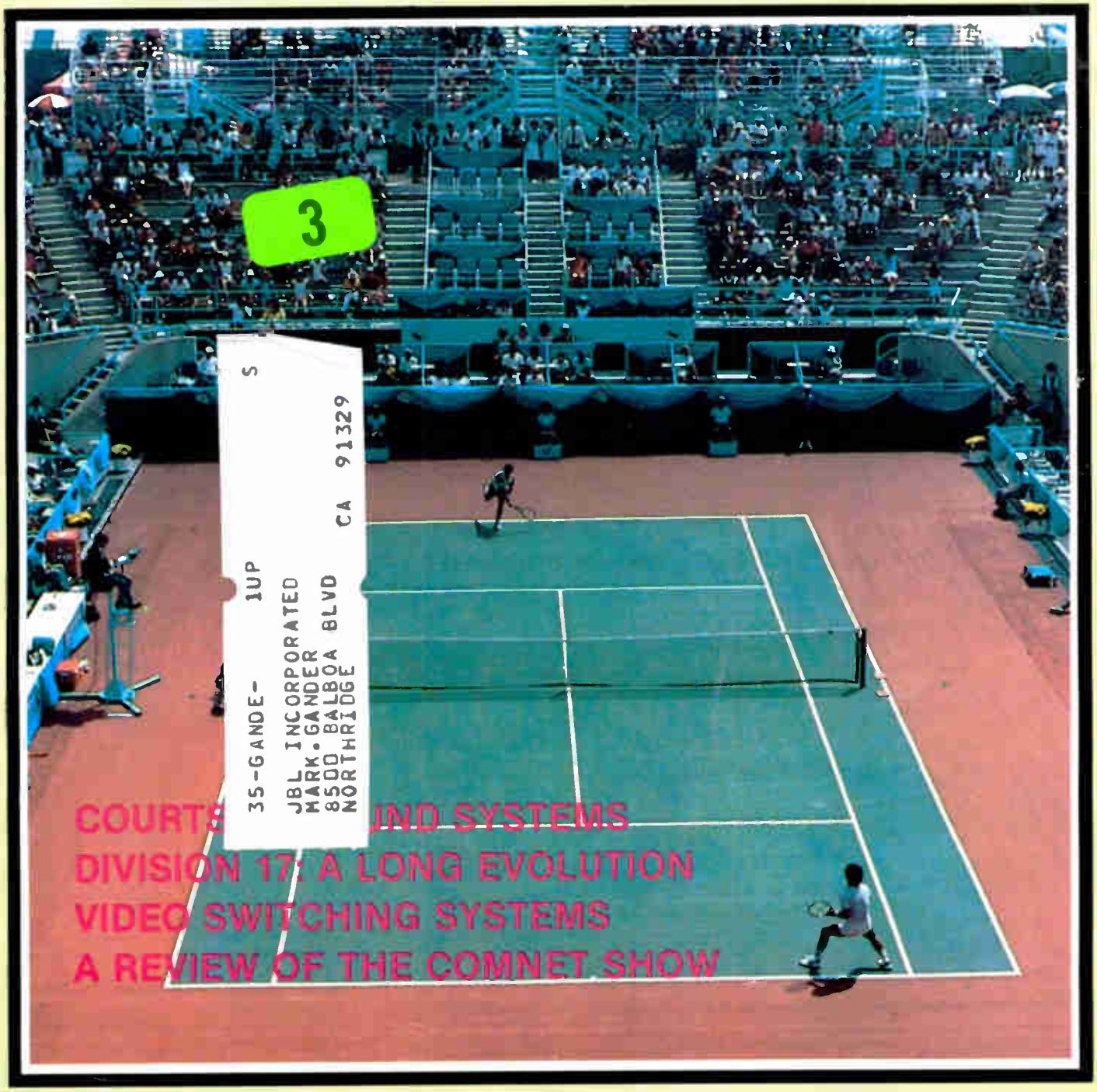
SOUND & COMMUNICATIONS

COVERING TELECOMMUNICATIONS
AND ELECTRO-ACOUSTICS

MARCH 1985

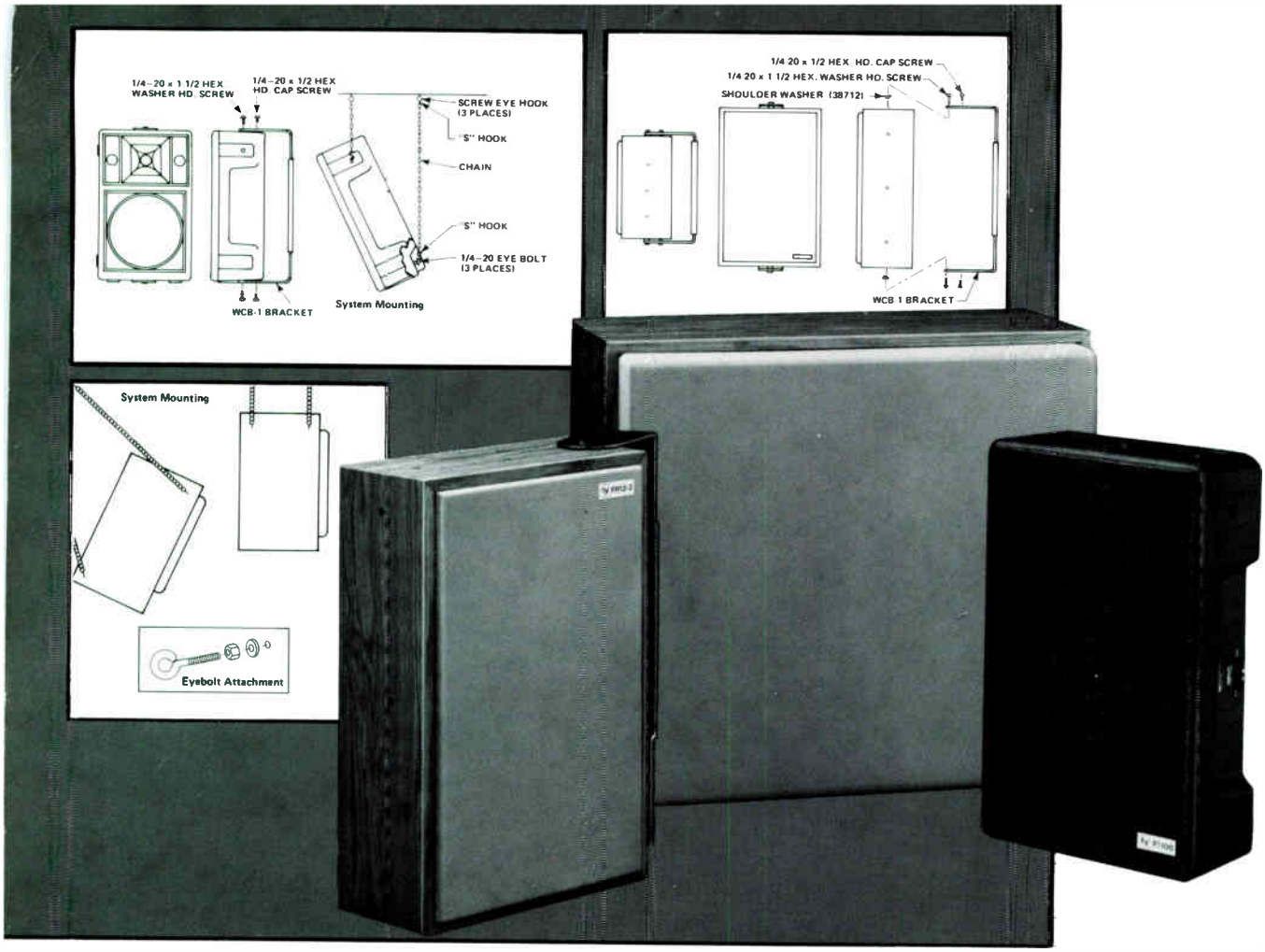


COURT[illegible]UND SYSTEMS

DIVISION 17: A LONG EVOLUTION

VIDEO SWITCHING SYSTEMS

A REVIEW OF THE COMNET SHOW



Great Sound In Small Packages

Contractor-Friendly Speaker Systems from EV

We went into the field to find what you wanted most: a wide-angle speaker system that works like a component array, but installs with ease and looks great anywhere. Then we designed our new FR15-2, FR12-2 and PI100 speaker systems to make your job easier.

All systems are factory-fitted with threaded inserts to facilitate suspension. And, with an optional telescoping bracket, the FR12-2 and PI100 can also be wall or ceiling mounted in six versatile positions. For constant-voltage operation, an optional TK60 line transformer kit replaces the normal direct input panel.


TK60 TRANSFORMER KIT

The FR15-2 and FR12-2 have oak-grained, vinyl-covered enclosures, for use indoors.

The PI100's one-piece molded polyethylene enclosure is tough enough to go outdoors.

All three new units are two-way, full-range systems featuring EV's own constant-directivity design which radiates sound over well-defined coverage zones: 90° × 40° for the FR15-2; 100° × 100° for the FR12-2 and PI100. They're all substantially more sensitive (96/97 dB, 1W/1m) and more rugged (100/200 watts long-term average power capacity) than most competing systems.

The FR15-2, FR12-2 and PI100 speaker systems from Electro-Voice. Outstanding performers that install with ease and look as great as they listen. Let us tell you more. Contact Jim Long, Director of Marketing/Professional Sound Reinforcement, Electro-Voice, Inc., 600 Cecil St., Buchanan, Michigan 49107.

Ev Electro-Voice®
SOUND IN ACTION™

NO MOVING PARTS—ZERO MAINTENANCE

Solid-state, natural voice digital message repeater

The new DMR series is the latest addition to the MacKenzie message repeater line. The DMR uses EPROM memory chips to store a digitized recording of an actual human voice. Upon demand, the digital information is reconverted to analog, and the message is played to an audio output. The messages are permanently stored and may be played over and over again. The sound is completely natural—just like a conventional tape recording—and the audio quality is excellent.

Designed specifically to handle short messages, the MacKenzie DMR series is ideal for life safety and informational announcements such as:

- ☐ *Fire alarm announcements*
- ☐ *Voice evacuation*
- ☐ *Fireman's return*
- ☐ *Tornado warnings*
- ☐ *Parking warnings*
- ☐ *"Watch your step" safety warnings*
- ☐ *Rental car return instructions*

DMR messages are stored in plug-in cartridges which are recorded at the MacKenzie factory from scripts furnished by the customer. If a message requires changing, the cartridge is returned to the factory to be erased and re-recorded with the new material. An exchange service is available to eliminate "down time".

The DMR unit consists of the message cartridge and the controller "main frame". The main frame contains the control circuitry as well as a short test message which may be used to test the system during installation and before the final message is ordered.

Features and Specifications

- ☐ All solid-state construction.
- ☐ No moving parts—*zero* periodic maintenance is required.
- ☐ Messages are stored independent of power.
- ☐ Standard message time is up to 30 seconds.
- ☐ Longer message time is available.

MacKenzie's new DMR series digital message repeaters have no moving parts. They use EPROM memory chips to play back messages from actual recordings of human voices. The sound quality is excellent—and completely natural.

- ☐ Dry contact actuation provides start/stop/test (optically isolated).
- ☐ Power is 24 VDC. Options: 115 VAC, 220 VAC and 12 VDC.
- ☐ Audio output is line level, transformer isolated.
- ☐ Barrier strip connections are used for input and output.
- ☐ Frequency response is up to 6.8KHz.
- ☐ Brackets are available for various mounting schemes.
- ☐ Size in inches is 8.0 x 6.2 x 2.4, plus desired mounting brackets.

For more information about new DMR series digital message repeaters, call MacKenzie Laboratories toll-free: **800-423-4147**.

MACKENZIE

MacKenzie Laboratories, Inc.
5507 Peck Road, Arcadia, CA 91006 USA
Telephone: (818) 579-0440

SOUND & COMMUNICATIONS

MARCH 1985 **Volume 31 #3**

FEATURES

COLUMNS

DEPARTMENTS

combining **SOUND MERCHANDISING & MODERN COMMUNICATIONS** FOUNDED 1955

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WHY ARE THEY SO UGLY?

by Chris Foreman

This month, you get to listen to another one of my pet peeves: ugly loudspeakers.

Actually, most loudspeakers are not *that* ugly. But they are not exactly attractive. With some exceptions, such as studio monitors, loudspeaker designers appear to have been interested in visual appearance only after a product has been functionally designed. The way to sell loudspeakers, it is believed, is to provide the best performance and sound quality for the dollar spent. Dress it up for sale after you've made it work.

What is wrong with this philosophy? Every salesman knows the answer! As an engineer, I learned the answer when I got my first job in sales and found out what my customers really wanted! Sure they wanted all those performance specs and that great sound quality, but in a vanishingly small package. (They also wanted it at a price that was about one-tenth of what I had in mind, but that is a subject for another editorial.)

The Sources of the Problem

There is a real and continuing conflict between what the customer wants and what we can give him. The problems are simple. First, except for low-SPL ceiling distributed systems, loudspeakers are large. Physics say they have to be large to provide good directional control and good low-frequency performance. The problem this creates is obvious: where do you put multiple large loudspeakers? An important related problem is that in most cases, the best place to position the loudspeakers turns out to be the worst place from a visual point of view. A third problem is the actual appearance of many loudspeakers which is something only a designer could love.

The Traditional Solutions

Where do you put multiple large loudspeakers? Sometimes the salesman does a real sell job and persuades an unbelieving church council that "After a few services, people will stop looking up there." Sometimes, the loudspeakers are shrouded. The trouble is that the shroud has to be even bigger than the cluster. Occasionally the system designer is lucky enough to work with the architect or interior designer from the beginning of the project. Then, the room can be designed to accept the loudspeaker system and either blend with it or hide it gracefully. Fortunately, more architects are accepting the need to do this kind of early planning and for a long time, I believed this was the only reasonable way to handle the problem.

Another Idea

Then one day a light turned on in (actually over) my head. I was sitting in a restaurant with a large hanging lamp above my table. I noticed the lamp and realized how well this piece of functional, electrical apparatus fit into the design of the room. It was an inverted copper dish with a single decorative bulb in the middle and the assembly.

Lighting designers, I realized, had hit on the right idea years ago. Disguise the functional apparatus as a decorative item. Hire a creative product designer to come up with a catalog full of attractive shapes and sizes and types of products with the primary goal being appearance. Sell the items as accents to the appearance of a room. Sell them first as decoration, second as functional. And charge the customer substantially more than you would charge them for a bare bulb on a wire.

Now go back to the church. I will bet the church council had no trouble accepting the idea of hanging lighting fixtures in the sanctuary. The council may have participated in the choice of fixtures based on the architect's suggestions for functional types and sizes.

How about a hotel ballroom? Hang a loudspeaker cluster? No way! But they will spend tens of thousands of dollars on a giant chandelier and hang it directly down from the middle of the ceiling! Do you think they would do that if the lighting fixture was a group of bare mercury lamps designed for directional control and arranged for optimum lighting coverage?

The Last Step

In my opinion, a smart loudspeaker manufacturer could double his market share in a hurry by hiring a creative product designer and by giving that person the authority to design products with appearance as the number one goal. I am not talking about a furniture designer, either. Studio monitors fit the decor of a studio. They don't necessarily look right anywhere else.

