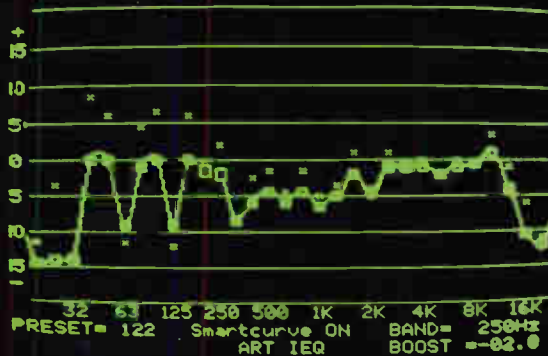
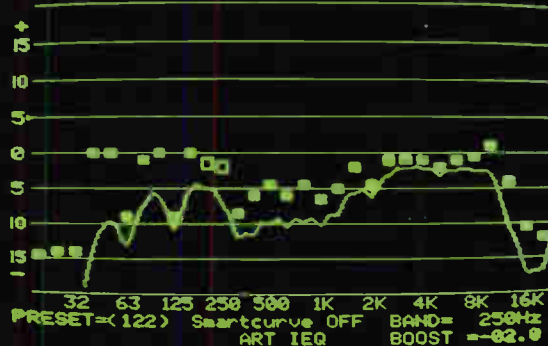
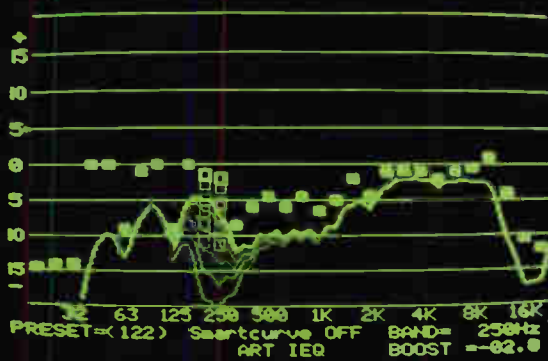
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1 See the Sound

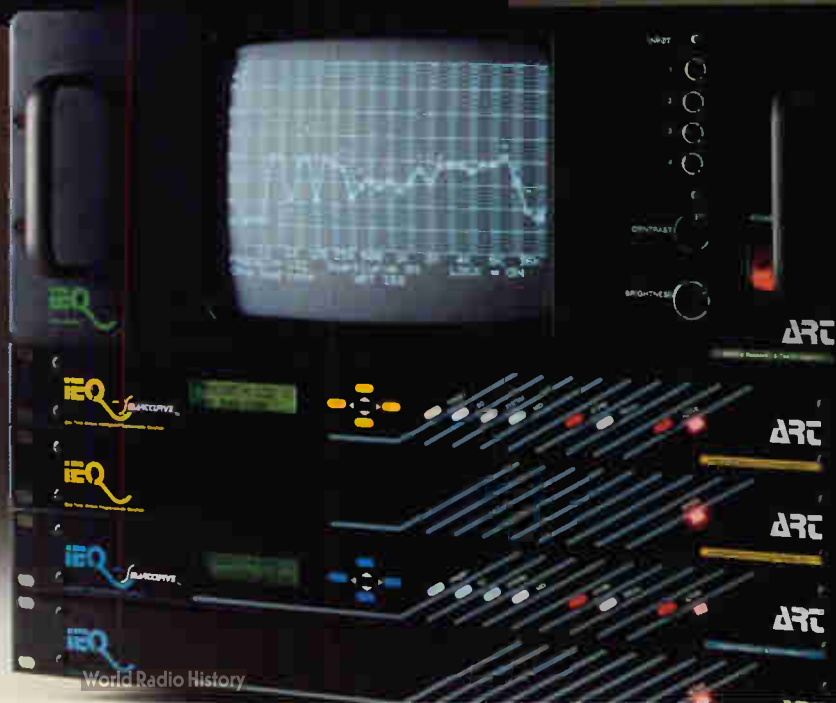
This is a video output of the IEQ as the unit is being adjusted. The sliders can be moved \pm 15dB in 1/2dB steps to get the exact response you need. With the simple push of a button, complex equalization can be done in seconds with incredible accuracy.

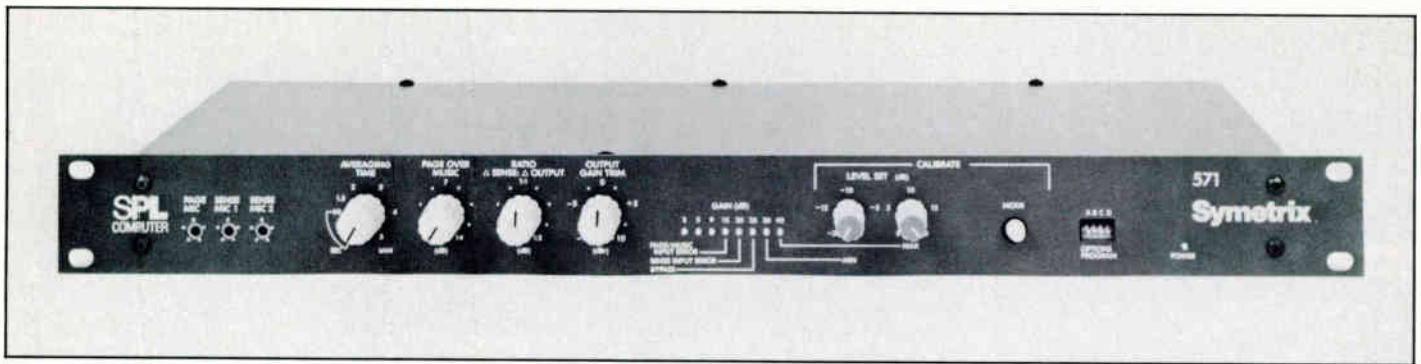
2 Hear the Sound

The power of the IEQ readily becomes apparent as the video display plots the frequency response due to the slider settings. The IEQ offers high quality constant Q equalization. The video graphic display shows the correlation between the sliders and the frequency response.

3 Perfect Sound

Turn Smartcurve™ on and perfect equalization is at your fingertips. Note the difference between the second frame. (Smartcurve™ OFF) and this frame. The position of the sliders represent the actual frequency response of the EQ. Interaction between bands is virtually eliminated. Incredible! Just think, now when you adjust the EQ you get exactly what you need. The perfect EQ? Let your eyes and ears decide.





The Symetrix SPL Computer combines DSP and analog processes.

knows that all the problems of analog-to-digital and digital-to-analog conversion have been solved, since we are in our third generation of CD playback technology. Since personal computer technology is rapidly becoming another household type appliance, the manufacturing costs and technological versus cost benefits to the end-user are becoming greater all the time.

Take these two given statements that we all agree on, and combine them with the knowledge that any frequency-domain event has a reciprocal descriptor in the time-domain. Voila, we have reduced all of the complexities, textures, and nuances in music and speech to a numbers game—something that can be programmed by the average sixth grader of today. Enter DSP.

The term DSP is most often used in academia and in the general electronics industry to indicate a process whereby a stream of numbers—that happen to represent some audio, or series of complex audio, events in time—are fed through a dedicated number-crunching computer. And under a set of instructions, mathematical computations are performed on the bit-stream; the results are output as raw data.

The term DSP, however, may sometimes be taken to mean an electronic unit that performs some aspect of audio signal modification, and happens to incorporate some sort of digital circuitry. This second meaning does not really comply with what most of the world defines as DSP. But it does not mean that this type of circuit is inferior to DSP. In fact, the marriage of digital circuitry and good basic analog processes is not only viable in many situations, it is superior in some instances.

Back to the number crunching we just mentioned. Since we have this whole generation of computer whiz kids that can out-program the pants off many extensively experienced and seasoned pro-

grammers, lots of programs and algorithms have been developed to work in the DSP domain. Filtering, dynamic control, tone modification, simultaneous level control and routing, effects, and enhancements are just a few examples of the manipulations that can be performed to a digital bit-stream as it passes through a computer using digital signal processing.

Thought you'd never ask. You say that when you run a typical spreadsheet, with not all that many computations, there is a definite waiting period—even with your hyper-speed RAM card and time-warp accelerator board working in concert with the obvious one gig of RAM, 64-bit micro, and other associated pipelining processors. Every computer from the simple hand-held types to the cutting edge technology of tomorrow's supercomputers have a definite measurable time to complete a given set of processes. It all depends on how long one is willing to wait for the results.

In the analog domain, the results of these frequency-domain manipulations happen in real-time by definition. However, in the digital domain, there is an absolute time that it takes to multiply numbers—the bigger the number, and the more complex the number of mathematical operations, the longer it will take. The factors of the total mathematical operations and the bandwidth (or sampling rate) of the signal will determine the amount of computational power required for the desired time. Technically this is referred to as the real-time bandwidth. This is loosely comparable to the "is the glass half-empty or half-full" analogy. Instead of de-rating the system's computational time performance, the time performance is kept at a real-time number and the bandwidth is restricted. There are a lot fewer samples to numerically massage.

To sum up to this point: There are specifying factors of finite throughput-

time versus bandwidth, the numerically-based tasks to be performed, the software program that executes the appropriate series of computations, the hardware that

Defining Terms

Arithmetic-and-logic unit (ALU): the component of a processor that performs addition and subtraction, as well as logical operations like AND and OR.

Control word: a series of bits whose contents provide directives to control the operation of microprocessor computing elements.

Floating-point mathematics: calculations on data elements represented as a fixed-point or fractional component and an exponent; such calculations assure a specific degree of accuracy for values over a wide numerical range.

Microcode: the lowest level of instructions that directly control the interaction of a processor's computing elements—that is, machine instructions wired into the hardware that is being controlled.

Pipelining: a method of parallelism in processing in which execution of a new task is started before the preceding task is completed.

Register file: a small area of memory in which several data elements, or registers, can be accessed simultaneously, rather than one by one.

Scaler operations: mathematical operations performed on random data elements rather than on sequential data elements.

Sequencer: the component of a processor that controls the program flow by implementing branches for subroutine processing and handling interrupts.

Vector processor: a processing unit whose architecture is optimized to perform mathematical operations on sequentially ordered data, known as vectors.

Courtesy of IEEE SPECTRUM



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PHMAS to power up to 32 sets of headphones, while its 4 inputs, complete with volume and pan controls provide you with total flexibility.

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If you need extra inputs, the PHEX-8 gives you 8 more, bringing the total to 12. It interfaces directly to the PHMAS via a special jack which provides power and audio signals for the PHEX-8.

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The MIX-5 is U.S. Audio's single-space rack mountable five channel monophonic mixer. Four balanced low microphone or four high impedance/line level inputs and one summed stereo auxiliary input, plus a ten-segment LED level indicator combine to make the MIX-5 a welcome addition to anyone's "audio toolbox".