Next, as a secondary consideration, get the engineers to put a working loudspeaker inside the resulting package. Chances are the engineers will growl and complain and say it can't be done, but eventually they will come around and make it work.

If this sounds radical, it probably is. But, to their credit, several manufacturers have made a good start. Soundolier with their Four Plus and Eight Plus series have made ceiling speakers more attractive. Other ceiling baffle manufacturers have followed Soundolier's lead. JBL has taken one of its small attractive automobile speakers and now offers it in its professional line as the SLT-1. Shure Brothers, with its new ST6000 audio teleconference system has a table-top loudspeaker that looks something like a solid wood ashtray and has excellent sound quality.

More is needed however. Paging speakers are a good example. Most are unnecessarily ugly. I would bet that attractive paging speakers, placed in an attractive catalog and sent to architects nation-wide would persuade the architects to put paging systems into places without them. The manufacturer with the products and the catalog would probably double his market share in traditional applications.

What should these products look like? My first thought is to do what Soundolier has done and make them look like lighting fixtures. Blending them in with existing interior design schemes would give the loudspeakers manufacturer the advantage of allowing someone else to do all the preliminary psychological and design studies.

Another idea is the one Shure chose with their ST6000 series loudspeaker. Make the loudspeaker look like it belongs on a conference table and it would also look great on a coffee table in a hotel lobby. What better way to put low-SPL paging in exactly the place it belongs?

The same approach could be taken with sound reinforcement horns and low-frequency devices. Although the design challenge is greater since these products are larger, there must be hundreds of design possibilities.

Epilogue

One morning about a year from now a few lucky sales people will see a new catalog on their desks. It will feature a whole new product line of *attractive* paging loudspeakers. It will also include equally attractive, yet functional, mounting hardware. Pricing will be higher than conventional paging loudspeakers but the products will be well made, attractive, and designed to last "a lifetime."

When it happens, the sales people will pinch themselves to see if they are dreaming. Then they will get to work on the easiest sales they have ever made.

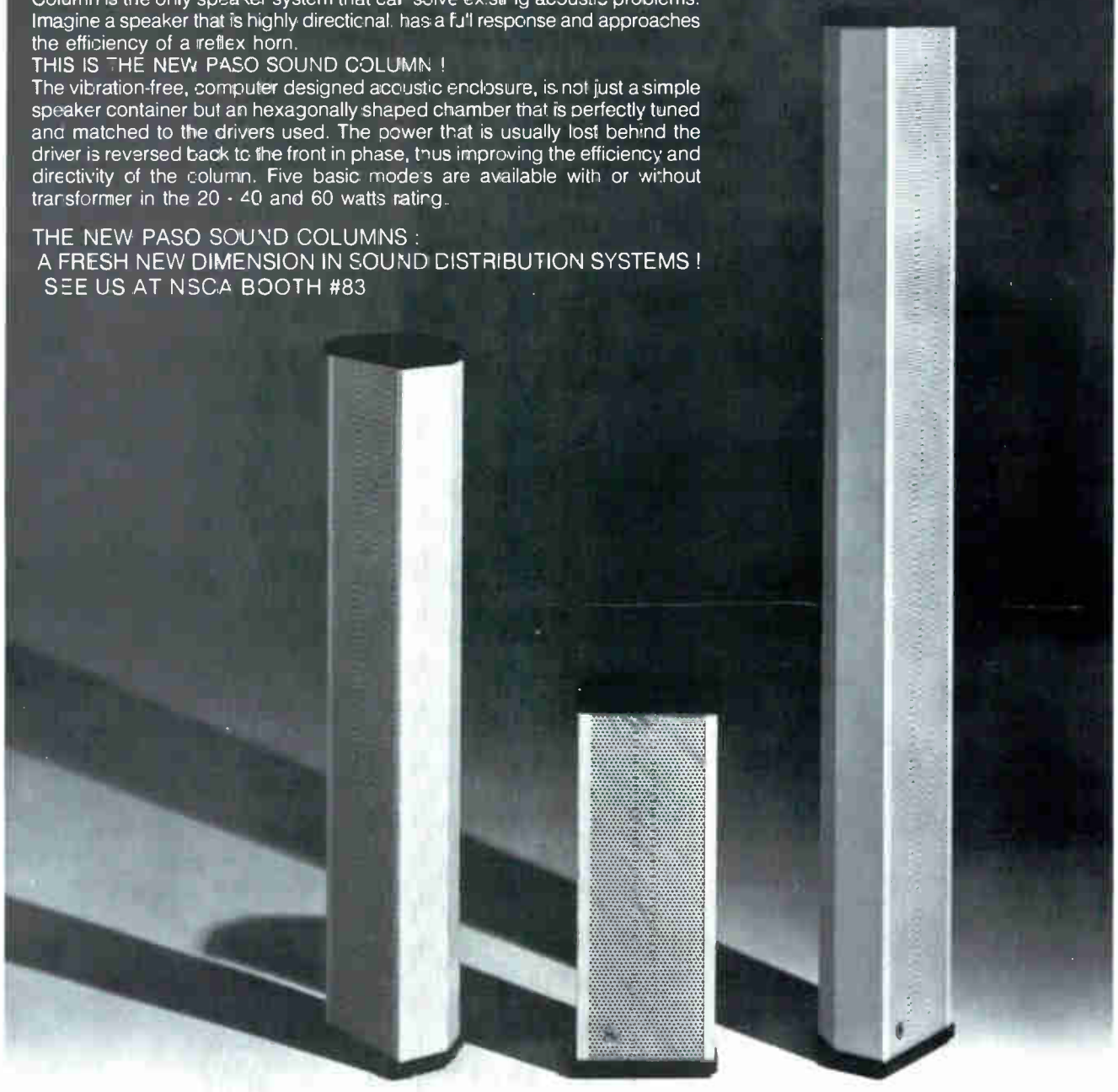
WE HAVE PUT THE "EFFICIENCY" BACK INTO THE SOUND COLUMN !

That's right ! For too long the "Sound Column" has lost its right place in sound reinforcement systems due to poor design and yet in many applications the Column is the only speaker system that can solve existing acoustic problems. Imagine a speaker that is highly directional, has a full response and approaches the efficiency of a reflex horn.

THIS IS THE NEW PASO SOUND COLUMN !

The vibration-free, computer designed acoustic enclosure, is not just a simple speaker container but an hexagonally shaped chamber that is perfectly tuned and matched to the drivers used. The power that is usually lost behind the driver is reversed back to the front in phase, thus improving the efficiency and directivity of the column. Five basic models are available with or without transformer in the 20 - 40 and 60 watts rating.

THE NEW PASO SOUND COLUMNS :
A FRESH NEW DIMENSION IN SOUND DISTRIBUTION SYSTEMS !
SEE US AT NSCA BOOTH #83



paso
SOUND PRODUCTS

For more information on Paso Sound Products, please contact:
Paso Sound Products, Inc.
14 First Street — Pelham, New York 10803
Phone 914 738 4800 Telex No. 646783

NEWSletter

ACQUISITIONS AND MERGERS

REPUBLIC TELECOM ACQUIRES COMTECH COMMUNICATIONS

Republic Telecom announced on January 24 that it had acquired Comtech Communications of Boulder, CO. Republic Telecom provides telecommunications systems and services in the United States and internationally. Comtech Communications provides network system products used primarily in private networks by corporations and telephone authorities. Republic views the Comtech acquisition as a major step in its post-divesiture marketing strategy.

VAN RYSWYK BUYS WHITE INSTRUMENTS

White Instruments, a 30 year-old manufacturer of industrial filters and filter related audio products, has been purchased by Carl Van Ryswyk, former vice president of engineering at White Instruments. The company will continue to operate as White Instruments Division of C. Van R, Inc. During his 20 years with the company, Mr. Van Ryswyk has designed countless industrial filters and White Instruments range of audio products. Many of the products have become industry standards.

EARNINGS REPORTS

RCA REPORTS A RECORD FOURTH QUARTER IN 1984

RCA reported on January 22 that it had record sales and earnings in 1984 and that its fourth quarter earnings were up sharply on record sales compared to the fourth quarter of 1983. Full year earnings rose 50 percent to a record $341 million from $227 million in 1983. Earnings per share increased 71 percent to $3.30 per share from $1.93 per share in 1983. Sales for the year increased 13 percent to a record $10.11 billion from $8.98 billion in 1983. For 1984, record profits were reported by the Broadcasting and Electronics divisions after excluding the special VideoDisc provision.

LEAR SIEGLER REPORTS RECORD FOURTH QUARTER EARNINGS PER SHARE

Lear Siegler reported on January 23 that its sales, net earnings and earnings per share hit records for the second six months ending Dec. 31, sales were $1,144,981,000 up 50 percent from 1983's $764,235,000 and net earnings were $41,344,000 up 21 percent from 1983's $34,111,000. Fully diluted earnings per share were $2.21, a 13 percent increase from 1983's $1.96 and primary earnings per share were $2.27, up 12 percent from 1983's $2.02.

ED--While both of these companies are highly diversified, both take a significant amount of their profits from communications. Thus, these reports from the giants add support to a positive outlook for 1985 for the communications industry as a whole.

NEW REPS AND DISTRIBUTORS

PASO APPOINTS CENTURIAN MARKETING AS MIDWEST REP

Paso Sound Products announced the appointment of Centurian Marketing Associates as a Paso representative in the states of Iowa, Kansas, Nebraska, Illinois, and Missouri.

CONTRACT NEWS

MITEL INC. AND SONECOR SYSTEMS SIGN 5-YEAR EXTENSION

Mitel Corporation announced on January 22 that its U.S. subsidiary, Mitel, Inc. and Sonecor Systems, a division of Southern New England Telephone have signed a five-year extension to a contract for distribution of the Mitel line integrated products. The contract includes PABX products and an agreement to jointly work on hardware and software applications for current and future Mitel voice and data products.

ED--Sonecor, in continuing this relationship, appears to be typical of the hardware divisions of the divested B.O.C.'s who seem to want to separate themselves as far as possible from AT&T.

ADC NEGOTIATING WITH AETNA TELECOMMUNICATIONS LABORATORIES

ADC Magnetic Control Company of Minneapolis, MN, has announced that it is negotiating with Aetna Life and Casualty Co. to acquire the assets and intellectual property rights of the Aetna Telecommunication Laboratories, Fiber Optic Component Division, located in Westborough. MA. in the event that the acquisition is consummated, Peter Gombrich a senior vice president of ADC, will be named president and general manager of the new fiber optic operation, intended to be established as a separate subsidiary of ADC. Gombrich will relocate to Westborough, MA, but will continue as an officer of ADC.

The subsidiary's corporate name will be ADC Advanced Fiber Optics Corp. It is intended that the operation will be dedicated to the further development of fiber optic technologies and products for markets including, but not limited to, the telecommunications marketplace.

INDUSTRY NEWS

NATA MAKES CHARGES AGAINST THREE BOC SALES AGENCIES

New England Telephone, New York Telephone and Wisconsin Bell have been charged by NATA with failure to authorize the FCC mandated "reasonable number of third party vendors" to market basic services, including Centrex, under their sales-agency programs. Following a July 11, 1984, FCC order, Bell Operating Companies (BOCs), unregulated affiliates have been allowed to market customer premises equipment and basic services jointly, provided the same arrangement is available to a "reasonable number" of affiliated vendors. When the complaint was filed, none of the three BOCs had selected more than one independent vendor. NATA is motioning for a FCC summary judgment to press for stepped-up acceptance of unaffiliated vendors as telco agents.

THE COMING TRANSMISSION GLUT DISCUSSED IN MEDIA

Electronics Weekly Magazine reported in the January 21 issue that more than 150 commercial satellites could be in orbit by the end of the decade compared to the approximately 25 in position today. This should mean at least six times the satellite communications capacity available today.

INDUSTRY NEWS

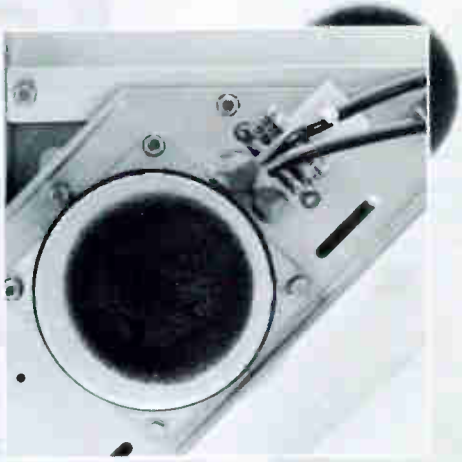
Fortune magazine in the January 7 issue, reported that "If all the new (fiber optics) projects get off the drawing boards, the capacity of the U.S. long-distance network would grow more than six-fold in the next four years."

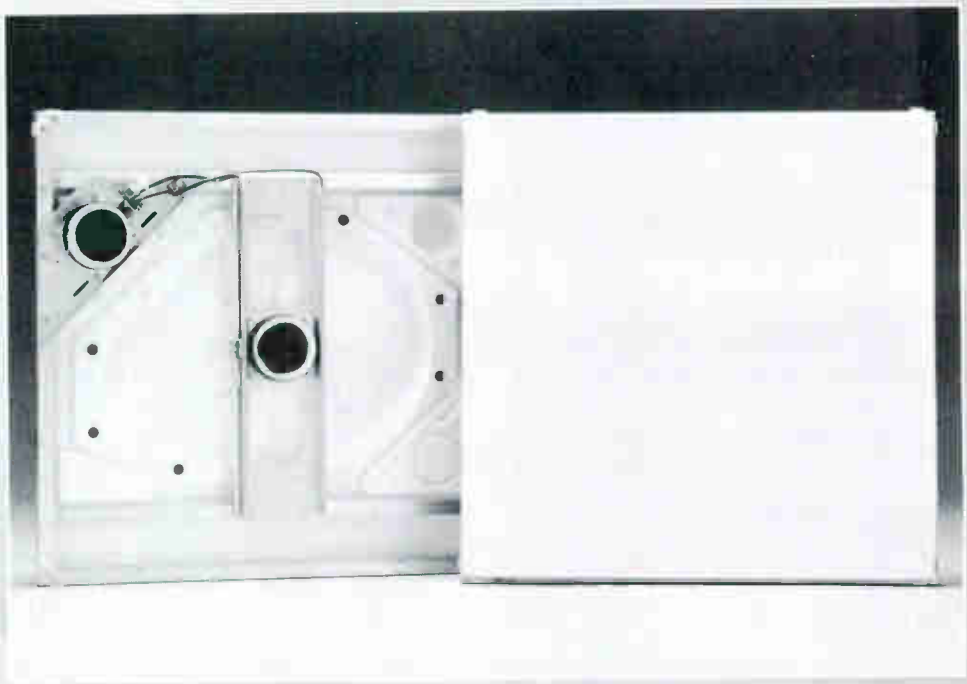
Put these two figures together and you get a very conservative estimate that, by 1990, we will be faced with a transmission glut of a dozen or more times the capacity we have today. This could mean "fare wars" that would greatly benefit end users but could spell the end for smaller transmission line suppliers. It should also mean very good business opportunities for those companies whose business is hanging equipment at the ends of those transmission lines.

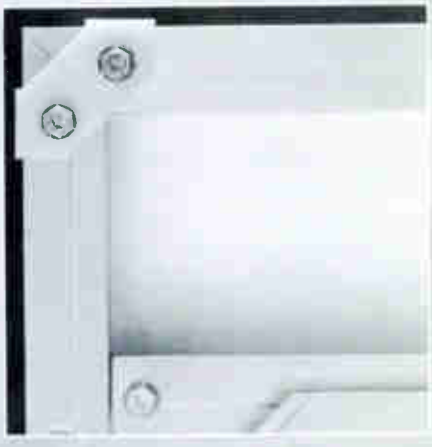
PEAVEY ELECTRONICS RECEIVES PRESIDENT'S EXPORT AWARD

Peavey, a musical instrument and sound reinforcement equipment manufacturer based in Meridian, MS, has been awarded the Presidential "E" Star Award. The award is their second exporting honor presented by the Office of the President of the United States. Since Peavey's first Presidential "E" Award in 1977, the company's export sales have increased 285 percent.

Some Things are Better Than Others...







Introducing One of Those Things...

Consider a speaker which easily fits into a 2′ × 2′ drop ceiling, becoming an invisible part of it. With such wide dispersion that it can replace up to 12 ordinary speakers. With the dynamic range to provide foreground as well as background capability.

BES technology brings a whole new level of performance capability to the ceiling environment. For example our C70D specifications rival well known monitor systems of great bulk and expense —which *won't* fit in a ceiling. Frequency response ±3 dB 40–19 kHz; distortion less than 1% above 400 Hz at 96 dB SPL.

What you hear is precisely etched high frequency response, along with solid impact response at low frequencies. Furthermore, 180° dispersion across the entire rated spectrum plus Phase Coherent radiation reduce the tendency to feedback

Often you can install a BES High Performance Ceiling Speaker for far less than traditional ceiling speakers.

Some things really *are* better than others.

B.E.S.

345 Fischer Street, Costa Mesa, CA 92626
TELEX 67-8373 / 714-549-3833 / **800-592-4644**

☐ Please have a sales rep contact me.
☐ Please send me the BES C70S. C70D ceiling speaker brochures.

NAME _____
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TELEPHONE ( ) _____

IMPROVING INTERCONNECTION

by Jerome Brookman

The industry's romance with interconnection has evaporated.

It appears—from all the publicity that comes to this desk—that the public's interest in interconnection has evaporated, too.

The marketplace for customer owned telephone equipment has been whittled down to the small business area (25 people or less in a commercial establishment) and the home market.

The local dealer finds himself competing with the other telecommunications dealers offering personal computers as a throw-in to capture the sale of a key-system. In addition, there is the local telco marketing of multiple product and services!

A very short-hopping survey indicated that anything resembling the Mitel "distributor program" among other prime suppliers, is not widespread.

The marketing of interconnection systems has fallen into the pattern of—price cutting. Swapping one piece of hardware for another piece of hardware never did make a profit for the local dealer.

The local dealer, in some instances, has been denied direct access to the factory price for equipment because his credit has evaporated. His source for systems, hardware and accessories is the large distributor such as Graybar, North Supply, Buckeye Telephone, and Midwest Telephone. The difference in the cost of product—direct from manufactuer vis a vis the distributor—can spell a lost sale!

Now comes Martin McDermott, Vice President of National Accounts/Mitel Inc. His full statement as published in the February 1985 issue of *Superswitch News* states:

"1984 was the year Mitel charted a course into unknown waters with the establishment of a second channel of distribution. This second channel is known as the Authorized Major Accounts (AMAC) Sales Program. These programs came about because of the SX-2000™ and the support that was needed to serve the resulting Mitel customer base.

"With the new distribution strategy, Mitel has retained its flexibility while attempting to better fulfill the requirements of the marketplace in regards to that elusive commodity called service.

"In announcing our National Account Sales Program, I do so with the realization that (1) most major companies have such a program, and (2) many of those companies would say that the success of that program has been limited. Various reasons would be proposed for the limited success, the most prevalent being competition of the manufacturer with the channels of distribution. Thus, in structuring the National Account Sales Program at Mitel, our paramount concern has been support for our distribution channels and their customers. Here's how the program works:

"There will be five categories of national accounts; but simply put, a 'national account' will require multiple locations for a large dollar volume annually. A national account will also require product management and will want to deal only with a manufacturer. Mitel will enter into a national account sales agreement and as the systems are ordered for the various locations, the AMAC covering that area will have the system, in its entirety, assigned to his organization minus the cost of sales to Mitel, which will be minimal...

"...The customer receives the stability of Mitel as an umbrella project manager and the AMAC receives a sale (and its profits) that he otherwise wouldn't have if it weren't for the National Account Program."

A very short-hopping survey indicated that anything resembling the Mitel "distributor program" among other prime suppliers, is not widespread.

Thus, for the non-affiliated local dealer in interconnection systems/products, the need for a fallback position is imperative. There are not many choices available from prime sources.

So marketing tricks and services become the order of the day!

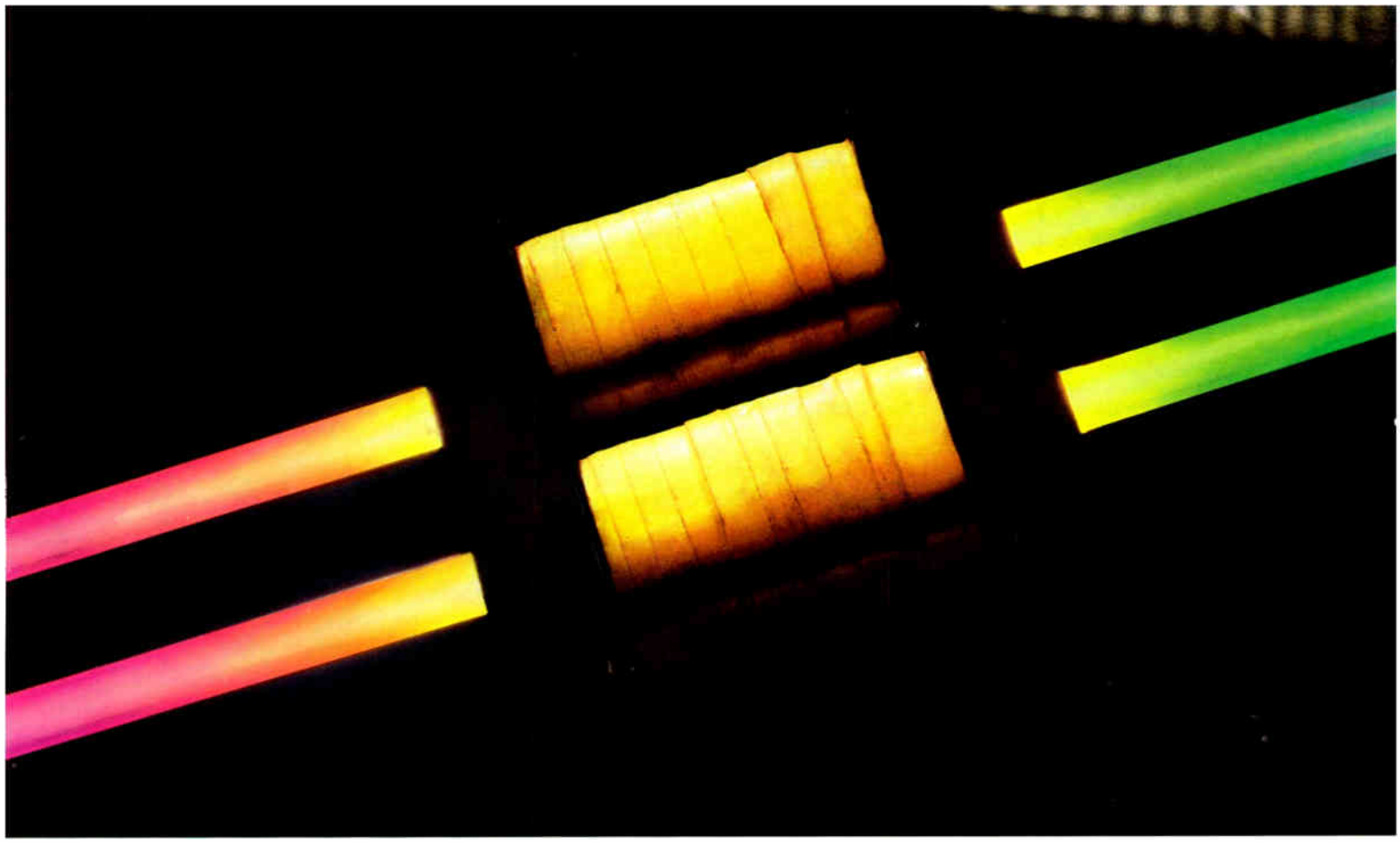
A tie-in arrangement with the local business machine dealer handling personal computers, might be one way to market telephone systems. A better tie-in could be locating rebuilt equipment suppliers whereby the initial cost of equipment is lower. If the application does not require the fourth generation of microcomputer-based gear, installation costs will then be minimal.

A marketing trick is the peddling of a "Service Coupon Book." Each coupon is worth a fixed amount of money on a service call. Service call charges are printed on the cover: a first call, so much money. A switch adjustment (like replacing a blown power supply), so much money. A handset move, so much money. The coupon is intended to work as "the cents-off coupon" the way a housewife uses coupons towards her purchases at the supermarket. The distribution is made by a neatly-dressed solicitor who knocks on office doors.

A marketing service should be performed for the existing customer—an outright purchaser, or a lessor. The customer is issued a Service Coupon Book, for each recommendation that develops into a sale, making it possible for an on-going account, to obtain his servicing at the lowest cost.

A marketing trick is to work up a "dog and pony" show for presentation to the local service organizations: Rotary, Lions, Shriners, etc. The demonstration wants to be built along the "tricks possible with my equipment." Don't sell hard-

(continued on page 48)



Our painstaking vacuum and coil-winding technology increases efficiency and eliminates acoustical "buzz."

Our Scientists Had To Operate In A Vacuum To Give You A New Quality Of Sound.

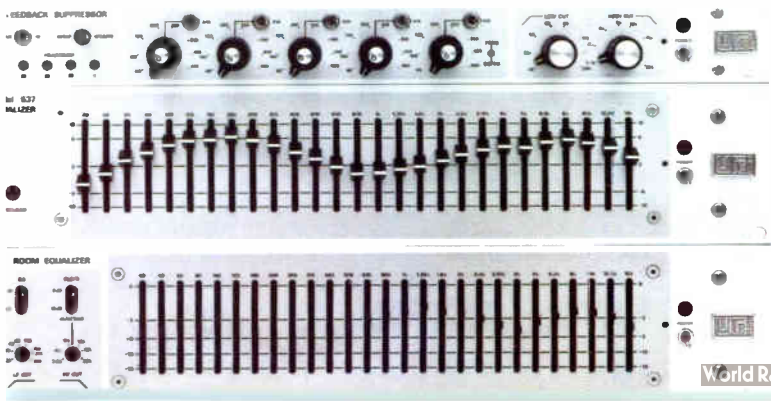
The quality of any sound system begins at its source. Precision in the power supply is vital to capturing and maintaining the fullness and subtlety of amplified sound. The need for that exactness is why we insist on operating in a vacuum rather than depending on outside sources.

A vacuum tank, to be precise. An environment in which our transformer is created with an air expulsion process. Where air pockets are purged from multi-layers of the transformer's high grade core laminations, and the core made airtight with a special impregnating sealant.

This process gives us impeccable control of transformer function and quality. Which gives you the assurance of the most efficient transfer of power possible, and an end to the acoustical "buzz" that so often fights sound purity.

To a lot of manufacturers the lowly transformer is far down on the list of priorities. For us, every element in the sound system relies on the exacting performance of every other element, and must be painstakingly attended to.

Whether your requirements are simply for outstanding quality and reliability in a church or boardroom system, or for the demands of driving a high-power sound reinforcement array, you'll find our technology giving outstanding clarity to your work in products from our 6000 Series amplifiers to our equalizers, limiter/compressors and a full line of other signal processing equipment. To find out what system is designed to meet your needs, contact your authorized JBL/UREI professional products dealer today.



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Northridge, CA 91329
U.S.A.

JBL UREI ELECTRONIC PRODUCTS

DIGITAL DEVELOPMENT

by Hartley D. Peavey

Since World War II, there has been essentially only one major change in audio power amplification. During the late '50s and '60s, solid state amplifiers replaced tubes as the "devices of choice," but, in essence, the general "mode of operation" has been essentially the same. In the last 10 years, sound reinforcement has come from art to science, and while many new "tools" have become available for the sound man, the final electronic link in the audio chain has seen only moderate improvement. Vacuum tube amplifiers were inefficient as well as extremely heavy. Solid-state amps solved many of the difficulties with tube type equipment, but still averaged considerably less than 50 percent efficiency, resulting in the classic heat-related problems

High-powered Class AB amplifiers have become an integral part of the commercial/pro sound market over the last 20 years. The original high-powered amplifiers were tube-type units untilizing multiples of large beam powered pintodes similar to those used in radio transmitters or horizontal output applications in commercial TV sets, i.e., 6146s, 6L07s, etc. These tube-type designs gave way to single diffused silicon power types as exemplified by RCA's 2N3773 series and the various successors.

Of late, many manufacturers have extrapolated on the earlier Class AB designs primarily by changing the *output* devices to more modern bi-polar types or to power FETs. Significantly, even the highly "touted" FET-based designs generally used bipolars in most parts of the circuitry except the output. The current generation of power amp designers apparently have approached "Mach One." Almost any variation of output devices keep running into the "efficiency barrier" of Class AB operation.

Presently, several well-respected companies have attempted (with limited success) to circumvent the "dissipation" problems of their fundamental Class AB designs through utilization of a "gear shifting" power supply. In essence, these amplifiers feature two or three "steps" in their power supply voltages with appropriate circuitry included to shift voltages (gears) automatically to match the demands of the input signal. These "gear shifting" designs actually do help minimize the signal Class AB dissipation problem.

However, the *efficiency* problem remains. Some very esoteric and often misleading monikers have been applied to these "gear shifting" amplifiers, but the unfortunate fact is that they still suffer from the same inefficiencies and corresponding heat dissipation problems, especially at the higher outputs. This problem is compounded by the fact that the slightly decreased heat dissipation made possible by the various "voltage shifting" schemes often prompts the designer/manufacturer to skimp on heat sinking and perhaps most importantly, the power supply/transformers.

Often these gear/voltage shifting power amplifiers feature "demitasse" power transformers, marginal heat sinks, and are often crammed into relatively small chassis. Evaluation of the various competing designs illustrated that these voltage-shifting techniques were only "band-aids" and that the underlying problems of efficiency and heat could only be solved by taking a totally different approach. In professional audio, history has consistently shown that merely covering up a problem tends to make the end result worse. This realization prompted our R&D staff to seek a totally different approach.

In researching the various approaches, it seemed apparent that some type of a "switch-mode," PCM, or "Class D" approach might be highly attractive. Our research began with a thorough review of the literature and an investigation of switch-mode type power amplification. Several variations of switch-mode/Class D designs were evaluated, including a "pre-packaged" hybrid affair from a company in California. Unfortunately, all these approaches suffered numerous problems, and while we did achieve several designs that would indeed pass something vaguely resembling a sine wave, each approach resulted in significant and unacceptable problems with performance and/or reliability. It seemed that approximately 50 to 60 watts reliability became a severe difficulty and distortion remained a major obstacle until several breakthroughs (patents applied for) were achieved.