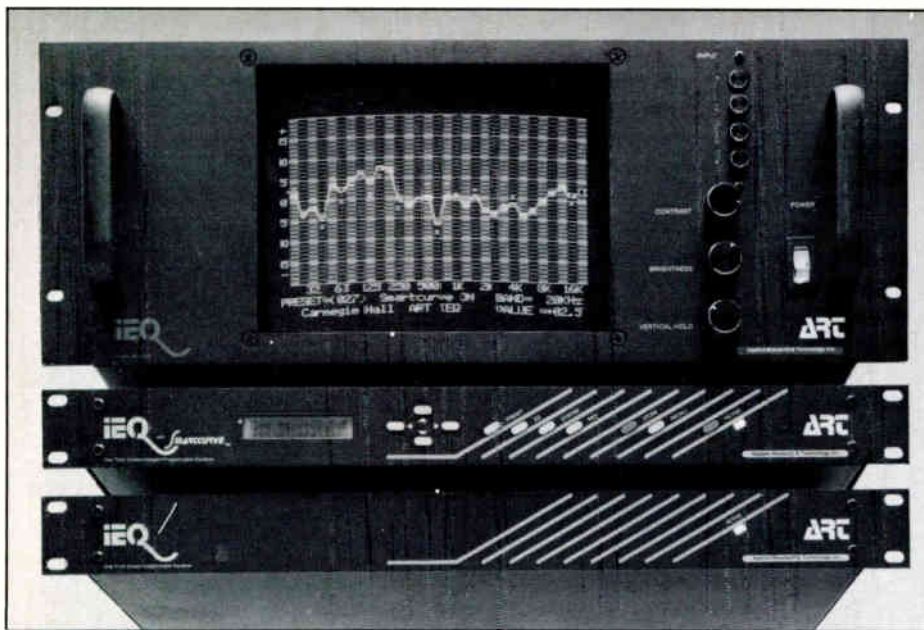
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ART's IEQ has artificial intelligence based software that controls the equalizer, supports MIDI and provides various other outputs.

handles the data flow, and the hardware that actually performs the computations. Various audio signal conditioning functions that are normally handled in the analog domain using frequency-domain models have been modelled as time-domain functions using mathematical models for years. You know, all those papers that appear in the journals, and in these pages with all the funny Es and Ss.

The software basically takes these various mathematical models and streamlines their execution with algorithms, dividing the functions to be performed among different parts of the digital circuit that are most suitable for the particular operation. Because there are so many different types of mathematical procedural possibilities, more than just your plain vanilla wrapper micro is necessary. General purpose DSP chips, specialized application DSP chips, and custom configurable DSP chips are some examples of the kinds of circuit components currently available. These are used in conjunction with the digital audio circuitry, the microprocessor itself, general purpose math co-processors, multiplier-accumulator chips, and even other array and pipelining processors.

As one can imagine, the software and hardware possibilities are becoming so complex that the design is not possible by a small group of engineers—at least to make a cost-competitive product. Applications in allied fields of communications, speech and voice recognition, and video are creating a growing demand for the development of increasingly more

powerful components, software, and systems. These systems can typically perform a complex mathematical operation within a single clock-cycle—as opposed to 20 to 30 clock-cycles on a conventional computer for an even simpler operation. These processors are currently running well below the 100 nanosecond range. Real-time bandwidth for video processing takes a lot of big numbers, processed quickly. These applications afford audio designs support in systems, components, and tricky techniques.

A whole new art is quickly developing; one that is being developed and led by industry—not academia. Major labs like AT&T, Texas Instruments, and Motorola are carving new territory in these math chip technologies. New applications are supporting the intensive work of thousands of programmers to develop new algorithmic techniques and clever ways of working around the shortcomings or limitations of specifically price-bracketed chips. At times, the goal is to squeeze more nanoseconds out of a \$3 chip than the competitor can, and the more cleverly implemented algorithm just might do the trick.

Myriad chip architectures are being developed that range from the basic multi-data path, RAM buffers, instruction path/cache to the more complex multi-instructional, instruction looping, 64 k byte + fast RAM accessing, hierarchical addressing and task designations, auto overflow handling, multiprocessor hand-shaking, and much much more. Defense, aerospace and telecommunica-

tions applications are adding incredible fuel to the DSP fire raging at labs all around the world. ISDN and other allied forms of computer communications systems are also creating a significant demand on DSP hardware and software development. Computer aided design and engineering, image processing, and consumer digital products in both video and audio will also play a more prominent role as new standards for high definition television and newer video standards are finally adopted globally.

Another outgrowth from this DSP stuff is newer languages more suitable to address these DSP chips and systems with streamlined and more efficient coding than current languages. Compilers and other assemblers are being developed that work more efficiently in these math intensive programming schemes that become so complex that the average college trig prof would have to scratch his head for a while before throwing his hands up in defeat. The key word here is defeat, because these new DSP components and systems are quickly defeating the current programming languages, and creating even more powerful systems and environments.

Digital audio may not be perfect, computers may not be perfect, and programmers may not be perfect. However, with so many of us audio refuseniks complaining to the marketeering guys, digital just keeps growing, and getting better, more powerful, and more cost competitive than the analog technology it is replacing. Manufacturers are starting to realize the benefit of creating a black box that can be 20 different models by simply plugging in different models by simply plugging in different programs—or even coming out with next year's model as simply a software update. The computer industry is starting to rub off on us; we just take a while.

If this brings illusions of audio engineers being replaced by some young computer whiz kid, that may be a lot truer and sooner than we may all suspect. But don't be shocked when you approach a real hard-core DSP'er and he says, "Audio, hah, that's too slow and simple an application for our product line!" Many of us kiddingly scoff at the day when the "black-box" approach will simply be one of a chain within a computer system that has its own on-board powerful computer, executing the newest version of artificial intelligence based software. Call this dribbleware, vapoware, or dreamware—but it's coming to a theater near you real soon.

The MAIN ARENA of the COW PALACE, San Francisco

By Charles J. Catania

Installation Profile

COW PALACE HISTORY

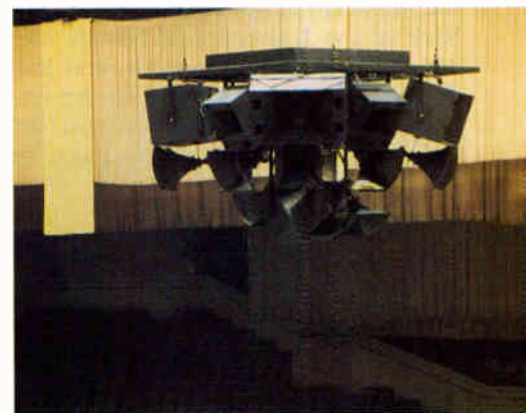
First opened to the public in 1941, the Cow Palace has become one of America's best known convention, meeting, and show places. The irony of the timing of building this great showplace did not go unnoticed by newspaper reporters, such as one who reported, "While people all over the country are starving, out in San Francisco they're building a palace for cows."

In the early 1930's, at the height of the Great Depression, this immense construction job got underway. It was to be a vast livestock exposition hall built for the benefit of California's substantial agricultural industry. The mammoth

structure straddles the line between San Francisco and San Mateo Counties.

The Cow Palace was opened the night of November 15, 1941, with the first Grand National Livestock Exposition and Rodeo. As a matter of fact, the hall was originally named "First Grand National Livestock Exposition and Rodeo." Too much of a mouthful for the press and public, it soon became known as the Cow Palace, a name that was adopted officially a couple of decades later. The vast pavilion was inaugurated and dedicated with the late great jazz band leader, Paul Whiteman, who turned judge for the opening night walking horse competition.

Over the years, the Cow Palace has be-



come home for many annual events, including sports, entertainment spectacles, exhibit shows, concerts/musical events, conventions, trade shows, and other events. It has featured concerts by famous artists from Elvis Presley to Prince. Some of the current annual events include the Grand National, the Trans-america Open Pro-Tennis Matches, San Francisco Sport and Boat Show, Golden Gate Kennel Club Dog Show, Ringling Brothers' Barnum & Bailey Circus and Ice Show, and many others.

SOUND SYSTEM DESIGN

In April 1987, it was decided to explore the possibility of replacing the existing

84 feet or 25.6 meters
 With JBL 2445J
 With 100 watts to driver:
 dB increase in output =
 $10 \star \log (100/1) = 20 \text{ dB}$
 dB loss over 25.6 meters =
 $20 \star \log (25.6/1) = 28 \text{ dB}$
 $111 \text{ dB} + 20 \text{ dB} - 28 \text{ dB} =$
 103 dB at side seats

A JBL 2445J HF driver with 2360 (Bi-Radial Constant Directivity Horn) 90 by 40 degree horn was selected for the short throws. A minimum of 100 watts per unit was required, so Altec Model 1269 in standard mode (two channel), 120 watt per channel power amplifiers were used.

Similar calculations using two JBL 2225H/J 15" woofers showed that with 200 watts to each unit, 86 dB would be achievable at the farthest corners. Other calculations showed that 90 dB would be available in most other areas. It was very unlikely that more than this low frequency level would be required. This was borne out when the finished system was adjusted and equalized. Altec Model 1269 power amplifiers in Bridged Mode, 400 watts into 8 ohms, were used to supply power to two 16 ohm bass speakers in parallel in each corner cabinet. Other amplifier output-to-load matches were

used, depending on the length of throws. (See Figure 3, the one line wiring diagram.)

The next phase of the design was a study to determine the coverage patterns of the selected horns and drivers. The author used a Mapping Program that he designed for the IBM computer. The program was based on Altec newsletters and seminars, and previous work for the Apple computer by Belew Sound. One example of this mapping, the long throw to the east end, is outlined below:

The parameters fed to the computer for this throw were as shown in the computer verification readout, Figure 4.

The 9 tick marks on the Latitude-Longitude Map represent the computer calculated dB loss points with relation to 0.0 dB, the furthest throw to the top center of the respective seating area, shown as #1. For convenience of identification, the ticks have been numbered 1 to 9.

The dB values shown within squares are the computer calculated relative values, and the dB values shown within circles are the resultant direct SPL values with the horn on-axis AIM point, directed to the point that gives the most even coverage in the respective seating area. The resultant values are obtained by

using a horn overlay pattern that shows the 3 dB, 6 dB, and 9 dB down point, to the same scale as the map. In this example, the off-axis SPL at point #1 was -2 dB, so $0 \text{ dB} + (-2 \text{ dB}) =$ a relative SPL of -2 dB for that location. The off-axis SPL at point #9 was -2.5 dB; therefore, the combined result of a 2.5 dB INCREASE due to closer proximity to the horn, and the 2.5 dB LOSS due to the off-axis SPL at point #9 combine to give a relative SPL of 0 dB. The map shows that from the closest seating, to the center, the Aim point in this example, and to the farthest center seating in this coverage area, the direct SPL varies from 0 dB, to +1.3 dB, to -2 dB, a total variation of only 3.3 dB.

ELECTRONIC DESIGN. Three White Model 4400 28 band 1/3 octave equalizers with 800 Hz crossovers for bi-amplification were used in the system. The loudspeakers covering the East and East down were equalized as a group; the loudspeakers covering the West and West down were equalized as another group; and the North and South side shorter coverages were equalized as a third group.