Digital Energy Conversion Amplification (DECA) has provided, for the first time, a solution to the efficiency problem, thus largely minimizing the heat dissipation that has been plaguing amplifier designers and users since the beginning. The DECA™ concept represents the first commercially available production "digital" power amp. While it is true that our DECA utilizes switching techniques, it's totally different from anything previously offered to the market—not only in terms of efficiency, but in terms of sound characteristics. The DECA's unmatched 90 percent conversion efficiency qualifies this amp as an "energy saving device," which is highly significant to the commercial user/installer.

It is our belief that the field of audio amplification will be changed forever by the introduction of this radically new and different approach. Even the physical construction of the DECA is substantially different since the "works" of the amplifier more closely resemble that of a VHF radio transmitter than that of an audio amplifier.

The concept of digital energy conversion is rather simple, although the actual implementation is somewhat more complex. There is, indeed, some reasonable amount of circuit complexity, but the implementation of the DECA™ principles are certainly no more costly than most high-performance conventional Class AB amps. Six separate DECA patents have been filed, with a seventh currently being submitted. All in all, this new approach to audio heralds what we feel is a major milestone in the field of audio amplification.

A full technical description of DECA™ principles would be too lengthy here, and, additionally, there are certain patent considerations that must be accommodated. As a generalization, the DECA process may be generally thought of as a regulated power supply that is modulated at the audio rate. The DECA, in addition to its unmatched efficiency embodies a number of extremely unique characteristics.

Most conventional Class AB amplifiers exhibit significant open loop distortion typically in the range of three-eight percent. In addition, conventional (AB) amplifiers tend to have high order harmonic distortion (primarily as a result of "crossover effects"). Typically, this distortion is reduced to tolerable levels throughout by considerable amounts of negative feedback.

It is generally known that excessive negative feedback contributes greatly to a number of amplification problems, most noteably that of transient intermodulation distortion (TIM). Most engineers agree that small amounts of negative feedback are highly desirable *if* adequate performance can thus be obtained. Some hi-fi amplifiers have reverted to massive Class

(continued on page 32)

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COURTSIDE SOUND SYSTEMS

by Emily Sobin

Growth in the popularity of tennis—as a competitive game, as great exercise, and as a spectator sport—has inspired the upgrading of courts all over the continent. That, of course, includes the sound systems. We want to hear the umpire's call, loud and clear.

Canada's expanded love affair with tennis caused Tennis Canada to add so many more places for spectators at its tournament site that a completely new sound system became a necessity.

In 1976, Tennis Canada, a nonprofit organization, created the National Tennis Centre on property it rents from Toronto's York University, and, in 1980, built an amphitheater for its center court. The concrete stadium is the annual staging area for the Canadian Open Tennis championships. The championships alternate the prestigious Players International, for men, and Player's Challenge, for women.

A permanent headquarters for Tennis Canada now is under construction next to the stadium. The new headquarters will contain a training center for Canada's most promising players and will include the new sound system specifically designed to meet the demand for bigger and better reinforcement. Once the center is ready next May, the staff will be able to work there year round.

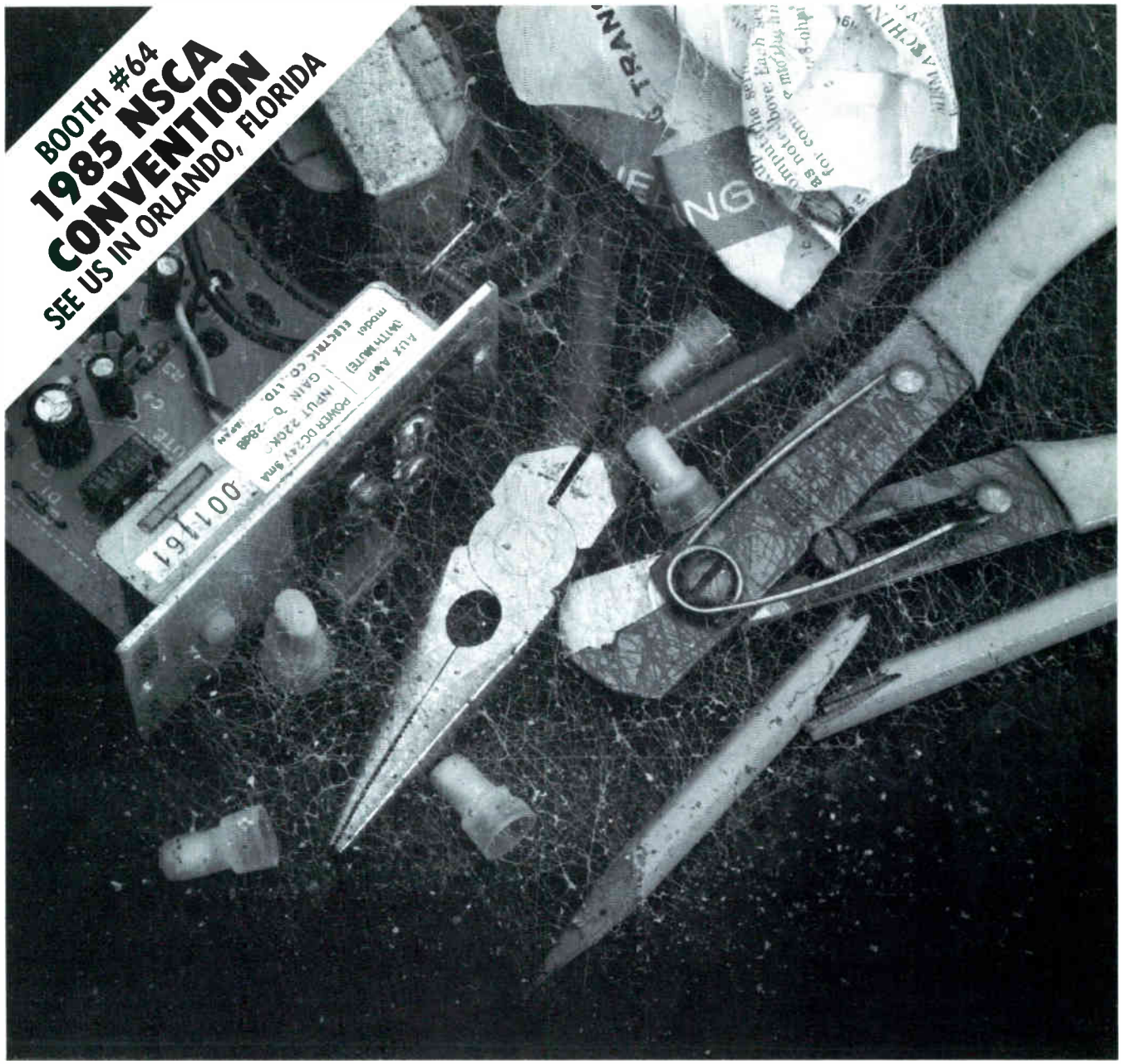
Until now, a rented sound system was installed annually to enable the 9,000 or so fans at center court to hear the umpire and the public address announcer. Expansion of the Center is part of the new building program. It includes four additional courts under a bubble for winter use. This will give a total of 14 courts, ten of which will be used at the championships. The rented sound system's limitations quickly became obvious.

The company that rented out the previous system placed speakers on light posts in each of the four corners of the stadium. These were inadequate to cover all the seating areas, so Tennis Canada called on Toronto-based sound contractors Reid and Campbell to create a permanent installation.

For this assignment, Reid and Campbell worked in conjunction with Atlas Electronics Limited, the Canadian representative for Bogen sound equipment and for Atlas Sound speakers. Together they devised a unique system for a unique situation.

Several limitations were central to the installation design. For one thing, spectators do not want towers or supports in front of them that might obscure their view. For another, the shapes of the spectator areas change when smaller bleacher sections are transferred to other nearby locations. In addition, the practical suggestion of a goose-neck microphone for the umpire was ruled out because it could obstruct a view of the court at a crucial moment.

The first consideration was selection of, and locations for, the new 120 degree×60 degree horns. They were mounted on rear supports above the major bleachers. The supports are 10-inch high galvanized steel tubes. Standard hardware was used to bolt ten



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of them into place around the top of the amphitheater.

To cover the remaining dead spots in smaller sections, another of the Atlas APC30T horns was added to each of the corner poles. The next order of design was the choice of amplifiers.

One primary consideration was the fact that smaller tennis events with fewer spectators also take place at the National Tennis Centre. Then, too, some matches are held on court #1, which is outside the amphitheater, but also requires sound amplification.

The design team decided on a dual system to allow a choice of either large or small amplifiers, as needed according to location and crowd size. However, equalization, because of the promise of feedback from the concrete walls, was an important consideration, too.

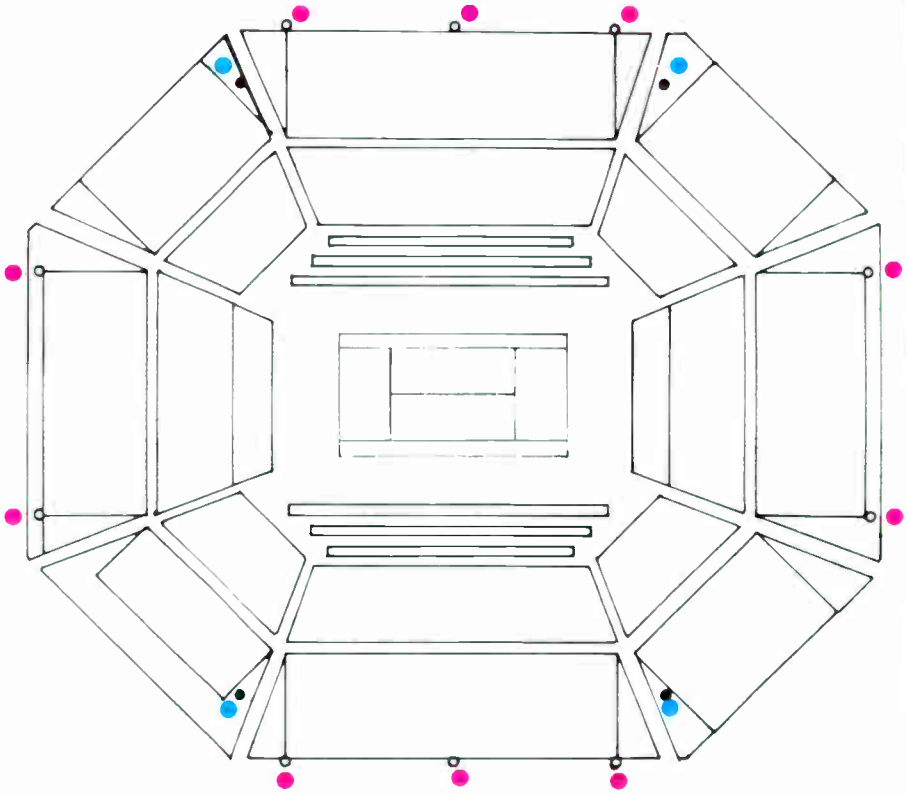
For the smaller events, Bogen's CT100B with its 100 W of power was the choice. Its ten slide filters easily handle boosting and attenuating for acoustic equalization and its adjustable electronic compressor assures uniform output no matter what microphone technique is in use.

For larger crowds, such as those at international tournaments, the choice to expand required sound system power was two Bogen MT-125C power amplifiers with 125 W each and that company's CFC-1 2/3-octave equalizer/acoustic feedback controller, which also has ten active slide filters. The new system provides each tennis tournament with the capability for six microphones, microphone precedence, two telephone lines and two auxiliary sources, such as a tape deck and a tuner.

A microphone in front of an umpire's face possibly could bring charges of loss of the line of sight during a tense moment. To Tennis Canada officials, the only acceptable alternative to the suggested goose-neck microphone was a lavalier microphone.

The design crew did not look kindly upon a lavalier microphone in this outdoor setting. The distance between the umpire's mouth and the microphone cartridge may be as much as 18 inches. This, of course, requires more gain on the amplifier input setting than a hand-held dynamic microphone would.

As they suspected, the sound was none too good when they set up the system and tested it with a 3020 B&K Dynascan function generator with a speaker to drive the microphone at an acceptable level. Added to microphone difficulties was the fulfilled promise of



feedback from those concrete walls.

The technicians got a "burst" frequency from the 3020 in order to pulse the microphones with the audio spectrum. Then they could determine which frequencies must be amplified and which attenuated in order to prevent feedback while maintaining proper amplification.

Using the values obtained by their test, they set the combined 20 equalizer controls of the CFC-1 and the CT100B where indicated. Then, they say, "it was a simple matter of placing a remote gain control in the spectator area for local adjustment of volume." Volume level is reset as needed for the number of spectators around center court at a given event.

The system was up and running in time for the August '84 Players International. Its superiority over the previous system was obvious to the delighted audience and tournament backers.

Atlas Electronics and Reid and Campbell enjoyed the collaboration. They feel that combining the expertise of the company representing the equipment with that of the sound contractors gave Tennis Canada a complete, superior system that will last for many years.

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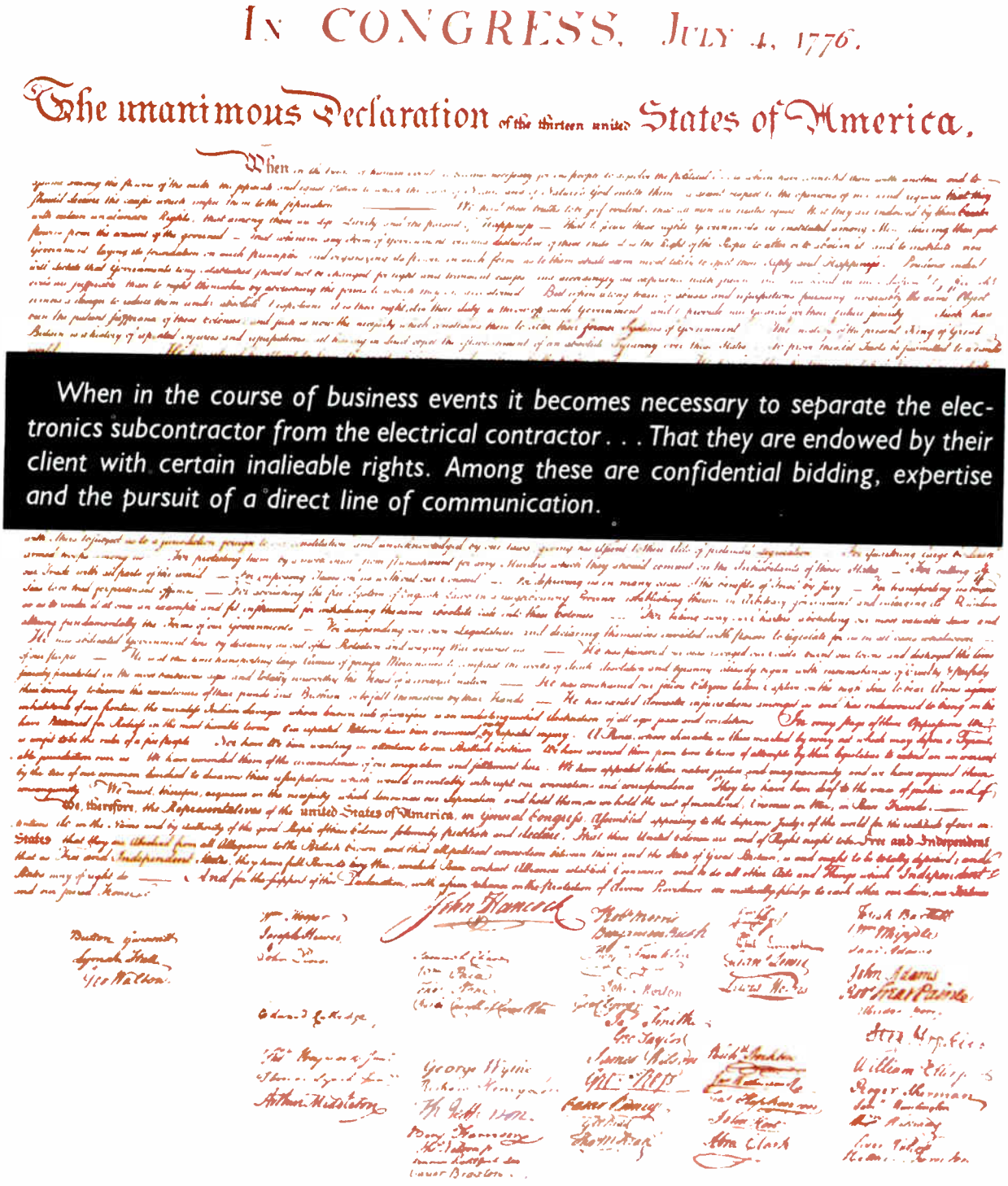


DIVISION 17: A LONG EVOLUTION

By Elliot Luber

Little has transpired since David L. Adams' talk on the establishment of a Division 17 for sound and other specialty electronics contractors at last year's NSCA Convention. But the concept still lingers in the minds of many, as do other dreams deemed unobtainable in the immediate future.