A two pushbutton (lighted) system was designed to operate relays that configured the sound system to operate as follows:

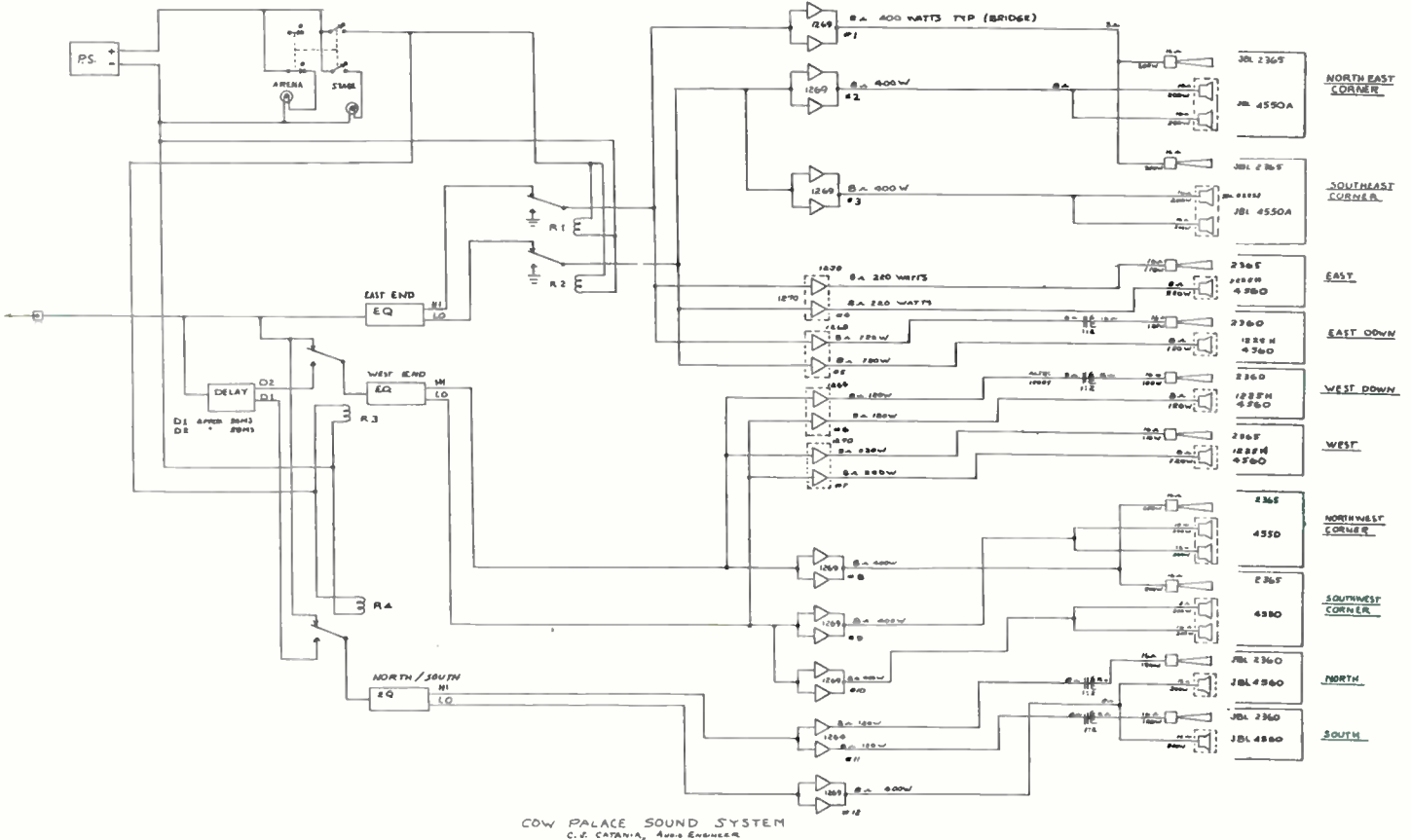
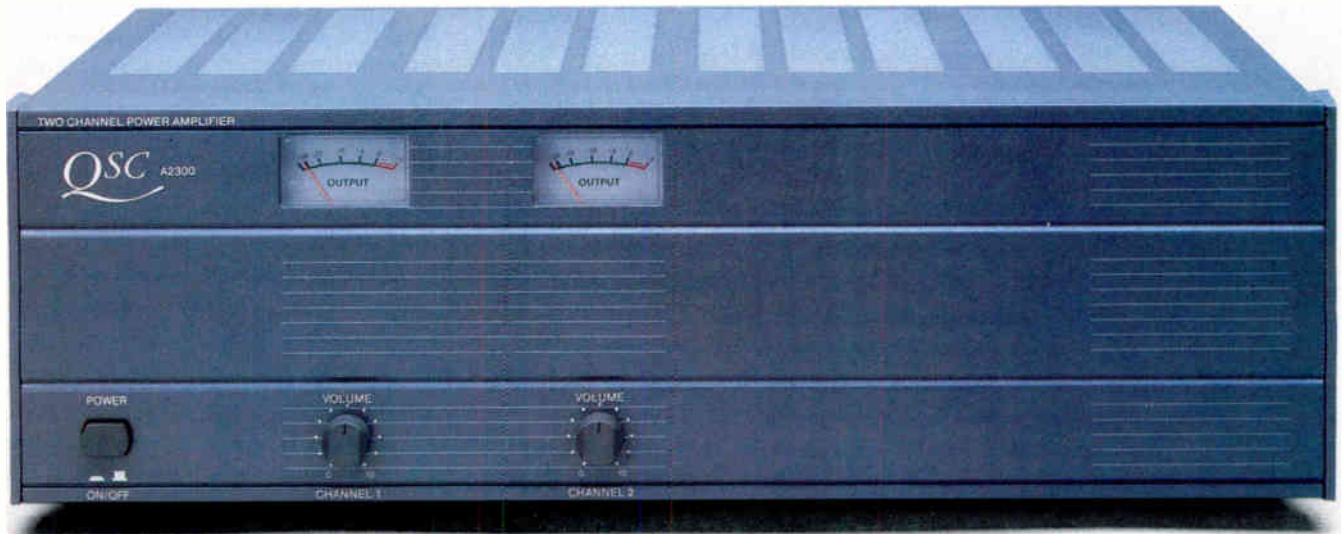


Figure 3

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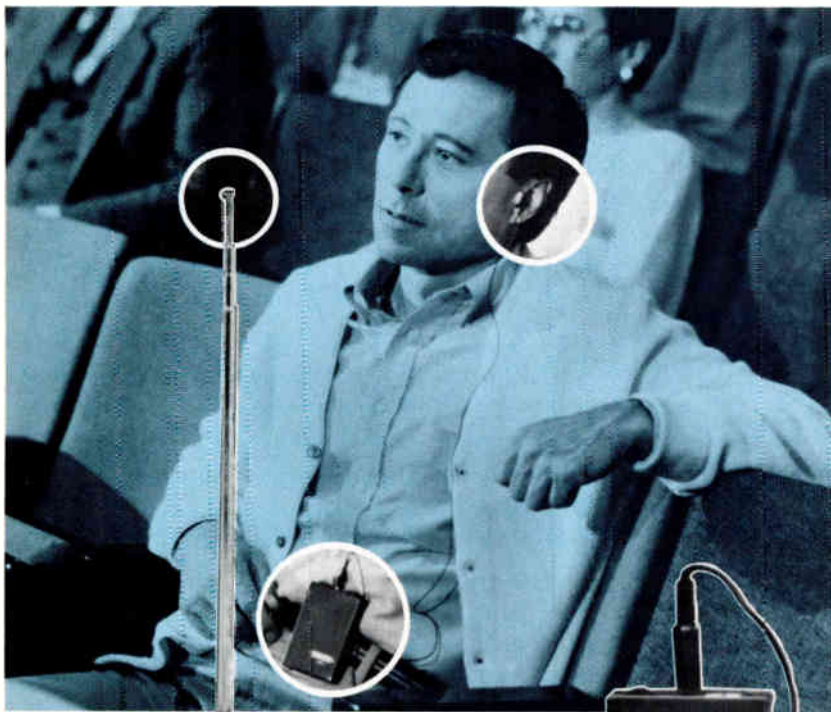
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Circle 211 on Reader Response Card

World Radio History

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ARENA BUTTON ON: The system input would feed all three equalizer inputs with no delays in the circuit, and all speakers in the central cluster would be in use. With this operation, the existing cluster would not be used. **THIS IS NORMAL OPERATION MODE**, and the relays are in Fail-Safe mode.

STAGE BUTTON ON: The inputs to the four speaker groups covering the EAST and EAST DOWN parts of the Arena, the stage end, will be grounded and thus turned OFF.

A two output TIME DELAY unit, Klark-Teknik's Model DN716, will be inserted in the circuit.

The North and South short side throw speaker groups will receive the program signal from Delay #1, and the three West groups, and the west down group will receive signal from Delay #2. Delay #1 is set at 30 milli-seconds, and Delay #2 is set at 50 milli-seconds.

MECHANICAL CONSIDERATIONS. The central cluster was designed with the loudspeaker components hanging from a custom metal rack-platform. The platform was suspended from the ceiling with four ½ ton electric hoists. Each hoist was built with enough chain for 100 feet of vertical travel. This allows the cluster to be lowered to floor level for diaphragm replacements, adjustments, etc.; allows it to be raised to operating height of 50 feet; and allows it to be raised to the ceiling for obstruction clearance. A custom controller, designed and built by the sound contractor, allows individual hoist control for leveling, and by the flip of some switches, allows all four hoists to move in unison. A locking key switch removes electric power from the hoists, so that accidental movements cannot occur.

The movement of the multiple 12 gauge speaker cables from the top of the Arena to the floor level was solved by designing a four sided box bolted to the top of the cluster rack-platform; thus, when the cluster is raised, the umbilical cord gathers itself into the box, and when the cluster is lowered, the cord freely extends itself as required. Each loudspeaker pair from the equipment rack to the central cluster was about 400 feet. This represents 800 feet per run, and a resistance of 1.27 ohms per run. This was figured into the power requirements by making available additional power.



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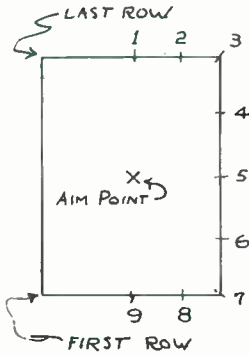
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 - 3/8"-16 threaded mounts
 - 3-pin XLR connector



Circle 220 on Reader Response Card

LENGTH OF SEATING:..... 66
 ROOM WIDTH AT FIRST ROW:..... 140
 ROOM WIDTH AT LAST ROW:..... 140
 CEILING HEIGHT AT FIRST ROW:.... 101
 CEILING HEIGHT AT LAST ROW:.... 58
 ARRAY HEIGHT: (above heads).... 70
 BELOW ARRAY TO FIRST ROW SEAT:.. 140



SEATING PLAN
66' x 140'