The Construction Specifications Institute's recommended format for contracts includes sound systems and other electronic specialties as subs under the electrical subcontractor in its final division, Division 16. Adams created a good deal of excitement last year by proposing a Division 17, but that is a difficult task to bring about. It obviously conflicts with the interests of the electrical contractors, and both sides present common sense arguments for and against the move.

History—not to mention combined clout—is on the side of the electrical contractors. Some very sizable companies in the heating system business have long been unsuccessful in their own attempts to become Division 17, as they must go through the electrical contractor for wiring of complex heating control systems. Also, the NSCA is not as firmly established as the NECA, and the membership of contractors from this industry is said to be more independent and have less free time to coordinate such a massive campaign at this time. Nonetheless, talk goes on about Division 17, though not as enthusiastically as last year. Some contractors report successes negotiating individual contracts including a Division 17, particularly in large jobs, which require heavy electronic systems, such as prison security systems.

"Approval of a Division 17 would mean recognition for the sound, video, and electronic specialty contractor as a separate contracting entity," explained Adams, contacted at his Denver office. "Electrical contractors in general lack the skill or capability to install such sophisticated equipment, and the end result is loose control of the project. The owner deals with the architect whose engineer works with the general contactor, who works with the electrical contractor, who works with the sound contractor. Often the system will not work as specified, and it's a long way for the sound contractor to communicate with the owner on what he needs and wants."

Vic Hall of Communications Company, San Diego, CA, and a member of both the NSCA and NECA, said: "I've heard no more on the matter since the NSCA Convention, but we would like very much to have a Division 17. In this industry, we're all pretty busy keeping our businesses going, and we don't have enough meetings to deal with issues like that.

"Division 17 would help to eliminate some of the bid farming, and it would bring us closer to the end user. Under the present system the customer is less likely to be satisfied, as it's hard to communicate with the customer. Separating the specialty electronics contractors would make it less likely for bid shopping to occur."

He explained that under the present system, bid shopping, or the unethical disclosure of the low bid, can occur on either of two levels, since the general contractor bids the job to an electrical subcontractor, who in turn bids the job to a specialty contractor. He said this often results in someone taking the job at a loss in the hope of making up the difference on extras.

He said in many cases the specialty contractor realizes that the technical specifications set won't work, and he is then unable to bring the information to the customer with informed recommendations without getting involved in major disagreements down the chain of command.

NSCA president Harold Landers, of Signal Communications, Seattle, WA, said contractors have successfully negotiated Division 17 contracts for sophisticated system jobs such as prisons, which require heavy communications, closed circuit TV, automatic doors, etc. He said his company is an example of that. But he admits that "not all sound contractors are capable of handling financing for major projects," one benefit of the current system. He said the industry is hard to gauge numerically, but he estimated there are between 800 to 1,200 contractors capable of handling such a job at present.

Landers said the NSCA has discussed the issue on several occasions, but time constraints would probably prevent such a massive undertaking at present. It has not taken an official position on the issue. He said, however, that the NSCA is growing considerably, based on last year and a

similarly heavy convention turnout expected this year, which could have positive long-term effects on the amount of services provided.

Robert Wilkinson, director of services for the National Electrical Contractors Association (NECA), obviously opposes any attempt to establish a Division 17, but he explains the current system was designed to provide a workable order to massive construction projects, and feels its drawbacks would not be relieved by a system which could create confusion on its own.

Wilkinson, who is also president of the Association of Specialty Contractors—a group comprised of organizations for electrical, roofing, masonry, mechanical systems, sheet metal, plumbing, heating, and painting—said: "There are already 16 divisions to be negotiated on a contract. If all of the little specialties went out separately, there would be no coordination. The system was established so that major projects could be managed.

"All electrical devices should continue to come under the responsibility of the electrical contractor, who supplies power to them."

Adams' Remarks:

What? You say there are only 16 divisions in the Construction Specifications Institute (CSI) format? This is true, but I believe the time has come for the creation of a Division 17 for electronic systems.

I first publicly addressed this issue in January 1984, and the response from those involved in all aspects of the sound, communication, and video industry has been overwhelmingly favorable.

The current CSI Format places most audio and video systems in Division 16, Electrical. Under Section 16700, Communications, are the following subsections: intercommunication systems; public address systems; and television Systems. Other electronic systems, such as security, life safety, fire alarm, etc., can be found in subsections of Division 10—Specialties, Division 13—Special Construction, Division 15—Mechanical, and in other sections of Division 16.

The entire work of Division 16 is bid by electrical contractors. Yet, everyone understands that the audio and video systems will be subcontracted by the electrical contractor to a firm or firms that specialize in installing such systems because few electrical contractors have the knowledge, capability, tools, equipment, facilities, or, for that matter, the desire to install audio and video systems.

A majority of the electronic systems being designed today are far too complex to be installed by anyone other than the most highly trained and fully experienced contractors. Most electrical contractors acknowledge this fact. Obviously, there are portions of the electronic systems that rightfully belong in the electrical contractor's work, for example, the conduit, outlet boxes, electrical power, and, perhaps, even the supply and pulling of the wire. This is no different than the electrical power, conduit, and control wiring for a building's mechanical system.

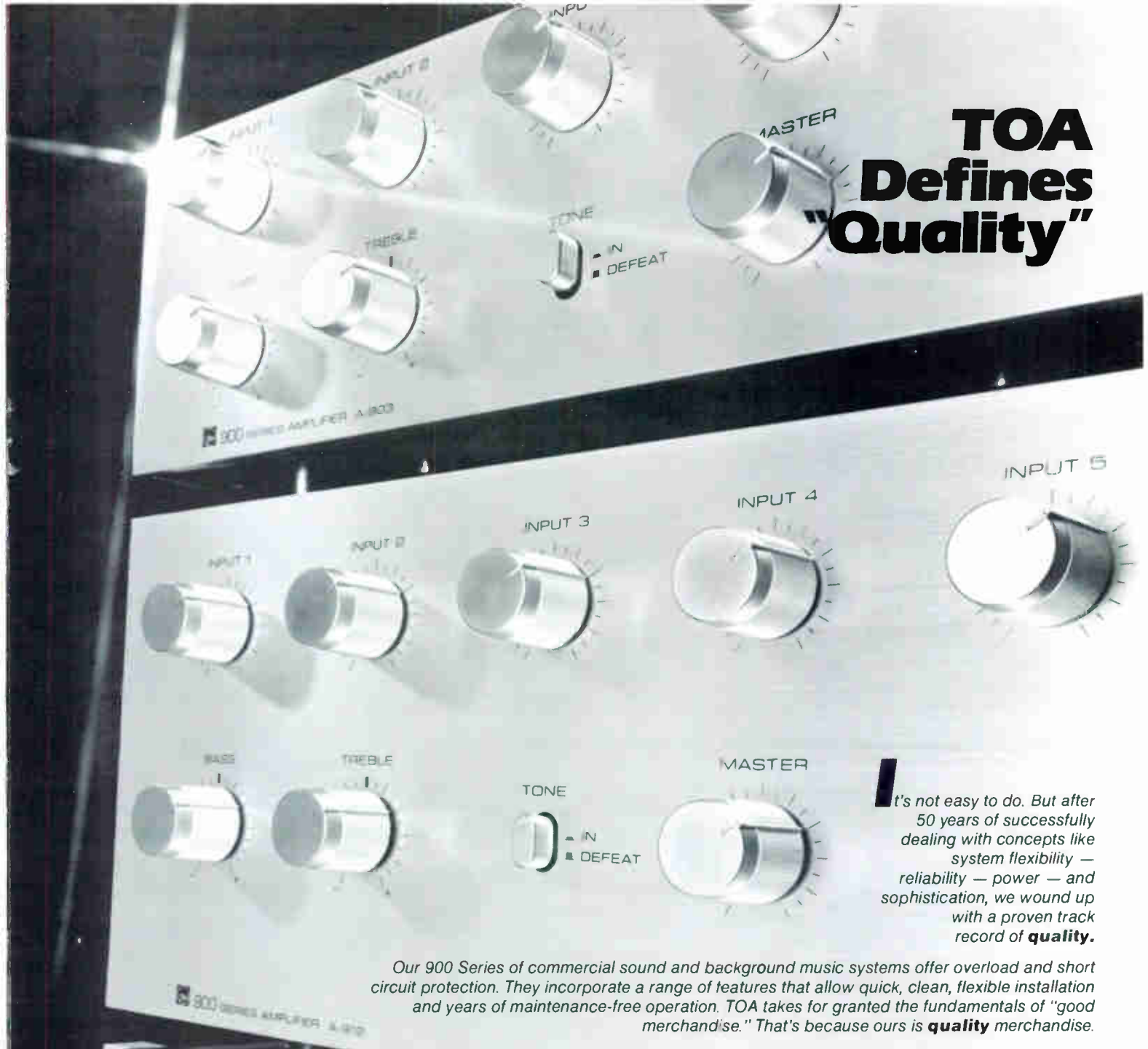
However, how often have you seen the mechanical equipment and its installation in Division 16 rather than Division 15? Is there not as much difference between electrical and electronic systems as there is between electrical and mechanical systems?

When electronic systems are placed in Division 16, the cost to the owner reflects a markup of the subcontractor's bid by the electrical contractor and, on those construction projects having a general contractor, an additional markup by him.

Because of their lack of knowledge and skill in the installation of electronic systems, most general and electrical contractors maintain an aloof, apathetic attitude toward these "non-electrical" systems. The system designer must work through the architect, the general contractor, the electrical contractor, and sometimes the electrical engineer. Because of this, the potential for error and misunderstanding is enormous.

It will not be easy to create a Division 17. The Construction Specification Institute must be made aware of the problems associated with the current format, and the industry need for a Division 17 must be established. To do this, we must make a concerted, unified effort through our trade, industry, and professional organizations, and most importantly, through CSI itself.

—David L. Adams



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VIDEO SWITCHING SYSTEMS

by Keith Bose

It has been said that a camera cannot see around corners, nor can it lift up and check under a tarpaulin, inspect a door, or do many things that can be done by personnel on the spot. Surveillance by video camera may not be as effective as having an armed guard present, yet a well-designed system can do almost as well.

The most expensive part of a video security system is the human part. Someone must observe the monitors when the system is operating. The amount of surveillance done by a single person can be increased by adding cameras and switching their output to a single monitor. It is also possible for a single individual to observe more than one monitor, with each monitor displaying the output of several cameras.

Although there is no limit to the number of cameras that can be switched to a monitor, there is a limit to the number of scenes that can be effectively monitored. Cameras that are in motion, as in automatic panning, should not be monitored by sequential switching. Some situations may require only a cursory glance at a monitor. The time spent in monitoring a certain scene determines the amount of detail that can be observed.

Any combination of cameras can be switched. A deterrent camera arrangement may be combined and switched to an apprehension system. Unused or out-of-service cameras may be bypassed. Certain cameras may be automatically brought to the monitor or switched by a variety of intrusion alarms ranging from video motion detection to conventional photocell detectors, smoke sensors, or other devices. The video switch may be in the form of a simple unit or it may be a so-

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phisticated solid state device with complex features.

The composite video signal does not behave as a simple direct current, hence, switching requires added detail. Switching requires that the video spectrum of the signal, approximately 4 mHz wide, be switched without "ghosts," high frequency loss, low frequency phase shift, or AC hum bars. In a simple installation with short cable runs, a simple passive switcher with proper termination will be sufficient. In more complex situations it may be necessary to employ some form of signal processing to guarantee good picture definition with all switching combinations.

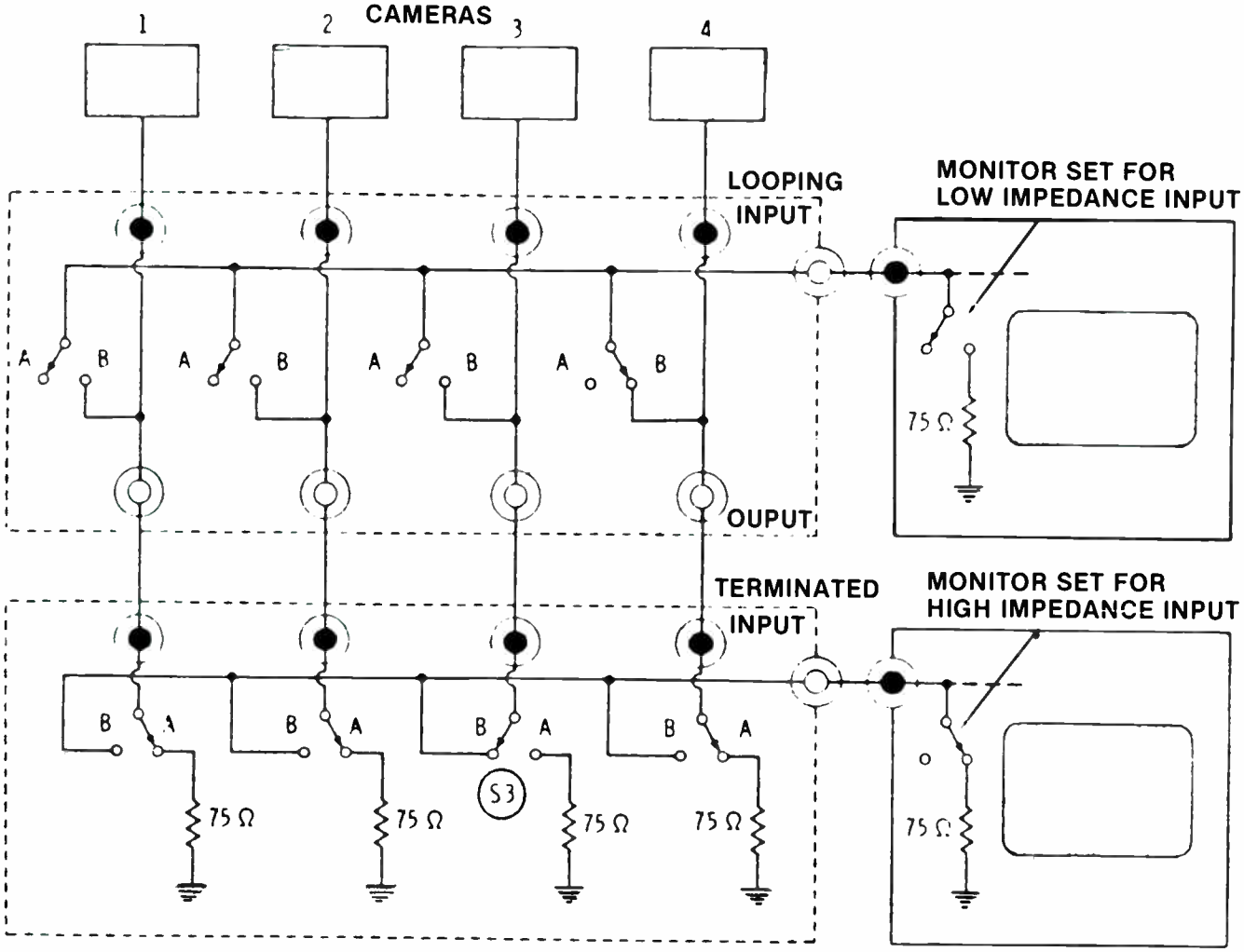
The falling cost of color cameras opens the way for them to be used for surveillance. Good color definition expands surveillance capability in situations where color is a factor. Although the color signal can be more sensitive than black and white, the same techniques apply in signal transmission and switching. The color signal is less tolerant of transmission error.