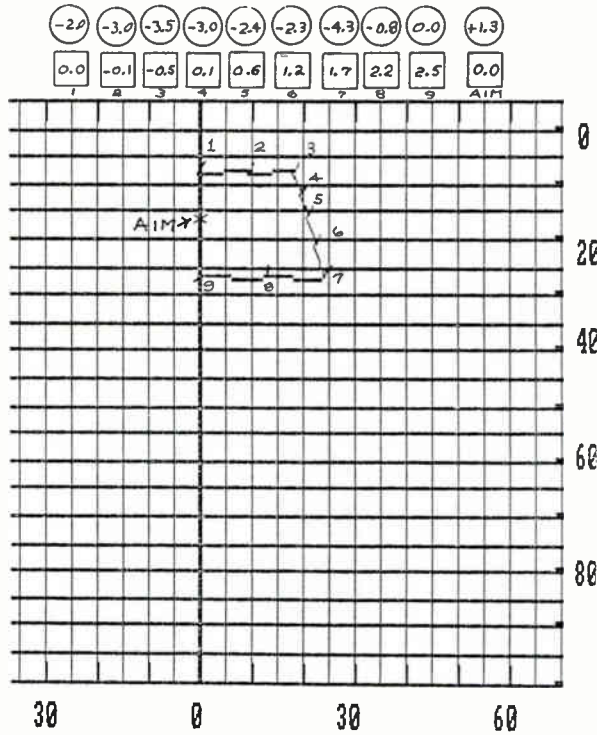


Figure 4

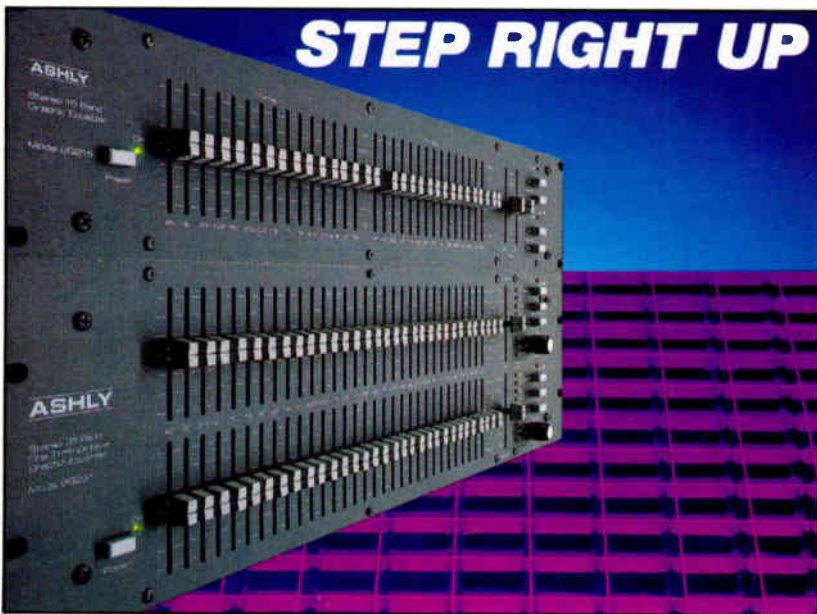
LAT.	LONG.	RANGE	dB
-7.5	0.0	207.8	0.0
-7.5	9.6	210.7	-0.1
-7.5	18.6	219.2	-0.5
-11.3	19.9	205.5	0.1
-15.7	21.3	192.8	0.6
-20.8	22.7	181.4	1.2
-26.6	24.1	171.5	1.7
-26.6	12.6	160.4	2.2
-26.6	0.0	156.5	2.5

EQUALIZING AND ADJUSTMENTS. There was close coordination between the installing sound contractor, Pro Media of San Francisco, and the consultant. After the installation was completed, and to expedite final system checkout, it was decided that the consultant would equalize the system. The system was equalized by separately turning ON the respective speaker groups connected to the equalizer being adjusted. After equalizing was completed, pink noise was fed into the system, and with one speaker group at a time, the respective levels were adjusted for the low frequency units and the high frequency units by using an Ivie Model IE-30A 1/3-octave spectrum analyzer/sound level meter. By moving about in each area of coverage, and viewing the frequency response and overall sound pressure level reading, each power amplifier was adjusted for proper output.

Before equalizing began, a typical reading of the Arena RAW HOUSE CURVE was placed in the Ivie's memory, then plotted on an HP Plotter. After the equalizing process was completed, each major area in the Arena was tested and plotted. The system is flat, then drops 2 dB at 7.5 kHz and 5 dB at 9.5 kHz. Figure 7 shows the final response of the East Area. The plots show that the coverage is flat from the noise floor of the room, about 30 Hz, to -3 dB at 9 kHz.

After the equalization and amplifier level adjustments were completed, each power amplifier was swept from 25 to 20,000 Hz, and the respective outputs were plotted. Although the output levels of each amplifier were relatively similar, affected only by the length of throw, the plots were grouped on a few charts, for convenience, by raising the plotting pen to a higher output level. The roll-off at about 50 Hz is due to the High Pass setting on the respective equalizer. As an example, the bottom two curves labeled Amp 7-ch 2, and Amp 7-ch 1, show the outputs to the Bass driver, Ch 2, and to the High Frequency driver, Ch 1, of the speaker group covering the long throw to

(continued on page 66)



Ashly has spent the last several years researching Graphic Equalization, with the goal of designing the best sounding equalizers available. Incorporating Q-Enhanced Wein-Bridge filters and high slew rate op-amps, world class specifications have been achieved, while offering nearly noiseless, transparent sound. For your most demanding applications, listen and compare—the Ashly GQ-Series will be the choice for your next equalizer.

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Brand-Rex Silicone Rubber Tubing

Brand-Rex Cable, a division of BRIntec Corporation has introduced the first UL-listed Electrical Grade Extruded Silicone Rubber Tubing for temperatures up to 200 degrees centigrade, and voltages up to 600V. The tubing is also flame resistant.

Brand-Rex Turbo 117U and 117U-FR tubing was developed for insulation of leads, connections and components in applications where operating temperatures are high or extremely low.

117U is an unsupported tubing produced from a custom formulated methyl-vinyl polysiloxane silicone rubber. It is available to meet both 300V and 600V voltage ratings, depending on wall thickness.

117-FR is formulated to meet the UL type VW-1 flammability requirement. Also available for 300V and 600V, it is rated for use at -73 degrees centigrade to 200 degrees centigrade.

Circle 36 on Reader Response Card

General Devices Cooling Module

Finger guards are now standard on the redesigned model D-4118 cooling module from General Devices. The module provides circulation of cool air for the operation of instruments, printed circuit boards and power supplies.

The D-4118 allows the user to specify up to nine fans without having to add another cooling module. Each fan is rated 108 CFM and is designed to meet UL, CSA and VDE requirements. D-4118 features include a vertical profile of 1U panel space (1.75") a 5 foot cord, an aluminum extruded frame, a black enamel front panel and circuit breaker protection.

Circle 37 on Reader Response Card



Panduit MAS-CON Connectors

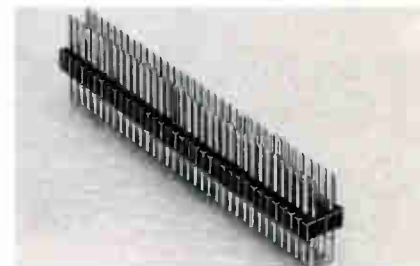
A new series of .100 inch centerline end connectors for use with LED and transistor leads has been announced by Panduit Corporation.

These connectors feature high performance copper alloy contacts with

tin over nickel plating and are available with two and three circuits. The contacts accept LED/transistor lead sizes of .010" to .016" square.

Part of a complete line of MAS-CON mass-terminated IDC connectors, the new models are offered for wire sizes from 28 to 22 AWG. Connector housings are made of 6/6 nylon with a UL flammability rating of 94V-2.

Circle 38 on Reader Response Card



Samtec Terminal Strips

New double row terminal strips (TMS Series) on .050" centers are now available from Samtec.

The strips feature a male pin that is .018" square and they come in straight tail or right-angled tail. They are available in any number of positions from 2 through 36 pins in a row.

Also available is a single row strip and mating socket strips (SMS Series) with a high reliability tuning fork design contact. Sockets accept pins from .016" to .020" square with an insertion depth of .080" to .250"

Circle 39 on Reader Response Card

Consumer Products McCormick Mini-Torch

The McCormick Mini-Torch is a multi-purpose unit that solders and brazes. Soldering applications include repair of TV, radio, stereo, computers and more. Torch applications include plumbing and industrial jobs such as brazing brass and copper pipes. (2500 degree output from torch head).

Accessories for the torch include four sizes of replacement Solder Tips for detailed work and five-ounce Butane refills.

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The *Sound & Communications* panel was hosted by technical editor Jesse Klapholz. Held before a live audience, well-known guest panelists were Daniel Queen, president of Daniel Queen Associates; David Klepper, co-founder of Klepper Marshall King Associates, Ltd.; Donald Davis, president and co-founder of Synergetic Audio Concepts (Syn-Aud-Con); and Clifford Henrickson, consulting engineer for U.S. Sound Company. A lively discussion was followed by a question and answer segment by the studio audience.

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CONTRACTING CLOSE-UP

International Sound Installs Systems

International Sound has completed the design and installation of a sound and video system in the Marriott Hotel in Princeton, New Jersey. The system utilizes JBL speakers, BGW, TOA and Altec amplifiers, Rane signal processing equipment and FSR custom relay

and switching networks.

International has also recently installed systems in the Princeton Forrestal Village mall, Caroline's Comedy Club in New York City, and Bridge-water Commons Mall in Orange, New Jersey.

Klark Teknik On Land and Sea

Klark Teknik signal processors will be used in several venues across the U.S., the company announced. Leading the list, Ancha Electronics of Miami installed nine K.T. DN301B Graphic Equalizers and five DN716B Digital Delay Lines in Joe Robbie Stadium in North Miami. Three K.T. DN716B Delay Lines were installed at Sea World in San Antonio, Texas, by Southwest Sound.

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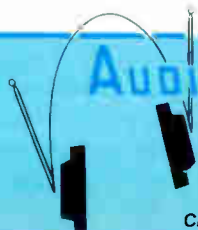
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Circle 225 on Reader Response Card World Radio History

Electronic Engineers Bring Sound To UAB

Electronic Engineers, Inc. recently installed a sound system for an 8500-seat convocation center at the University of Alabama at Birmingham. The UAB arena system designed by David Kaye included 27 drivers and horns by Electrovoice and JBL, driven by 13 Crown PS series amplifiers. A Yamaha M916 mixing board and Telex intercom system were a part of the package.

IDB At the Tee

IDB Communications provided the CBS and USA Networks with C-band and Ku band earth stations for their four day coverage of the Master's Golf Tournament from Augusta, Georgia. IDB also supplied transmission services for CBS Radio, who also broadcast the event live.

BOSE Gets The Picture

R/C Theatres of Reisterstown, Maryland have announced the installation of BOSE Cinema Sound Systems in the R/C Theatres at New River Valley Mall in Blacksburg, Virginia. The BOSE system features computer-aided design software and BOSE Acoustic Wave Cannon System loudspeakers. This installation marks the first use of the BOSE system by R/C Theatres.

The AES Heyser Scholarship Fund



The Richard C. Heyser Scholarship Loan Fund has been set up to honor Dick Heyser, a highly gifted, loved and respected engineer, with a lasting memorial. The scholarship loan will financially assist promising graduate engineering students in the field who, otherwise, could not continue with their studies.

In March of 1987 Dick died, just a few months before he would have assumed the office of AES President. He not only was active in AES but he contributed greatly to the audio field through his Time Delay Spectrometry discoveries. He gave of himself on a personal level as well. Carolyn Davis, Co-Founder of Synergetic Audio Concepts, said of the fund, "Dick, himself, gave so much to all those with whom he came in contact, especially those just starting out; we feel Dick would have been pleased to know he is being remembered in this way."

In conjunction with this memorial, a major update of The PHD Program[†] will be dedicated to Dick Heyser and all the proceeds will go to the Richard C. Heyser Scholarship Loan Fund.

You may obtain a program for a donation of \$300.00 or more; prior owners may upgrade for a donation of \$50.00 or more. Make your check payable to the Richard C. Heyser Scholarship Loan Fund. Send to the Richard C. Heyser Scholarship Loan Fund, c/o *Sound and Communications*, 25 Willowdale Avenue, Port Washington, NY 11050.

[†] Trademark of Ambassador College.

FACES AND PLACES



Tony Leger

Stentofon Announces New Regional Managers

John Powell was named regional sales manager for the firm's Northeast regional office based in Philadelphia, Pennsylvania. Powell brings 11 years of sales and management experience to the company.

Tony Leger, who has nine years experience in the communications and broadcasting field, will serve as Midwest regional manager. He will be based in the Chicago area.

Kerry Orr, regional manager of the Southeast, comes to Stentofon after 12 years in sales to business, industrial and government markets. Orr will be based in Atlanta, Georgia.



William G. Connolly

Sony Names New Presidents Connolly and Wheeler

Sony Corporation has announced the appointment of William G. Connolly to the post of president of the newly created Advanced Systems Division. Richard K. Wheeler will now serve as president of Sony Communications Products Company.

Connolly, who has over 25 years of experience in the broadcast-technology field, will be responsible for Sony's emerging technologies, such as High Definition Television. Charles A. Steinberg, executive vice president, said, "Bill Connolly brings a wealth of experience to this activity, and is uniquely qualified to carry out this important new assignment."

Connolly joined Sony in October, 1983, as president of Sony Broadcast Products Division. He took over as head of the Sony Communications

Products Company when it was launched in 1986.

Wheeler, former senior vice president of the Sony Communications Products Company, joined Sony in 1974 and has held several management positions. Wheeler will be responsible for sales and marketing of products manufactured by the company's three divisions: Professional Video, Broadcast and Professional Audio.



Daryle Skaugstad

Aiphone Appoints Sales Managers

John Mosebar has been promoted to branch manager of the Midwest regional sales office, according to the Aiphone Corporation. Mosebar will manage the Chicago office and organ-

ize a technical assistance program for Aiphone dealers and sales reps throughout the midwest.

Mosebar joined Aiphone in 1983 and has worked in several positions in the technical sales department. During this time, "Customer calls for technical information grew from about 15 a day to more than 100 calls a day," said Hiko Shinoda, president of Aiphone.

Daryle Skaugstad will replace Mosebar as technical sales manager, and will work from the company's headquarters in Bellvue, Washington. Skaugstad will provide technical assistance to sales representatives and dealers nationally.

Before joining the company, Skaugstad played professional football for six years with the Houston Oilers, the San Francisco 49ers, the Green Bay Packers and the New Orleans-Saints. Most recently, Skaugstad served on Aiphone's technical sales support team.

(continued on page 68)

REP NEWS

The Dallas-based AMX Corporation has appointed several new rep firms on both sides of the Sierra Nevada. In the west, Terry Richardson and Richard Hansen of Pro-Tech Marketing in Salt Lake City, Utah, will pan for gold in the Rocky Mountain and Western Plains states. Back east, Ken Zori of KBZ Communications will venture into the New England states, and Debbie Franklin of Franklin Communications will cover the Southeastern seaboard stopping just short of Dixie.

Community Light & Sound, Inc. presented their annual Sales Rep of the Year award to Signet Corporation, which represents Community throughout the Mid-Atlantic states. The eight-member Signet team posted sales figures which were twice as high as those from their previous year. Community also announced that Roger DuNaier's Pacific Audio Group will represent the company in Southern California.

The Pacific Audio Group is based in Torrance, California.

Jeron Electronics Systems, Inc. has appointed two new rep firms. Bi-State Marketers of Ridgefield, NJ will cover New Jersey and parts of New York, and Pacnor Marketing, Inc. of Lynwood, WA, will bring Jeron's products to Washington, Oregon, Idaho and Alaska.

Pirelli Cable Corporation has announced its plans to augment its marketing efforts. Several rep firms have been appointed to market fiber optic cables, assemblies, installation services and other Pirelli products. They are: Col-Ins-Co for Florida; Fiber Optic Associates for Maryland; High Tec Sales for Massachusetts; Interconnect Technologies for Washington; Johnson Associates for California; Metro-Tek Associates for New York; Technical Marketing for New Mexico, Colorado and Utah, and Texport Electronic Sales Company for Texas.

PRODUCTS IN REVIEW



Lectrosonics Pro 4 Channel Wireless

The Lectrosonics Pro 4 Channel Wireless System combines four wireless receivers into a system with one antenna and one AC power cord. Included in the system are: the DM4 antenna and power distribution module, a 19 inch EIA standard rack mount, four receivers and four transmitters with microphones. Four discrete audio outputs or a common audio output is available.

The R185 receiver used in the system has a front end consisting of a six pole helical resonator assembly with ultra-low noise J-FETs. The mixer is a double balanced type. An audio input on the receiver rear panel provides a mixing bus for the audio outputs. The audio outputs of all four receivers may be mixed together through these jacks. Audio outputs are XLR balanced microphone level; 1/4 inch balanced line level; and RCA line level.

Circle 15 on Reader Response Card



ART Launches MultiVerb, New Tool

Applied Research & Technology has "launched" MultiVerb, which provides up to four simultaneous effects from a single rack. Reverberation, arpeggio effects, reverse gates, pitch shift, doubling, imaged doubling, digital delay, chorusing and EQ multi-effects can be programmed into MultiVerb's 200 memory locations, or can

be selected from the unit's 100 on-board presets, and stacked. These multi-effects can be random accessed in groups of four if needed.

The MultiVerb is part of ART's ProVerb family of digital signal processors and incorporates several standard ProVerb features such as battery backup, remote footswitch jack with preset increment, a level selector, 16 bit digital processing, and full MIDI compatibility. Other features include a random access keypad and 32 character LCD display. Pitch transposition is included as standard.

Circle 16 on Reader Response Card



QSC Introduces Series Two Amplifiers

Two new amplifiers have been added to the QSC Series Two line of products. The A2300 is a two channel amplifier that has been designed for the installed sound market. It incorporates features found on the QSC MPS 2300 Music and Paging System, but without the preamp section. Each channel delivers 125 watts at 8 ohms. A transformerless output circuit delivers wide frequency response and low distortion. Speaker equalization controls are provided behind the front panel. Built-in adjustable PowerLimit circuits prevent clipping. The A2150 is a single channel version.

Circle 17 on Reader Response Card



Furman Sound Parametric Equalizer

The PQ-4 parametric equalizer is the successor to Furman Sound's

PQ-3. The company says the new EQ is its most flexible equalizer. The range goes from a full 20 dB of boost to an infinitely deep cut. The PQ-4 is a full function four band parametric equalizer with peak/shelf switches allowing either usual peaking EQ or shelving EQ where all frequencies above or below the selected frequency are boosted or cut. The PQ-4 features isolated connectors, a ground lift switch, and a low-noise design. The suggested list price is \$359.

Circle 18 on Reader Response Card



CS Series II from Community

The CS Series II loudspeakers from Community Light & Sound consists of nine models ranging from the portable CS25 to the full range CS70. According to the company, "each member of the CS Series II line expresses the refinements made since the introduction of the product group." Transparent grille cloths now expose the drivers to full view, and plywood grille frames have been added, along with steel corner protectors on the larger models.

Additionally, Community has re-designed elements in the crossover networks to improve the fuseless protective circuitry. Other features include ferro-fluid cooling of the low and midrange drivers, black carpet covering of each enclosure with steel screen protection; recessed back panels to permit flush mounting; T-nuts on top, bottom and sides.

The newest addition to the series is

the CS28M, a compact wedge-shaped floor monitor housing the same internal components as the CS25.

Circle 19 on Reader Response Card

BEFORE SONEX 1 INSTALLATION						
COMFORT						
AFTER						
0	1	2	3	4	5	6

REVERBERATION TIME (seconds)

Alpha Audio's Sonex 1

Alpha Audio's newest addition to its sound absorbing product line is Sonex 1 with a noise reduction coefficient (NRC) of .81. It is made of a melamine material and has a Class 1 fire rating. The porous acoustic melamine material meets all Class 1 regulations for flame spread, smoke density and fuel contribution. The material's internal structure is a spacious cellular complex of slim, flexible webs which are membrane-free. It is lightweight with very low density, and its contour is based on an anechoic wedge design. Sonex 1 can be installed with glue, and can be cut with a knife. It comes with an optional Hypalon finish and repels oil, acid and solvents.

Circle 20 on Reader Response Card

Tektone Audio-Visual Nurse Call System

Tektone's NC-300 microprocessor based audio/visual nurse call system features an English language patient information format displayed on a high resolution compact CRT.

The basic system consists of standard peripheral devices used in hard wired or microprocessor audio/visual systems. However, the company says the system allows custom tailoring. The heart of the system is a CPU with a 120-patient room capacity able to simultaneously power four CRT/master stations. All master stations can select specific areas, set patient priority level and room status. Programming

may be protected by user-selectable passwords.

Circle 21 on Reader Response Card



Sharp Electronics Pro DAT Recorder

Sharp Electronics Corporation has announced the market availability of a professional R-DAT digital audio tape recorder/player, the Model SX-D100. The SX-D100 uses four direct drive motors, an aluminum diecast chassis, 16-bit dual A/D and D/A converters, a 16-bit quadruple oversampling filter, linear skate tape loading mechanism and a dew sensor/heating system; in addition, it offers a three-wire (grounded) AC power cord, and is UL approved for commercial use. The unit carries a suggested list price of "approximately" \$2,700.

Circle 22 on Reader Response Card



Tape-Athon Dual Cassette Chimes System

The Tape-Athon Soundmarker 2000 Dual Cassette Chimes System can sit on a desk or be rackmounted. It features dual cassette, 24 hour a day operation, programmability in five minute intervals, individual cassettes programmable individually or together. Each day of the week is programmed for operation. In addition it can be operated automatically or manually and has a built-in monitor speaker and a power failure indicator.

Circle 23 on Reader Response Card



Wheelock 15-Watt Horn-Speaker with Transformer

Wheelock's Series ST-H15 horn is an indoor-outdoor unit for one-way voice paging, background music and tone alerting. The company recommends it for large and/or noisy location: warehouses, construction sites, transportation terminals, etc.

The horn has a built-in 15-watt line matching transformer with power selector switch for matching the horn's power requirements to the 25V or 70V constant voltage output of an amplifier. It has a conduit interface adapter as a standard integral part. The conduit interface adapter is threaded for standard 1/2 inch pipe, and accommodates flexible or rigid conduit, BX cable, and matching connectors.

Circle 24 on Reader Response Card

HME Adds New Power Station to Intercom Line

The RP733 rack-mountable power station is the newest addition to HME's 700 Series cabled intercom products. It is compatible with the entire 700 Series line, as well as with most other three-wire intercom systems. The RP733 has two independent channels with two headset stations having communication access to one or both channels. Two auxiliary inputs allow microphone and line levels to be fed to one or both channels. The unit can power up to 32 belt pacs, with call lights, or up to 100 belt pacs if the call light feature is not needed. Both electret and dynamic headsets can be used.

Circle 25 on Reader Response Card



Audio-Technica Offers Outdoor Omnidirectional

Audio-Technica U.S., Inc. has introduced the Atus AL60 two-way omnidirectional speaker which features an ABS weather resistant housing.

The AL60 is a dual-driver system with one six-inch cone woofer and a 1-1/2 inch tweeter. With a frequency range of 100 Hz to 18 kHz dispersed in a 360-degree horizontal and 30-degree vertical pattern, the indoor-outdoor speaker has, according to the company, a clear and natural sound. The speaker can be affixed to a flat surface at any angle, or pipe-mounted from the bottom. It also features a 70.7 volt line transformer with selectable taps of 2, 4, 8 and 15 watts. It is finished in beige and can be painted.