The simplest form of video switch is a single-pole, double-throw switch of the type used in telephone switching. Several switches are joined mechanically to form a bank. They are linked mechanically so that only one switch may be on at any time. A passive switcher is a device that switches the signal to a monitor without processing it in any way. Passive switchers employ ordinary contacts such as used in telephone switching. The majority of CCTV systems use unbalanced coaxial cable with a characteristic impedance of 75 ohms. The cable must always be shunted at its terminal end with 75 ohms. Otherwise ghosting and spectrum loss will result.

A monitor or other device is said to be looped into a circuit when the circuit passes through the device without disturbing the respective terminating impedance. Thus, "looping" is actually a simple "T" connection. It is assumed in this case that the device in the loop offers negligible impedance. Most monitor chassis are provided with a 75 ohm input resistor that may be switched in and out. More than one monitor may be thus placed in parallel across the cable, with the last monitor set for the 75 ohm terminating impedance.

The term bridging is used simply to indicate that a device is capable of being switched across circuits. In all cases, whether looping or bridging, the cable must be properly terminated. Usually this will be the end monitor, which has been set for the terminating impedance.

Most video switchers are simple pas-



The upper monitor in this diagram is "looped." It does not present an impedance to the cable. The terminating impedance is contained in the lower switching unit. Any one of the four cameras may be selected from either switching unit.

sive devices such as what has been described. When several switches are employed on a cable, or with long cable runs between switchers at different locations, active devices must be employed. Switches at different locations may require an isolation amplifier, high frequency boosting, or separate termination. Solid state active devices may be employed when switching is to be controlled by other than manual means. Diodes or field effect transistors (FETs) have excellent switching characteristics, and are usually employed as the switching element of a circuit.

Sequential switchers are devices that cause the signal from remote cameras to be automatically displayed in sequence at an adjustable interval. Sequential switchers result in manpower savings by increasing surveillance capabilities. They are useful in hospitals and industrial operations as well as in security installations. Most sequential switchers employ a ring counter. This is a chain of monostable stages that mutually operate in succession. They are available on a single chip and rarely cause trouble. The pulse interval can be made adjustable. Actual switching is performed by driving a diode in and out of cutoff, or a field effect transistor.

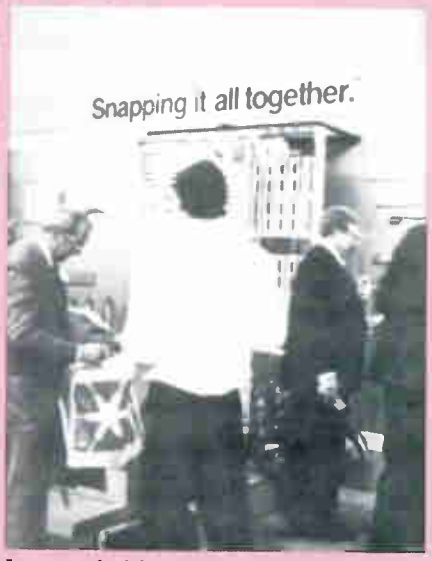
A common synchronizing signal is employed in broadcast television and some surveillance installations. But if a common sync signal is not present, when the signal is switched at random from one camera to another, the picture "jumps" and a moment is required for the monitor to become synchronized with the new signal. Moreover, if the signal is being fed to a videotape recorder, the nature of tape recording devices is such that the signal must be switched only during the brief intervals at the start of a new frame. The technique is known as vertical interval switching. It is accomplished by stripping off the vertical synch pulse. The leading edge of this pulse is then used to actuate a solid state switch. Many cameras are now manufactured with adjustable vertical phase. This produces clean switching without the use of synchronization.

A special type of switcher may be employed with a video tape recorder. A great advantage of video surveillance is that a video tape of a given area can be made at intervals. This will preserve the identity of individuals and activities in that area. A single tape recorder may be used and the single frame output of several cameras may be recorded alternately. It is not necessary that 30 frames per second be recorded. The frame sequence from each of the cameras may be individually recovered and played back. The frame speed may be varied when played back and scenes may be halted for closer examination. This technique is known as time lapse recording.

It is not necessary to record continuously in most surveillance situations. Frames may be taken at intervals of several seconds or even minutes. A continuous video record is made available, or the tape may be erased and reused. This is the great advantage of videotape surveillance over photographic surveillance. Videotape is available for instant replay whenever desired and the tape may be erased and reused.

The video switchers now available give long, trouble-free service. Switches may be incorporated in most systems without complication. The greater problem is the decision as to where they are to be added to a system. Properly used, switches increase the surveillance area. Too many cameras on a monitor overload the monitor attendant. Yet the most valuable contribution of the switch is a reduction in the manpower required for surveillance.

Code-a-Phone was one of the few interconnect suppliers at the show.



Interested visitors gather at the Mod-Tap exhibit. Mod-Tap are suppliers of computer hardware.

At the General Datacomm exhibit, the personal computer hints that the "Networking" they are selling is local area personal computer networking.

A Northcom salesman shows an interested onlooker the Northcom Premier electronic key system.

A LOOK AT THE COMNET SHOW

by Chris Foreman

Coming from the sound reinforcement side of our industry, I am still a bit confused by the telecommunications and transmission businesses. Because of my current teleconferencing orientation, however, I am learning! Part of my learning experience has been to attend some of the more important telecommunications trade shows, like the recent Communications Networks show in Washington, DC.

Billing itself as the "nation's largest telecommunications conference and exposition," COMNET, as it is called, covers everything from keyphones to local area networks and satellite teleconferencing to phone company bypass. Even though this was my second year at COMNET, I admit to being a bit overwhelmed.

There were always four or five different seminars going on. A sampling included "Multitenant PBX: Policy Issues," "Private Cable," "Intra-Lata Services and By-Pass," "Direct Broadcast," and "LANs: Which Vendors Will Survive?" I attended teleconferencing-oriented seminars and found them to be well-planned .

One very apparent theme was the integration of communications systems with computers. There were seminars on using a PBX as part of a local area network and seminars on using a local area network for voice communications! Improvements in 32 kbs voice lines was a big topic (normally, digitized voice travels at 64 kbs).

There were also many seminars and talks on marketing and business topics, ranging from the obvious talks about the future of telecommunications regulation to one entitled "Market Forecast, 1990."

The exhibit floor was crowded every day, and it included any number of expensive exhibits, the likes of which I haven't seen since my days at the Consumer Electronics Show. It's obvious that the large communications companies believe that trade-show marketing really works.

About the only complaint I had about the overall show is that too many companies still call themselves "total communications suppliers" or use some other equally vague terminology to describe themselves. When I approach them at the trade show and ask "What is it that you do?" they are likely to reply: "We provide complete communications systems for business and industry." I reply: "But, what is it that you do?" Little by little I find out that they make PBXs and have a division that provides by-pass communications via microwave linkups. Why couldn't they just say that in the first place?

Last year, as a complete novice, I tried this question several times to several different suppliers: "What's a T1?" Most were no help whatsoever. Several were incredulous that I didn't know the answer to this very basic question. One wanted to sell me his "New T1 Stat Mux" even though I had absolutely no idea what a T1 Stat Mux was! No one was intelligent enough to tell me: "T1 is a term for a digital transmission line that transmits data at approximately 1.5 mbits/second, usually in full duplex."

So, if you already know most of the industry jargon, COMNET is a great show to attend. For me, my first year, I was most impressed by the Washington "Metro" subway. During this, my second visit, I was actually able to decipher enough to learn a little. Next year, I expect to even enjoy myself.

THEORY & APPLICATION

(continued from page 14)

A designs in order to reduce the open loop distortion and thereby negate the requirement for massive negative feedback and the attendant problems thus encountered.

Unfortunately, Class A design results in an even greater inefficiency (heat problem) in the place of the aforementioned distortion problems. The new DECA power amplifiers feature extremely low open loop distortion figures, approaching those of the better Class A amplifiers, i.e., approximately 0.2 percent THD over the entire power range. Because of the DECA's extremely low open loop distortion, only minimal feedback is necessary to reduce the distortion values to the design goal of 0.05 percent.

A simple discussion of any amplifier's harmonic distortion specifications usually does not include an analysis of the distribution and/or type of harmonics encountered in the distortion product. Many agree that the order of harmonics comprising the distortion is sometimes even more important than the actual percentage of the harmonics present. In any case, it's *musically* desirable for the distortion product to be even order. The inherent design of the DECA not only produces extremely low distortion (typically 0.02-0.05 percent), but that distortion is mostly composed of a 2nd harmonic residual with a tiny amount of 3rd greatly surpressed from the 2nd and then nothing. This is a very desirable feature musically, i.e., not only does the DECA produce extremely low harmonic figures, but the residual harmonics exhibit very favorable distribution musically speaking—a double bonus!

The combination of low feedback design, along with the aforementioned proprietary circuitry, enables the DECA system essentially to operate with distortion performance equivalent to the best Class A designs. DECA's 90 percent conversion efficiency is many orders of magnitude better than the best Class AB systems; Class A systems are usually totally unacceptable in most applications requiring high output levels. For instance, a "Class A" 350 W amplifier would dissipate an enormous 700 W per channel, compared to the minimal 35 W in the DECA 700.

Efficiency and performance are certainly not the only attributes of this new technology. Indeed, the unique implementation of the ECA power amplifier minimizes the considerable difficulties of "back emf" reflected back into the amplifier from the loudspeaker load. It is well-recognized that signals reflected back to the amplifier from the loudspeaker are impressed upon the amplifier's output circuitry and can (more often than not) adversely affect operation by "feeding forward" into the curcuitry of the power amp through the feedback network. To minimize the effect of back emf, it's generally desirable that *any* amplifier have an extremely low open loop output impedance. It should be noted that here we are talking about *open loop* impedance as opposed to the low impedance obtained through the use of massive negative feedback. Significantly, the problems with "back emf" from loudspeaker loads usually occur in the vital range near the fundamental resonance of the loudspeaker system, which is usually well within the audio band.

Low open loop output impedance is possible because the DECA power amplifier's basic output topography involves the output devices operating in a saturated mode. This design feature, coupled with minimal feedback, as well as total DC coupling in the power amplification stages, contributes a great deal to the exceptionally (tight) and accurate, low end response exhibited by the DECA system. Here once again, the design approach of this new system alleviates a significant engineering difficulty encountered with all conventional Class AB approaches; it is yet another attribute that must be heard and compared to to be fully appreciated.

Conventional linear amplifiers have traditionally been plagued by difficulties in maintaining phase linearity. Optimum phase response characteristics were a primary goal in the DECA R&D program, and the present production models have been specifically designed to exhibit a nearly ideal Bessel response. Square wave testing indicates that the DECA produces no "overshoots" regardless of the signal amplitude, with extremely well defined (and symetrical) rise and fall times. The actual phase characteristic is defined as a differential phase error typically *1 degree at 20 kHz* and only *2 degrees at 50 kHz*. These characteristics are significantly better than most contemporary analog/linear amplifiers.

Another interesting aspect of the DECA's exceptional performance is that it exhibits virtually no ringing or overshoot when passing a square wave or is actually driven into distortion. All normal conventional analog/linear amplifiers exhibit some ringing or overshoot (especially at clipping) due to the charging of various capacitors in the amplifier itself or in the feedback loop. The DECA amp recovers virtually instantaneously to tone burst testing in both the linear region (normal levels) and under clipping (max power) conditions. This outstanding attribute might best be illustrated by describing a worse case condition of an *asymetric* pulse burst of approximately 30 ms which drives the amplifier fully to one rail with virtually no overshoot or bounce when returning to zero or center.

While on the topic of clipping, it is significant to note that *many* amplifiers designed for professional use must (or should) exhibit excellent behavior when driven to full output (clipping). Many well regarded amplifiers exhibit truly atrocious idiosyncrasies when driven to the limit.

The DECA approach produces optimum characteristics when driven into full clipping. Significantly, the DECA uses a slight-

ly modified version of Peavey's patented distortion detectin technique (DDT) to virtually eliminate the possibility of the amplifier being driven into overload and subsequently supplying square waves to the loudspeaker load. Most engineers are award that square waves are among the most damaging waveforms that can be applied to loudspeakers, especially high frequency drivers. Overall, the unique approach to audio amplification exemplified by the DECA offers a wide range of significant advantages over conventional linear amplification.

The DECA performance/cost ratio is exceptional, as is the unequalled efficiency. In fact, the 90 percent plus conversion efficiency will enable the DECA system to be classified as an "energy saving device" and thereby qualify it for a tax and/or energy credit. This energy saving is especially significant when compared with the average 35-45 percent efficiency of most linear (Class AB) power amps. For professional, commercial, and home applications, the DECA exhibits the following attributes: 90% plus conversion efficiency (an energy saving device); open loop distortion comparable the the best Class A designs; ideal "Bessel type" response; near perfect phase linearity; absolutely *no* measureable TIM (transient intermodulation distortion); optimum square wave and/or overshoot characteristics with virtually no ringing and/or overshoot; and extremely favorable price performance ratio possibly unmatched in today's marketplace.

Many reading the specifications and general discussion on this new series of amplifiers may well find it difficult to believe that a single product can combine the numerous attributes described above. However, we feel the DECA *is* not only a definite advance in the "state of the audio art," but most importantly, the DECA™ actually *sounds* better than linear amplifiers, especially at the low end where the unique circuitry and design approach allow significantly crisper and a more controlled bass. This is especially true at or near the resonance of the speaker system for the reasons described previously. All factors considered, the DECA™ is not only the first of its kind, but the beginning of a revolution in the design of audio power amplification.

Ed—An indepth lab test and review of the Peavey DECA 700 will be published in the upcoming April issue of Sound & Communications.

Join us at the NSCA Luncheon 12-noon, Sunday.

Digital Power

Reflections Of The Future

Digital Energy Conversion Amplification™ . . . A new standard of power. Brought to you by Peavey via the DECA™-700 and DECA™-1200 power amps. The world's first (and only) 90 percent efficient and truly digital power amplifiers.

Because linear amplification allows at best between 40 and 60 percent efficiency, we knew that in order to manufacture a 90 percent efficient power amp, we would have to depart from conventional technology. DECA™ is not a conventional Class AB amplifier passed off under some "fancy"name. Its technology isn't analog. It's a totally new approach on which we have applied for six patents.

The DECA-700 and DECA-1200 power amps deliver time after time with virtually no heat, very little mass (24 and 26 pound units) and 90 percent efficiency. The DECA-700 specs out at a rated minimum power output of 350 watts RMS per channel into 4 ohms and 700 watts RMS into 8 ohms (in bridge mode). Our DECA-1200 is rated at minimum power of 600 watts RMS into 4 ohms and 1200 watts RMS into 8 ohms (in bridge mode). Other features include DDT™ compression circuitry to prevent amplifier overload, absolutely no measurable TIM or slew rate induction distortion, multiple overload output and load protection features. They are both available in a 19" rack mount (two space) configuration.

DECA Technology. Yesterday our competitors said it couldn't be done. Today they're wanting to know how we did it.

Discover for yourself DECA™ power amps by visiting your nearest authorized Peavey dealer. Or send $1.00 to Peavey Electronics, 711 A Street, Meridian, MS 39301 and we'll send you our Professional Audio Systems catalog with specs and features of the DECA Power amps.

FACES AND PLACES

Dorwaldt Named Bogen VP-Marketing

Carl C. Dorwaldt has been appointed vice president, marketing, for Bogen Division, Lear Siegler, Inc., the division's president John H. Ochtera announced. Dorwaldt will be responsible for the marketing of all Bogen's product lines, including planning, promotion, and sales.

Dorwaldt was executive vice president for Rauland and marketing manager for TOA before coming to Bogen. He also has solid experience as a sound contractor.

Lear Siegler, Inc. a company headquartered in Santa Monica, CA, produces aerospace, automotive and commercial/industrial products.

CARL DORWALDT

PETER WELLIKOFF

Wellikoff Named VP At Tandberg Of America

Peter Wellikoff has been named vice president of Tandberg's Consumer and Professional Audio Products Division, according to Tor Sivertsen, president of TOA. In addition, Wellikoff was made a member of the company's board of directors.

In his new management position, Wellikoff will be responsible for the overall operations in the United States, as well as working on international product development and marketing.

Prior to his appointment, Wellikoff was president of Creative Marketing Consultants, a management consulting group specializing in the consumer and professional audio/video industries. Preceeding Creative Marketing Consultants, he was responsible for U.S. sales and marketing management of Philips Audio/Video Systems, including divisions such as AKG Acoustics, Neutrik, K & M, and Philips Audio Products.

Prior to Philips Audio/Video Systems, a North American Philips Corp., Wellikoff was president of Innovative Audio Products. In that position, he was responsible for the overall management of all divisions; consisting of two retail stores (Innovative Audio), a distributor company (Designers Audio) and two speaker manufacturing divisions (Innotech and Abraxis).

Musci Named Bogen Sales Engineer

Andrew M. Musci has been appointed sales engineer at Engineered Sound Systems, for Bogen Division, designer and manufacturer of professional, industrial and commercial sound equipment; telephone paging equipment; intercommunication systems; institutional systems; centralized sound systems and microprocessor-based time control, and administrative telephone communication systems.

Musci comes to Bogen from seven years as sales engineer for Altel Sound Systems, Inc. in New York City. He resides in Waldwick, NJ, and he attends evening college classes toward a business degree.

ANDREW MUSCI

MARK NEVENJAS

Agfa-Gevaert Appoints Nevejans Sales Manager

Mark B. Nevejans has been promoted to the position of national sales manager for the Magnetic Tape Division of Agfa-Gevaert, Inc., Teterboro, NJ, according to an announcement by Maria A. Curry, director of marketing for the division.

Since joining the company two years ago, Nevejans has served as sales supervisor for the Atlantic region for the Magnetic Tape Division and, most recently, as sales manager for the Atlantic region.

He attended Lawrence Institute of Technology in Southfield, MI, where he studied mechanical engineering. Before joining Agfa-Gevaert, he was employed by the Watchtower Society as a studio manager for six years.

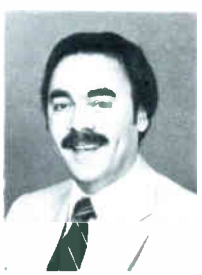
Hanley Named Augat/Isotronics Vice President, Marketing

Augat/Isotronics general manager Frank Gamari has announced Dennis T. Hanley as vice president, marketing.

Hanley joins Augat from Emca, where he most recently was vice president, business director.

A graduate of Suffolk Community College, NY, Hanley has presented numerous technical papers on polymer thick-film and cermet thick-film technology. Hanley also is a member of a number of industry technical and marketing organizations.

DENNIS HANLEY



JOSEPH SCHOENDORF

Schoendorf Named President of Industrial Networking, Inc.

Industrial Networking, Inc., manufacturer of vendor-independent local area networking (LAN) communications systems for the industrial automation market, has named Joseph P. Schoendorf president and chief executive officer, as announced by Ralph K. Ungermann, president and chief executive officer of Ungermann-Bass, Inc.

PRODUCTS IN REVIEW

SOUNDCRAFT SERIES 500 PA CONSOLES

The Soundcraft Series 500 console is the newest product in Soundcraft's full line of audio mixing consoles. Available in 16, 24, and 32 channel input mainframe sizes, the eight buss sound reinforcement console features six auxiliary sends, which utilize a series of "jumpers," which enable each pair of aux sends to be used either pre or post fader, or pre or post EQ on each input module.

The console features Soundcraft's four-band EQ with sweepable hi and lo mid frequency. There is a high pass filter which controls low end frequency (i.e. stage rumble, etc.).

The split configuration of the console allows for eight completely independent effects returns and doubles in use as an eight track recording console.

The Series 500 has direct outputs on each channel; and individual insert jacks facilitate easy patching to outboard signal processing equipment.

The Series 500 becomes available in January, 1985 and is priced as follows: 16 channel for $6,250, 24 channel for $7,950, and 32 channel for $9,950.

The basic specifications are electronically balanced inputs and outputs, −128 dBm EIn, and +24 dBm maximum output level. Apparently the general design and construction are similar to other Soundcraft products.

The input and output XLR connectors can be configured for pin 2 or pin 3 "high" by means of internal jumpers, so one need not rewire cables to match different standards. Additionally, the output modules have switches for nominal −10 or +4 dBm output level. This is handy if the subgroups are used to drive a −10 dBm 8-track tape machine (Wayne claims the console can be used for recording as well as PA). A particularly important feature is the EQ on the effects returns; this means that input channels don't have to be "used up" merely because EQ is needed on the returns.

Contact: Soundcraft Electronics, 1517 20th St., Santa Monica, CA 90404; (213) 453-4591.

Reader Service #1

HOT LINE TELEPHONE

Viking Electronics, Inc., has introduced a new low cost Touch-Tone® version of its K-1500-2 single number dialer "Hot Line" desk or wall phone.

Model K-1500-2TR is a new Touch-Tone® /Pulse programmable version of the Hot Line Phone installed at catalog mail order counters, money transfer, emergency, taxi, reservation and credit verification locations throughout the North American Continent. Features include internal Handset Volume Control for noisy environments and "Dial 9 + Pause" for use behind PBX's. The K-1500-2TR is line powered with internal battery back-up for up to two years.

Model K-1500-2TR can be programmed to dial any local, long distance or "800" number whenever the handset is picked up while eliminating the abuses of other courtesy telephones.

☐ For further information contact Viking Electronics, Inc., 1531 Industrial Street, Hudson, WI 54016; (715) 386-8861.

Reader Service #2

MONITOR LOUDSPEAKER

Audisar has introduced a 4-inch 2-way "convertible" monitor system. The enclosure of Model 14K100 is finished in light-textured black, plus it has a black snap-on polyester grill.

Mounting hardware is included for both the vinyl feet and the black anodized rack adapters, as provided. Frequency response is 68Hz −12kHz ±3dB, and a power rating of 30 watts (15.5Vrms @ 8 ohms). The polypropylene woofer is matched to its "Thiele" parameter design vented enclosure.

The crossover network is a parallel 12dB/OCT type, specifically matched to the transducers characteristics. The network includes high-frequency protection to prevent high-energy burst burn out. It retails at $166.

☐ For further information contact: Audisar Industrial Audio Products, P.O. Box 1561, Bellevue, WA 98009; (206) 454-2040.

Reader Service #3

EDUCATIONAL ELECTRONICS CASSETTE COPIER

Educational Electronics Corporation has announced the availability of a new family of audio cassette copiers from Sony Corporation.

The models CCP-110 and CCP-112 are one-to-one and two-slave add-on versions, respectively. These models duplicate audio cassettes at 16 times normal speed and record both sides of a C-60 monaural cassette in approximately two minutes. Features include the Sony-developed brushless and slotless (BSL) motors for capstan drive, built-in erase head and, as with all other Sony copiers, they carry an industry-

exclusive two year head wear warranty. Other features of the CCP-110 one-to-one copier and CCP-112 two-slave add-on are channel-select, audio end and short tape indicator and auto rewind.

Educational Electronics Corporation is the exclusive U.S. distributor for Sony AV Products such as the CCP-110 and CCP-112.

Since the units are mono only, and since they have a rated wow & flutter spec of 0.2% and frequency response of 50 Hz to 10 kHz (no tolerance given), they are clearly voice-grade units. The S/N ratio is said to be greater than 45 dB, or "reasonably good" for any cassette copier. In any event, the units are intended for low to medium production. They are well suited to making copies of church sermons, college or business lectures, sales presentations, and so forth.

Incidentally, the units operate at 16 times the normal 1-7/8 ips running speed, but since they copy both sides of a cassette at once, they effectively operate 32 times faster than conventional 1:1 copying with two regular cassette machines.

Contact: Educational Electronics Corp., 213 North Cedar Ave., Inglewood, CA; (213) 671-2636.

Reader Service #4

UNIBUS INTERFACE

Digital Sound Corp. has introduced an enhanced interface module for connecting the company's DSC-200 audio data conversion system to host computers using the unibus.

The new module, the DMA11 PLUS, occupies one slot in the unibus, permitting system expansion without having to add an expansion chassis.

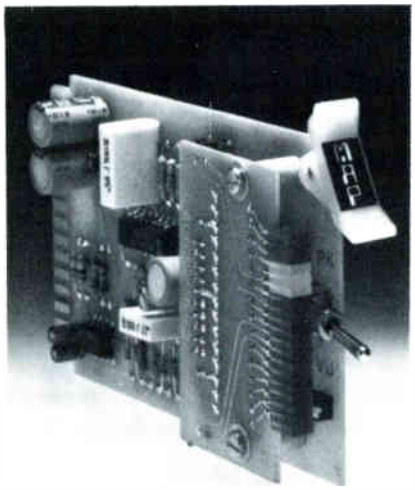
Replacing the DMA11, the DMA11 PLUS is a component of the DSC-200, a peripheral system that provides a complete interface between conventional audio equipment and computer disk storage. The module connects to the DSC-200's chassis via flat ribbon cable and is designed to link the DSC-200 with any DEC unibus computer, which includes the full VAX and PDP-11 lines.

The new interface has a direct peripheral connection feature that increases real-time processing capabilities by permitting direct data transfer between the DSC—200's converters and an array processor connected to the same host CPU.

Multiple DMA11 PLUS modules can be connected to a single DSC-200 chassis for shared use by more than one CPU and for full-duplex (concurrent record and playback) operations.

☐ For further information contact Digital Sound Corp., 2030 Alameda Padre Serra, Santa Barbara, CA 93103; (805) 569-0700.

Reader Service #5



LED LEVEL INDICATOR CARD

A multi-purpose LED Level Indicator Card for use in monitoring audio signals is available from Modular Audio Products, a division of Modular Devices, Inc. The Model 4062 allows switch selection of VU or peak reading as well as a multi-turn adjustment for setting 0 VU (zero VU) indication from −2 dB to +12 dB.

The Model 4062 consists of a 19 segment (red, yellow, and green) LED Indicator Board. The Indicator Board is connected to the main PC Board by ribbon cable. This allows LED mounting on remote panels where space is critical.

The Model 4062 offers balanced or unbalanced inputs. The high input impedance (100k ohm) prevents loading of other equipment and prevents signal degradation. Power supply inputs are reverse polarity and short protected.

Up to 16 Model 4062 LED Indicator Cards can be mounted in standard 19-inch MF-17 IMPAC™ Card Rack with height of 3½ inches and depth of 6 inches. This allows custom configuration using standard cards 4½ inches × 2¾ inches. The Model 4062 is compatible with the IMPAC Modular Card Series and is 4.5 inches deep by 2.75 inches high and .75 inches wide.

Professional net price is $140, with delivery from stock to six weeks.

☐ For further information contact: Modular Audio Products, 50 Orville Drive, Bohemia, NY 11716; (516) 567-9620.

Reader Service #6

ASPEN ENHANCEMENTS

Software enhancements to the Aspen™ (Automatic Speech Exchange Network) voice message system—including listen-only mailboxes, selectable return-to-operator, and system management statistics—were announced by Octel Communications Corporation.

Aspen will now support listen-only mailboxes, special mailboxes which will provide a "bulletin board" capability so that various announcements can be stored and played to any caller dialing a particular mailbox access number. No knowledge of the system is necessary and, for many PBX's, the caller does not need a touch-tone phone. Octel's research has shown that this capability is useful in such widely different functional areas as customer service, sales and marketing, personnel administration, and in a number of specific industries.

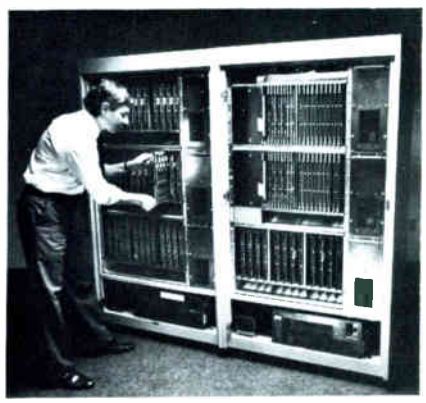
Selectable return-to-operator has also been added to the Aspen voice message system. When users press the "0" key to request human assistance while us-

ing Aspen, they will now be answered by the person most able to help them. This is achieved by giving Aspen the capability of transferring the call to any one of 30 different extensions in the company when the caller hits "0." The appropriate extension is selected automatically by Aspen based on which mailbox or system port the caller was using at the point of requesting assistance. This capability is especially useful in large orglanizations with widely dispersed facilities in either a campus or a multi-story building. It is also useful when different specialists are needed to assist caller with different types of questions.

Other enhancements include the support of PBX forced authorization codes to track use of voice message system outcalling, improved system diagnostics to enhance serviceability and system reliability, and new system management statistics.