Circle 26 on Reader Response Card

Jeron Electronic Visual Call System

Jeron Electronic Systems, Inc. has introduced a visual call system manufactured for installation in hospitals and clinics to provide a means of signaling highest priority emergency calls. The EC-310 Code Blue System features UL listing (1069) which is required in hospitals. When Code Blue Stations are activated, all associated code blue emergency call signals are activated in the system.

Circle 27 on Reader Response Card

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Circle 241 on Reader Response Card

PRODUCTS IN REVIEW

a closer look

gary d davis



of the 990 discrete op-amp being used in the Twin Servo Mic Preamp. This advanced circuitry includes power supply regulation, DC offset compensation, and input bias injection with thermal tracking. As Deane Jensen, originator and inventor of the 990 discrete op-amp, explains it: "These 990s are much better suited for the DC servo feedback circuitry which eliminates AC coupling capacitors." Over 60 components per module are selected by computer aided instrumentation. The transformers are graded and selected for matched pairs, and the load networks are selected for flat group delay, ± 50 nanoseconds, to 65 kHz.

Literature describing the Jensen Twin Servo 990 Mic Preamp with a list (including phone numbers) of those currently using the product, based on

Editor's Note: The press release for the Jensen Twin Servo 990 was prepared by Gary Davis & Associates.

Mic Preamplifier has established itself as the pre-eminent product of its type in the marketplace, coming out on top in more than 100 independent listening tests. The sonic success of the Twin Servo Mic Preamp is the result of a new 22-transistor circuit version

Jensen Twin Servo 990 Mic Preamp Press Release: In a relatively short time, the Jensen Twin Servo™ 990

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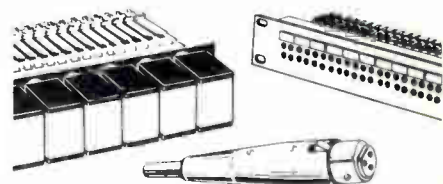
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listening test and evaluation, is available by contacting Jensen Transformers.

Comments: Jeff Nelson and Randy Gill of Boulder, working in association with Deane Jensen of Jensen Transformers, developed the current version of the Jensen Twin-Servo 990 Microphone Preamplifier (TSMP). Basically, the design and technology belong to Jensen, and Boulder builds the units on contract.

The 3½-inch-high unit is available in a stand-alone half-rack version which includes two channels of mic preamplification and a power supply. A full-rack version can be obtained with two, four or six channels, as well as power supply and rack-ears. Each channel has a conductive-plastic feedback gain control (18 to 60 dB), a polarity reversal switch, 52V phantom power on/off switch, 150Ω/20Ω input Z switch, "Clip" indicator, output ground lift switch, and gold-plated 3-pin input and output connectors.

Jensen's best transformers are used in the unit: the JE-16-AX for the input, with 60 dB magnetic shield, and the JE-11-BMCF output transformer with 80 percent Nickel/Moly core. The power supply uses metal-cased regulator transistors and is short-circuit protected. Both voltage rails track one another to avoid turn-on/turn-off thumps. A toroidal power transformer, with Faraday shield, minimizes adjacent magnetic and electrostatic interference.

The TSMP features described below are for one channel, but apply equally to each channel. The TSMP has two of Deane's 990 operational amplifier stages with DC servo feedback, eliminating the coupling capacitors in the audio circuit. By using his COMTRAN™ circuit simulation program to optimize component values, Deane was able to create a circuit which is claimed to exhibit one tenth the distortion, and twice the bandwidth of single-stage designs; the THD spec is

0.003 percent from 1 kHz to 20 kHz (0.036 percent at 20 Hz, the slight rise primarily due to the input transformer) while the -3 dB points are 0.4 Hz and 140 kHz! Clearly Jensen knows how to build a fine transformer when they can achieve near-DC response and 140 kHz bandwidth with that kind of low distortion. However, the excellent low-end performance specs (which we are told produce quite audible benefits) are as much due to the elimination of coupling capacitors in the audio path as to transformer quality.

Designing a good prototype unit is one thing. Manufacturing it is quite another; Boulder has interfaced a computer to their laboratory equipment to measure over 60 components per amplifier channel. Each transistor, for example, is evaluated for 40 operating parameters over the range of operating voltage and current. The computer program prints out a list of

(continued on page 70)

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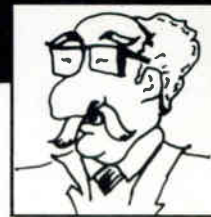
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Dear Dr. Wokka



Dear Dr. Wokka,

I own a pair of Blintz 15-inch Professional woofers and have recently compared them to my old Altec 515A 15-inch woofers. They just don't sound as good. What confuses me is that they're twice as heavy and have huge magnets on them. I've read that heavier speakers are always better. I'm

at my wit's end. Tell me I'm not crazy.

J.B. Martini
Lansing, Michigan

Dear Jay,

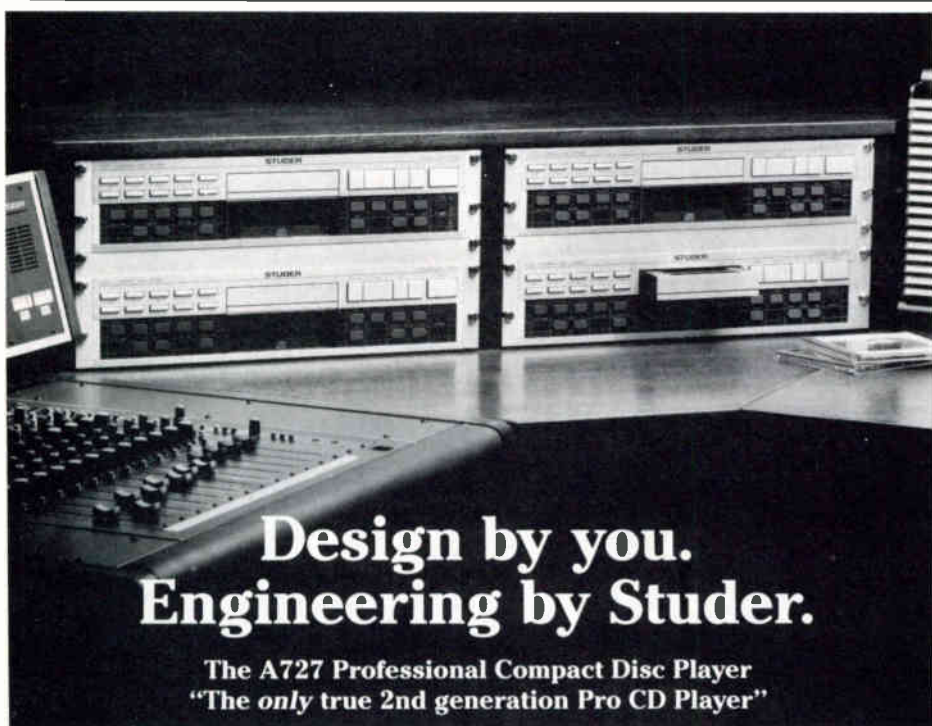
You're not crazy. I've bitten my tongue for too long on this one. You've opened the Pandora's box of the audio industry here, but don't fret; I'll take

full responsibility for this reply. This sham of "modern technology," the ceramic magnet, must be exposed once and for all. What you hear is the difference between Alnico V magnets (in the old Altecs) and the "ceramic" magnets, the ruination of good sound for the past three decades.

I can't truly explain to you, in scientific truths, the exact physics of what is going on here; there are certain things that only *Great Men of Audio Science* are meant to know. However, it all has to do with electron and position spins and orbits about the central nuclear-mass centroidal megnetron in the atomic structure and the phenomenalization of its relationship with the neighboring gamma ray bombardment. I know it sounds confusing, so I won't persist. Just be secure that I know what I'm speaking about.

What it comes down to on a normal mortal level is that Alnico is a *metal* and "ceramic" is a cheap fired clay made from dirt found near lodestone deposits in New Jersey, Montana, Brazil, Alaska and India. Alnico is a finely-crafted alloy made from Antimony, nitrogen and copper, thus the scientifically derived name. An American entrepreneur, Billy Blintz, brought the first ceramic speakers to the world in 1953 and shocked the scientific audio community by producing a speaker that reproduced *some* of the data that Alnico speakers did. Many manufacturers said "it's good enough" and sold truckloads of these abominations to guitar and bass players in indiscriminate "rock" bands. Today, everything (even vocals) sounds like an electric guitar and the world has accepted it. This has got to stop. Did you know that the material that ceramic magnets are made of doesn't even have electrons and protons? Shocked? So was I, peering into my electron laser-beam microscope in 1959. However, commercial pressure quickly buried my findings and I was forced (some say by payoffs) to be quiet. *No electrons at all.* That's why "ceramic" speakers are so heavy. They need tons of steel to keep the "magnetism" contained in the base

(continued on page 70)



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STUDER REVOX

Circle 224 on Reader Response Card

CONSULTANTS

(continued from page 14)

ble users for their input into the design of the project.

Since the Board regarded the planning process as incomplete, they decided to temporarily halt the project, and a market survey was defined and conducted. During this time, the board decided that strong, direct involvement in any future work was necessary.

The Board selected their president, former Congressman Richard Nolan, and his head of staff, Mr. Scott Johnson, to lead a more critical design process. They requested that the architect be required to provide its most experienced designers, and they issued a clear order that the previous process was inadequate and a new design process was required. (They did not attribute this move to the inadequacy of the architect, but rather to the failure to completely define the project before designing it.)

A survey of hundreds of potential users was performed by the World Trade Board staff, and a set of definitions was developed for the requirements of the Conference Center. These

requirements generated by clients included:

1. Need for larger rooms
2. Need for acoustic control
3. Need for high quality lighting
4. Requirement for high quality A-V systems
5. Need for daylighting availability
6. General need for higher quality spaces then were available in the area
7. Need for high room ceilings in large rooms.

Orfield Associates was retained to perform consulting services in the lighting, daylighting, acoustical, A-V and thermal fields (comfort), along with providing general project management assistance. Where previously the lack of definition resulted in many design problems, the new process included:

1. Defining population requirements for rooms
2. Reducing the A-V requirements and increasing the quality of A-C components
3. Dramatically increasing the lighting quality
4. Dramatically increasing the

acoustical quality of the meeting rooms

5. Providing far better isolation between rooms
6. Providing far more logical traffic flow between the two floors of the center
7. Providing far better security and traffic control within the center, based on a limited staff
8. Providing low-use A-V equipment via a rental agreement with the A-V contractor
9. Controlling the HVAC noise and vibration level within meeting rooms.

Some common architectural misconceptions that the World Trade Board dispelled in this process were:

1. Design quality is proportionate to cost
2. Architects generally understand the needs and uses of technical facilities
3. Architectural engineers provide adequate specialized lighting and acoustic design
4. Non-professionals (clients) do not need to participate in the design process.

(continued on page 66)

A · E · S · T · H · E · T · I · C · S

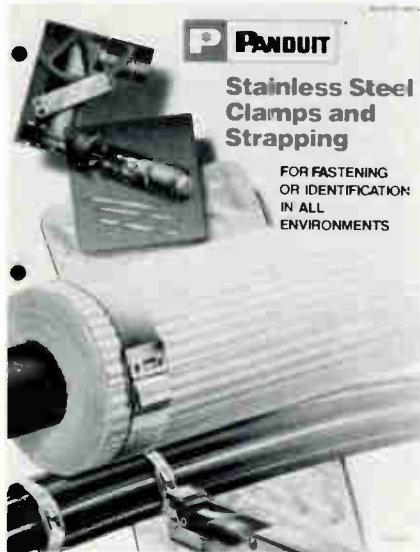
The new CSV Series speaker systems by Community complements the decor of the most discriminating contemporary commercial environment. CSV sound systems and floor monitors' built-in dynamic protection circuitry assures high reliability. Our simplified brackets guarantee ease of installation and offer the system designer a wide choice of mounting options. Also available are visually identical, specification-equivalent, optimally vented low frequency enclosures.



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Circle 231 on Reader Response Card



Panduit Releases Product Bulletin

A newly revised bulletin describing the company's line of stainless steel clamps and strapping is now available from Panduit Corporation. The 12-page bulletin provides detailed descriptions of the two systems, including

material specifications.

These products can be used for fastening or identification indoors, outdoors and underground in applications involving abrasion, weathering, corrosion, radiation or temperature extremes. Stainless steel clamps are available in either Type 302/304 or Type 316 stainless, with 316 recommended for applications requiring higher corrosion resistance.

Strapping is also available in Type 302/304 stainless in three widths for bundle diameters up to 10 inches. It is also available in 200 foot reels for larger diameter applications.

Circle 28 on Reader Response Card

Ring Group Offers New Intercom Literature

A new set of product data sheets detailing the features and capabilities of the Ring-Master™ intercom family, is now available from Ring Group, Inc.

The 13 sheet set offers a layman's description of main system components of Ring's microprocessor-based

internal communications systems. Product photos and technical specifications are also included to describe the range of Ring-Master stations, including master, industrial, explosion proof and substations.

Circle 29 on Reader Response Card



Talk-A-Phone Intercom Catalog

A new catalog describing a variety of systems and options is available from Talk-A-Phone. Talk-A-Phone intercoms range from 2-station to 40-station systems.

One of the features of the catalog is a hands-free 'Automation' system that enables 2-way conversation between two points without either using any controls.

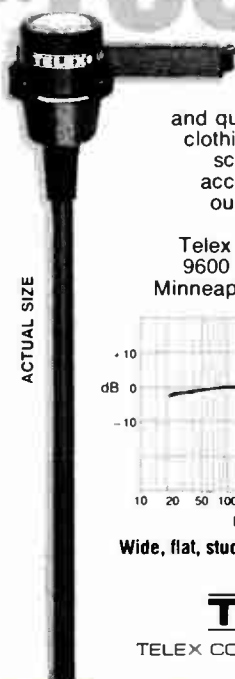
Circle 30 on Reader Response Card

The Telex LM-100 miniature lapel mic system

TINY but TOUGH!

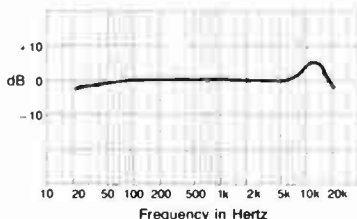
The LM-100 is an omnidirectional condenser mike system which includes the tiny LM-101 microphone and Telex PS-10 in-line phantom power supply. This mike was designed for day-in and day-out professional use under the most adverse conditions. In environmental testing, the LM-100 performed perfectly in extremes such as below zero temperatures, snowy television interviews and on location in the boiling heat of a desert Hollywood movie set.

The Telex lapel mike has a non-glare black finish and is supplied with three styles of mounting clips. The mike has a three foot cord terminated in a TA4F plug. This specially designed cord is extra supple



and quiet to prevent irritating clothing noise. A foam wind screen is available as an accessory for extra windy, outdoor use. For detailed information write

Telex Communications, Inc.,
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Crest Electronics New Product Catalog

Crest Electronics, a supplier of repair and replacement parts for hospitals, nursing homes and medical offices, has just released a new Products Catalog. The 16-page, full color catalog is free to health care professionals.

Some of the 185 items included are specialized Security and Surveillance Systems, Fire Safety and Alarm Units and Safety/Tamperproof Electrical Receptacles. There is also a special section on Crest's 'Easy Slide' I.V. Stand, television wall mounts and other patient and room accessories.

Circle 31 on Reader Response Card

Jeron Releases Short Form Catalog

The 1988 Short Form Catalog is now available from Jeron Electronic Systems, Inc.

The catalog has doubled in size from last year, with the addition of 23 pages of complete system sheets. It now serves as a complete ordering guide and directory to the range of products Jeron manufactures. Aiphone Brochure RCX Intercom Aiphone Corporation's RCX intercom, a micro-processor-based security and intercommunications system, is described in a color brochure now available from Aiphone. The RCX can include up to 480 open voice telephone surface-mounted masters or flush-mounted substations and up to four central exchange units. The brochure explains the station options, as well as the system's features and accessories and shows how the RCX is applied in hospitals, airports, car dealerships, offices, homes and ships.

"It's the first time we've shown our customers the full potential of one of our products in a brochure," said Hiko Shinoda, Aiphone's president and national sales manager. "We designed the brochure as an educational tool."

Circle 32 on Reader Response Card



Thomas & Skinner Mini-Log V

The Mini-Log V, a catalog which contains technical and reference information on Thomas & Skinner's standard line of electrical steel laminations is now available according to the company.

The catalog has a general information section that describes features and

benefits of each product grouping, while a technical data section offers test results and a comparison of electrical properties between the major material grades. In addition, information is provided on special size laminations designed to meet unique application requirements.

Circle 33 on Reader Response Card

AMP's Industry-Standard Product Catalog

AMP Incorporated has announced

that its 136-page Industry-Standard Products Catalog is now available. The reference includes photos and basic specifications on over 2,800 items that are in stock and available for shipment.

Some of the products included are: ribbon cable, post/receptacle, subminiature D, pin and socket, RF, and electro-optic connectors, plus IC sockets, DIP switches and shunts and terminal lugs.

Circle 34 on Reader Response Card

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Circle 236 on Reader Response Card

CONSULTANTS

(continued from page 63)

While the board consistently insisted that the architect and all consultants work within their budgets, they actively considered the design and performance options offered.

The Minnesota World Trade Board believes that client advocacy has been the crucial variable in making the facility one of the better conference centers in the country. I would encourage other clients to consider a more active roll in the design process, to insist on quality from the design staff and rely on their own common sense.

In order to appropriately understand design process, remember that the professional design firm has a clear incentive to move the process along. After basic design decisions have been made, the design firm is more efficient and can then begin to document the project. On the other hand, it is important to remember that design ideas are also useful to the client prior to firming decisions. As the examination of planning options is often the designer's greatest skill, the more time spent on this process, the better the final result.

While the architect, engineer and interior designer have broad and general skills that can be of great benefit to specialized facility design, it is important that the client consider all of the issues, including the need for specialized consultants. The client must understand that he is the sole advocate of his own interests in the large scale design process. The members and staff of the Minnesota World Trade Board have demonstrated a high level understanding of this process.

FIBEROPTICS

(continued from page 30)

end result is a cable that is small in diameter, bends readily and resists crushing.

In a loose-tube cable construction, the fiber is contained in a plastic tube that has an inner diameter considerably larger than the fiber itself. The extra space within the buffer tube provides a high level of isolation from external forces. The tube interior is usually filled with a gel material to prevent water or moisture penetration. Loose-tube cables are the safest choice for long difficult conduit pulls (provided connectors have not yet been at-

tached). Most fixed permanent installations—especially those with difficult installation conditions and environmental extremes—employ loose-tube cable constructions.

Belden offers two major rules of fiberoptic installation. They are: Do not pull directly on the fiber; and do not allow tight loops, kinks, knots or tight bends. In order to effectively pull cable without damaging the fiber, it is necessary to identify the strength material and fiber location within the cable. Then, use the method of attachment that pulls most directly on the strength material—without stressing the fiber.

Generally, it is best to install cable prior to connector attachment. After connectors have been attached, it becomes more difficult to protect the fiber from inadvertent stress. If a pull is to be made entirely in one direction, connectors may be pre-installed on one end, leaving the other end for pulling.

Fiberoptic connectors position fiber ends to receive or deliver light. Fiber ends must be, in effect, clear windows. The surfaces must be smooth and perpendicular to the fiber axis for greatest efficiency in accepting light rays which will be transmitted the length of the fiber. Rough, scalloped, slanted or dirty end surfaces block and scatter light.

One way to test continuity for short-to-medium length fiberoptic links is to shine an ordinary flashlight into a cleaved or connectorized link and observe if light comes out the other end. On short lengths, it may be necessary to cleave only the end where the flashlight injects light into the fiber. This simple check can be made on cable lengths of up to a mile and more. If cable ends are outdoors, sunlight may be used. On longer lengths, the light observed at the opposite end may appear red in color. This is normal and is caused by the filtering of light within the fiber. One note of caution: Never look directly into a fiber connected to light-launching equipment. This can cause permanent eye damage.

"From a distance, it looks like you're putting the same old humdrum connectors on," Stier said. "But you must have a close match between connector and fiber or you'll experience a serious reduction of light. You need a higher degree of precision when putting them on."

For data transmission as well as

transport of voices and images, fiber—optics is definitely making an impact and there is surely more to follow. *Seeing the light* is taking on a whole new meaning in the sound and communications industry.

INSTALLATION

(continued from page 50)

the East end of the Arena. The 800 Hz crossover point (graph paper is shifted slightly left) is clearly shown on the plot, and any problems would have been discovered during these tests.

PROBLEMS. At the first sound system use where seating was extended into the Arena floor area, it was discovered that speech was very difficult to understand, because of echo from the end walls. Originally, the cluster was suspended at 72 feet above the floor. To improve the relationship of direct sound from the down throw speakers, and sound from echos (delays of up to 300 milli-seconds), the central cluster was lowered to 50 feet above the floor level. The lower position would also help by reducing the amount of signal striking the surrounding hard surfaced walls. Also, it was found that under actual use conditions, the bass in the Arena floor area was excessive. The two down throw bass systems were turned OFF. This action would not have been possible without bi-amplification. The down throw high frequency systems were raised in level. After these changes, listening tests at the next performance proved that the intelligibility had been vastly improved.

UNIQUE FEATURES. This design has taken into consideration some of the unique features of transistor-type power amplifiers; namely, their ability to supply more output power at lower impedances, their ability to supply more output power at lower impedances, their ability to supply less power at higher impedances, and their ability to supply double or more power when connected in bridge mode and working into a specific impedance. For example, by using two 15# bass 16 ohm speakers in parallel (in one cabinet), the resultant 8 ohms matched properly to a bridged power amplifier that supplied 400 watts into an 8 ohm load. That same amplifier model was used in normal two channel mode to supply 120 watts into matched 8 ohm loads. Another more powerful amplifier (Altec Model 1270) was used to

DATEBOOK

DATE	EVENT/COMMENT	LOCATION	CONTACT
June 4-7	CES	Chicago, IL	(202) 457-8700
June 8-10	ICCE	Chicago, IL	John Henderson (609) 734-2531
June 13-16	NEPCON East	Boston, MA	
June 14-16	ISC International Security Conference	Chicago, IL	
June 20-22	PACE '88 Payphone Conference & Expo	Atlanta, GA	1-800-227-1234
June 22-24	Operator Service '88 Conference & Expo	Atlanta, GA	1-800-227-1234
June 22-24	Product Marketing Strategies for Information Security Products	Arlington, VA	Carol Every (212) 233-1080
June 23-24	Synergetic Audio Concepts	Toronto, ON	(812) 275-3853
June 24-26	NAMM	Atlanta, GA	(215) 438-8001
June 28-29	Synergetic Audio Concepts	Syracuse, NY	(812) 275-3853
June 28-30	IDG Conference & Workshop to solve user Network Management Problems	Boston, MA	Dorothy Ferriter (617) 879-0700
July 9-14	ICIA International Communication Industries Association	Indianapolis, IN	Debbie Hafer (703) 273-7200
July 23-26	IAAM	Nashville, TN	(312) 661-1700
Aug. 11-13	ICIA video, audio-visual computer seminars	Westchester, NY	Debbie Hafer (703) 273-7200
Aug. 23-25	ISC	New York, NY	
Sept. 1-3	ICIA video, audio-visual computer seminars	Toronto, ON	Debbie Hafer (703) 273-7200
Oct. 3-4	Kentuckiana Sound Seminar	Indianapolis, IN	Andy Baker & Assoc. (317) 253-9667
Oct. 6-8	ICIA video, audio-visual computer seminars	Atlanta, GA	Debbie Hafer (703) 273-7200
Oct. 12-15	IBMA	Fort Lauderdale, FL	(216) 833-4164
Oct. 19-21	Network 90's Telecommunications Conference & Expo sponsored by USTA & USTSA	San Francisco, CA	Paul Roguski (202) 835-3158
Oct. 22-25	NECA	New Orleans, LA	(301) 657-3110
Nov. 3-6	AES	Los Angeles, CA	(212) 661-8528
Nov. 14-18	ASA	Honolulu, Hawaii	
Nov.	NCAC	Honolulu, Hawaii	(201) 379-1100
Nov. 18-20	LDI Lighting Dimensions International	Dallas, TX	Patricia MacKay (212) 677-5997
Nov. 29-Dec. 1	Unicom II Expo & Conference Sponsored by NATA	Dallas, TX	Kay Hynson (703) 273-7200
Jan. 15-18 '89	PTC Pacific Telecommunications Council	Honolulu, Hawaii	Richard Barber (808) 941-3789
Feb. 2-4	INFOCOMM sponsored by ICIA & AECT	Dallas, TX	Kay Hynson (703) 273-7200

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FACES & PLACES

(continued from page 56)

Yamaha Announces Promotions

The Yamaha Music Corporation has announced a series of promotions.

Phil Watkins, general manager of the Consumer Products Division, has been named a vice president. He will continue in this division which markets portable keyboards.

Bill Hinely has been appointed division manager of the Human Resources Development Division (HRD), a new position and division which will be responsible initially for the training and overall development of company employees. Hinely was the previous manager of the Digital Musical Instruments Division.

Steve Thatcher, who had served as assistant general manager of the Digital Musical Instrument Division, will take Hinely's place as general manager. Andy Murray, the regional sales manager, will move to the company's California headquarters, where he will serve as national sales manager.

Two Regional Managers Named by Anixter

Anixter Communications has named two new regional managers. Bob Santini will manage the southeast region, and Pete Wagener, the midwest region.

Santini, who most recently served as the midwest regional manager, has been with Anixter for nine years in CATV sales and management positions. Santini will direct the company's regional CATV business from its Atlanta service center.

Wagener, who will work out of Anixter's Elk Grove center, has also been with the company for seven years in sales positions. He most recently served as a sales representative for Illinois, Indiana and Iowa.

Maynard Electronics Announces Executive Changes

The appointments of Kim Knapp as chairman and chief executive officer, Alison Knapp as president and chief operating officer and Henry Caplan as executive vice president were announced by Maynard Electronics. Founded in 1982, Maynard Electronics produces and markets tape back-up systems.

Kim Knapp co-founded Maynard Electronics in 1982. Previously, he managed hardware design for Stromberg-Carlson, and was a design engineer with Texas Instruments. Alison Knapp, a co-founder, has a background in the personal computer industry. He will oversee all of Maynard's operations.

Henry Caplan, came to Maynard in 1987 from PC Technologies, where he served as president. He has also worked for Tecmar, Inc., also a PC peripheral manufacturer and the Reliance Group.

William Bean Appointed President of Marconi

Marconi Instruments, Inc. has announced the appointment of William Bean as president. Bean will supervise the ATE Division of Marconi Instruments, the formation of Marconi Instruments from Marconi Electronics Inc., and the U.S. marketing of digitally based products. Bean is being promoted from the position of vice president and general manager of Marconi Instruments. He previously served as director of the Marconi Instruments facility in France, European sales manager for the ATE Division and ATE product manager for Fluke in Holland.

Rank Cintel Expands Offices

Rank Cintel, Inc. announced the relocation of its midwest Broadcast Sales office to larger premises.

The new offices have been equipped with a fully-digital graphics suite for demonstrations of the Gallery System still image management/library. This branch will primarily handle the sale of the Gallery System and its components.

Fane Appoints Court Systems Design Consultant

Fane Acoustics has entered into an agreement with acoustic design consultant Stephen Court. Court will develop a new line of professional enclosures and monitors, which will be manufactured and marketed internationally by Fane.

In this arrangement, Court will continue to operate independently. The new product line will carry the banner "Fane by Stephen Court."

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NSCA Wrap-up

Theatre Sound and Binaural Monitoring

Sound & Communications: Look Into It!

Don't miss the July issue of *Sound & Communications Magazine*

power a 15" 8 ohm bass speaker with 220 watts into a matched 8 ohm load, and the other channel was used with an upward mismatch into a 16 ohm high frequency driver load to supply only 110 watts. This is the wiring used for the West speaker group.

Many and varied events have taken place since the new sound system has been installed. The sound pressure level developed with the 4400 watts of available amplifier power at times was deafening but clear and undistorted. Now, San Francisco's historic Palace for the Cows, can ring loud and clear.

The author wishes to extend his gratitude to Mr. Michael Wegher, the Cow Palace executive, for the close coordination received throughout the design period, and to Mr. John Root and Mr. Bill Mendes of the Cow Palace for their assistance in making the Arena available for tests and adjustments.

The author wishes to thank the sound contractor, Mr. Drew Serb of Pro Media, and his staff, for the excellent installation, and for their continued cooperation throughout all phases of the project.

The author also wishes to thank Sam Amato, his assistant, for his help in equalizing, testing, plotting, and making final level adjustments.

Charles J. Catania is an electronic engineer and audio consultant and president of Catania Sound Inc. He is a life member of the Audio Engineering Society.

GARY D. DAVIS

(continued from page 61)

serial numbers for matching up sets of transistors for minimum distortion.

Generally, matching components in the lab is no assurance they will continue to track properly under widely varying "real world" conditions. For this reason, the TSMP includes temperature compensation and DC offset compensation.

Jensen has applied computer circuit optimization to the design, and Boulder uses computer aided manufacturing, in an effort to achieve and consistently maintain sonic clarity. Sophisticated circuitry and a "no holds barred" approach to construction, with lots of precision, individually-matched components, are responsible for the TSMP's high price tag. However, this unit promises to deliver exceptionally realistic performance, and for those "no compromises" situations where you or your client demand the most realistic, well-defined sound available, we think the Jensen Twin Servo Microphone Preamplifier deserves your *Closer Look*.

Circle 44 on Reader Response Card

DR. WOKKA

(continued from page 62)

material. Actually, the material is fired lodestone clay and the material only focuses the earth's magnetic field into these speakers; there is no field of its own. Lodestone, as you know, attracts magnetism but does not behave as a source, which brings up another disturbing fact.

As our industry creates more and more of these "false" magnets for speakers, do you know what's happening to the earth's magnetic field?

What it comes down to on a normal mortal level is that Alnico is a metal and "ceramic" is a cheap fired clay made from dirt found near lodestone deposits in New Jersey, Montana, Brazil, Alaska and India.

Have you noticed a lot more navigational accidents lately? More people being depressed? More trains being derailed? It's because the earth's field is being slowly but surely diminished. And do you know what will happen then? What will happen is that all your "cost effective" namby-pamby ceramic speakers will stop working. Then what?! *Back to Alnico* is what, and I predict we'll see a resurgence of good sound.


Not that it's out, let's see how these opportunistic manufacturers respond to this. I dare them to produce anymore ceramic loudspeakers.

Next Month:

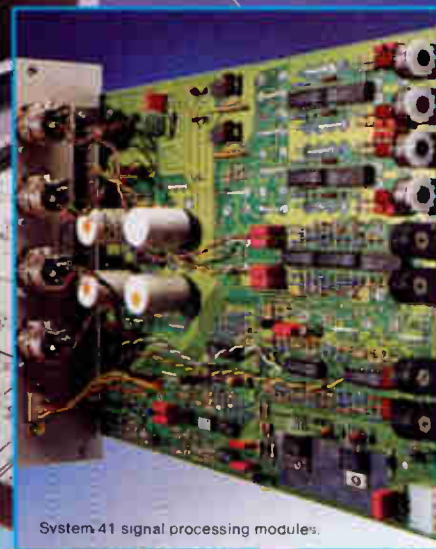
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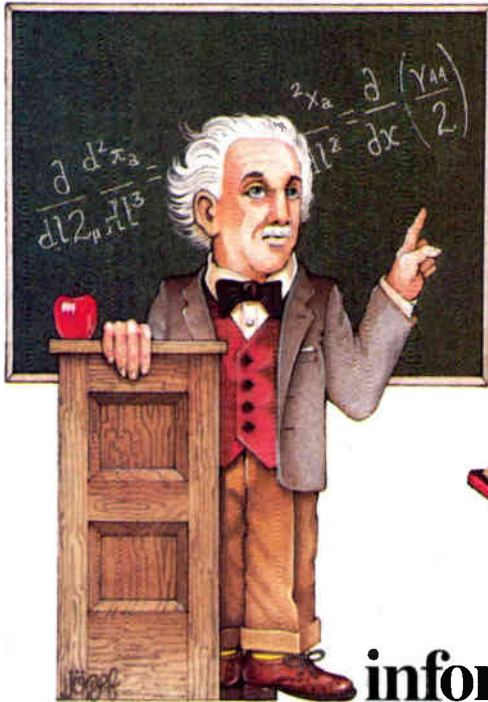
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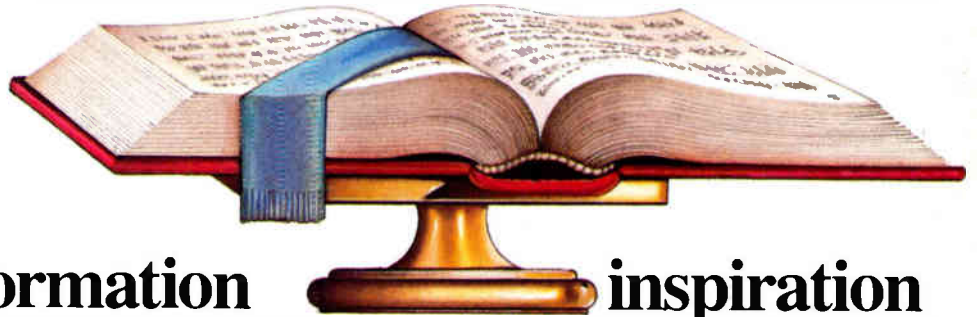
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