☐For further information contact Octel Communications Corp., 1841 Zanker Rd. San Jose, CA 95112; (408) 947-4500.

Reader Service #7



NETWORK SWITCHING

Harris Corporation's Digital Telephone Systems Division has announced a telecommunications network switching system designed to reduce the on-net portion of communications network costs by up to 30 percent for companies with private networks.

The first release of the digital tandem voice/data switching system, called the Harris 20-20 Integrated Network Switch, is based on technology supporting connections between a network's telephones when all point to point leased circuits in the network are busy. The new switch provides functionality of a private network without the need for additional leased private facilities to meet peak-hour traffic demands.

Because the new Harris switch's tandem routing protocols are compatible with switches from most major vendors —including AT&T, Rolm, and Northern Telecom—private networks incorporating the Harris 20-20 system can include equipment from a mix of vendors, while providing full billing and routing functionality. As a universally compatible switch, the Harris 20-20 switch permits telecommunications managers to economically construct or upgrade networks by replacing only fully depreciated node switches.

☐For further information contact Harris Corporation, Digital Telephone Systems Division, Novato, CA 94948-9986; (415) 472-2500.

Reader Service #8

(continued on page 41)

PRODUCTS IN REVIEW

a closer look

by gary davis

12 UL-LISTED LOUDSPEAKERS

Atlas Sound has introduced six medium power, UL-listed loudspeakers designed for application with intercom, paging, electronic alarm signal systems in hazardous locations were high quantities of dust, flammable gases or vapors may present an ignitable or explosive mixture.

The new MLE-30 and MLE-32 loudspeakers are manufactured to provide protection from specific hazards by rated types of atmosphere in the ambient environment. (MLE-1-30/32: for Class I, Group C & D, gas atmospheres. MLE-2-30/32 Series: for Class I, Groups C & D, gas atmospheres; Class II, Groups E, F and G, dust atmospheres. MLE-30-30/32 Series: for Class I, Group B, hydrogen gas and vapors; Class I, Group C and D, gas atmospheres).

Comment: They are intended for transmission of intelligible voice communications and/or electronic signals, in the chemical, paint, mining, petroleum exploration and refining industries, as well as in storage and loading dock facilities with combustible atmospheres.

Power rating for the 8-ohm MLE explosion-proof loudspeakers in 30 watts continuous. Sound level output exceeds 123 dB, and sensitivity as a microphone is −20 dBM (Ref: 10 dynes/cm²). A choice of re-entrant projectors for horizontal or omnidirectional sound dispersion directivity is offered. Each loudspeaker includes a compression-driver housing manufactured of heavy die-cast aluminum. Line matching transformers are available as an accessory, and can be installed within the driver housing.

The medium power "MLE" Series supplements the high power 60-watt "HLE" products. All 12 UL-listed loudspeaker models are designed for indoor and protected outdoor installation.

It strikes us that this class of paging/intercom/alarm system lousspeakers will become increasingly popular as the level of safety in hazardous environments comes under closer scrutiny by government agencies and insurance companies.

The stated sound output level of greater than 123 dB SPL for 30 watts input does not tell us much since the distance is unspecified—assuming it to be 1 meter, the sensitivity would be good (that calculates out to be 110 dB at 1 watt). The specification which particularly interests us is that for use as a microphone: −20 dBm ref. 10 dynes/sg. cm is about 40 dB more sensitive than the average dynamic PA mic, an interesting feat for an 8-ohm driver. This suggests that these drivers are an ideal choice for industrial intercoms, providing good mic sensitivity as well as low impedance (which makes more efficient use of the power amplifier).

☐For further information, contact: Atlas Sound, Division of American Trading and Production Corp., 10 Pomeroy Road, Parsippany, NJ 07054; (201) 887-7800.

COMPACT PA SYSTEM

Sony Professional Audio Division has announced a new compact public address system, the PA-200. Designed to supply voice amplification for audiences at conference halls, lecture halls, wherever presentations are made, the PA-200 is said to offer portability, quick set-up, and circuitry for creative effects and the elimination of frequently encountered feedback problems.

The unit features a rack-mountable 40-watt integrated amplifier (PA-200) and a pair of lightweight dual 6-inch speaker enclosures with dispersion baffles (SS-P200). The speakers can be either wall mounted or used on accessory stands. "Cannon" type cables connect the system.

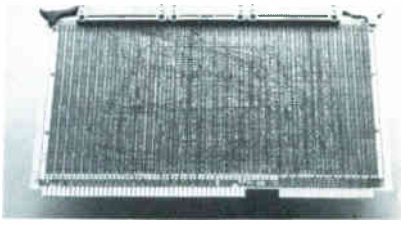
The PA-200 is suited for close proximity situations. Sony has engineered two feedback suppressor circuits to eliminate problems common with many public address systems. One circuit detects variations in the distance between the loudspeaker and the microphone and reduces the volume of the speaker nearest the microphone. The other reduces the microphone input level when the presenter is not speaking. The two "howling suppressor" systems can be used simultaneously.

Comment: This portable public address system falls in a middle ground, not a podium-based system, and not a full-scale sound reinforcement system. We don't know how much sound level one is likely to derive from a 40 watt amplifier and a pair of 6-inch speakers, even if they are used primarily for voice, but we suspect the system will be most suitable for a small meeting or conference room. While the release describes a muting circuit that gives priority to the mic input and drops the level of any background music, we question whether anyone would want to pipe music to a hall through a pair of 6″ drivers.

The aspect of the PA-200 we find interesting is the automatic feedback suppression. Apparently one circuit lowers the gain of the speaker which is closer to the mic (the amount of gain reduction is not stated), and the other circuit is simply a VOX gate that reduces the mic gain when the mic is not in use. Conceptually, these circuits should be handy for an unattended PA where the person speaking carries the mic around, as when walking to a chalkboard, and so forth; we would want to test the system and determine how well the feedback suppression actually functions before endorsing the implementation.

☐For further information, contact: Sony Communications Products Co., Sony Drive, Park Ridge, NJ 07656; (201) 930-6432.

(continued from page 39)



COMPATIBLE UNILAYER®

Augat Inc.'s Interconnection Systems Group introduced a Unilayer® II board that is compatible with Intel's Multibus® system. Supporting hardware is available as well—cages, backplanes.

The Unilayer® II board comes in a high density universal pattern and can accommodate up to 144 16-pin DIP equivalents. The I/O supports a general header area (accommodating 222 I/O connections) in addition to the Multibus standard P1 and P2 edge connectors.

Pricing for the unwired Unilayer II Multibus board is $225.50 for 1; $154.25 each for 10; and $91.00 each for 100. Wiring data can be transferred electronically to AUGAT's VAX computer system to achieve a three-week delivery of wired boards.

Unilayer II is an alternative to multilayer printed wiring boards. It is the only interconnection technology that provides component pluggability and wiring change capability with the same volume density as a multilayer printed wiring board.

☐For further information contact: Augat Inc., Systems Division, 40 Perry Ave., P.O. Box 1037, Attleboro, MA 02703; (617) 222-2202.

Reader Service #9

MERLIN SYSTEMS

Two new models of the AT&T Merlin Communications System, designed to provide an affordable, dependable, solution to the communications needs of small businesses, were announced.

The new models are the AT&T Merlin System Model 3070, designed for businesses with up to 30 outside lines and 70 phones, and the AT&T Merlin System Model 1030 for firms with up to 10 outside lines and 30 phones.

AT&T Merlin System models, initially needing only a few lines, can expand up to the maximum number of lines and phones by plugging in an expansion cartridge. The new models retain the features of the smaller models of the Merlin System while offering several new features.

☐For further information contact: AT&T Information Systems, 100 Southgate Parkway, Morristown, NJ 07960; (201) 898-8342.

Reader Service #10

BPE CONDENSER MICROPHONES

Philips introduces a new concept in microphone technology that is designed to offer high levels of professional performance in BPE Condenser Microphones.

The new range is made possible by combining the best characteristics of condenser and electret technology into a single, compact unit. This results in a selection of microphones with permanently charged back-plate electret (BPE) inserts, which are designed to meet an unusually wide range of professional applications.

Three dedicated ranges of microphones are available:

Professional, standard, and special purpose—which comprise no less than 11 different units. Each compact model is designed for easy handling, to ensure years of reliable service.

At the heart of the new BPE concept is the specially developed technique for combining a mechanically stable uncharged diaphragm with a permanently charged back-plate. The method of sealing the charge carrier to the backplate also ensures the effects of temperature are minimized. This is achieved through the careful selection of a diaphragm material that has acousto-mechanical properties. In addition to

an almost zero dependency on temperature fluctuations, the BPE Condensers feature good mechanical stability and high tone reproduction levels, low sensitivity to case-noise and vibrations, plus wideband frequency response. The design of the new units ensures a low sensitivity for diffused acoustic fields, low harmonic distortion, and low rumble sensitivity.

The professional range features five models, which are available in configurations to suit applications such as in theaters, and those where faithful reproduction of the voice and music are essential.

For more general sound reinforcement applications, the Standard range of four microphones provides an ideal choice. Different configurations are available to suit specific requirements, including a table stand model with an on/off switch and a roll-off facility for low frequencies. All microphones are hypercardioid to ensure the highest sensitivity.

Contact: Philips, P.O. Box 523, 5600 AM Eindhoven, Netherlands; Telex 51573.

Reader Service #11

WEATHERPROOF SPEAKER

Pasco Sound Products introduced a full range weatherproof loudspeaker, the C 51/AT. The computer designed enclosure used in tandem with a full range loudspeaker is designed to result in extended frequency response and efficiency, nearing that of a reflex horn.

The C 51/AT comes with a 25/70 volt line transformer and can handle 20 watts RMS. The stainless steel bracket provided allows mounting on walls, posts, shelves, trees, etc. The C 51/AT is directional, and it is constructed so that sound may be directed at an area by rotating the speaker in its bracket. The system can also be used for paging or background/foreground music applications.

☐For further information contact: Pasco Sound Products, 14 First St., Pelham, NY 10803; (914) 738-4800.

Reader Service #12

CALENDAR OF EVENTS DATE BOOK

DATE	EVENT/COMMENT	LOCATION	CONTACT
March 18-20	**Comtel '85:** International Computer and Telecommunications Conference	Infomart, Dallas, TX	Comtel '85 13740 Midway Road Suite 600 Dallas, TX 75244 (214) 458-7011
March 23-28	**ERA 26th Annual Management Conference:** Program geared to helping owner-executives.	Monterey Convention Center, Monterey, CA	Electronic Representatives Association 20 East Huron Street Chicago, IL 60611 (312) 649-1333
April 2-4	**Telecommunications Training Workshop:** Fiber Optic Communications	San Francisco, CA	Sandy Bourdage abc TeleTraining, Inc. P.O. Box 537 Geneva, IL 60134 (312) 879-9000
April 9-11	**Telecommunications Training Workshop:** Transmission and signalling of switched voiceband special services and private networks	San Francisco, CA	Sandy Bourdage abc TeleTraining, Inc. P.O. Box 537 Geneva, IL 60134 (312) 879-9000
April 9-11	**Telecommunications Training Workshop:** Conformance testing of local loop and trunk cable facilities	Denver, CO	Sandy Bourdage abc TeleTraining, Inc. P.O. Box 537 Geneva, IL 60134 (312) 879-9000
April 14-17	**National Association of Broadcasters Annual Convention:** Forum for the latest new products and production capabilities.	Las Vegas Convention Center, Las Vegas, NV	National Association of Broadcasters Washington, D.C. (202) 293-3570
April 23-25	**Telecommunications Training Workshop:** Practical telecommunication systems grounding	Chicago, IL	Sandy Bourdage abc TeleTraining, Inc. P.O. Box 537 Geneva, IL 60134 (312) 879-9000
April 23-26	**Telecommunications Training Workshop:** Introduction to telephone technology and practice	Chicago, IL	Sandy Bourdage abc TeleTraining, Inc. P.O. Box 537 Geneva, IL 60134 (312) 879-9000
April 30-May 2	**Telecommunications Training Workshop:** Telecommunications transmission systems	Chicago, IL	Sandy Bourdage abc TeleTraining, Inc. P.O. Box 537 Geneva, IL 60134 (312) 879-9000
April 30-May 2	**Telecommunications Training Workshop:** CATV management, engineering and operating principles	Chicago, IL	Sandy Bourdage abc TeleTraining, Inc. P.O. Box 537 Geneva, IL 60134 (312) 879-9000

DATAFILE *info. sources/new literature*

KINDORF® APPLICATIONS ILLUSTRATED IN BROCHURE

A four color, twelve page brochure describing the Kindorf Channel System for support applications has been published by the Electrical Products Division of the Midland-Ross Corporation.

Kindorf Channel is a modularly dimensioned, engineered metal framing and support system. All channel and components are protected with a two part corrosion resistant coating, an electrogalvanized zinc coating followed by a zinc dichromate treatment which provides further protection to the underlying zinc and steel.

The 1½ inch modular dimension makes the channel support system able to adapt to a wide variety of support applications, demonstrated with full color pictures showing: a triple trapeze application, three layer channel supports, hung one beneath another, holding multiple layer conduit runs as the runs change height and direction; vertical and horizontal runs of different diameter conduit intersecting with mechanical system lines; wall mounted telephone cable bundles supported with porcelain insulator clamps; framing racks and cable supports for horizontal runs of cable in a phone company dial center; well balanced conduit supporting trapezes adapting to the varying clamp needs of a structural steel supported metal desk installation.

Also shown are a typical use of the UL listed channel in its raceway form supporting and energizing high bay lights and structural support of cabinets and enclosures above the surface of concrete floors.

Contact: Electrical Products Division, Midland-Ross Corp., P.O. Box 1548, Pittsburgh, PA 15230; (412) 323-5400.

Data Star Features Detailed In Spec Sheet

FirsTel Information Systems, Inc., the business communications equipment subsidiary of U S West, has published a one-page brochure featuring product specifications of the Data Star, a digital telecommunications system that expands modularly.

This microprocessor-based business phone system has a variety of integrated terminals to meet the varied telephone needs of individual users within an organization. As the organization grows, the Data Star can be expanded without changing telephone equipment or most common program cards in the system.

A selection of station, system and attendant console features are listed in the Data Star brochure, along with a specifications table illustrating various components of the system.

From: Marketing Department, FirsTel Information Systems, Inc., 7900 East Union Ave., Suite 750, Denver, CO 80237; (303) 796-6773.

Cost Indexes For Construction Available

Price fluctuations in the construction and materials markets are indexed monthly on NewsNet, the nation's largest distributor of specialized business newsletter information.

Engelsman's Construction Cost Indexes show monthly cost indexes for 26 types of construction projects and activities and for 68 key construction materials.

Percentage increases and decreases from the previous month are detailed, as is the trend for the past 12 months, the trend for the past three months and projections for the next six months. Trends and projections are expressed in percentages per month, and projections are based on the trends and economic market conditions.

Books and reprints on the market are reviewed each month, with special prices for subscribers.

From: NewsNet, Independent Publications, Inc., 945 Haverford Road, Bryn Mawr, PA 19010; (215) 527-8030.

BOOK REVIEW *a new department*

Harry B. Miller (ed.), *Acoustical Measurements, Methods and Instrumentation*, [Benchmark Papers in Acoustics, Vol. 16], Hutchinson Ross Publishing, 1982.

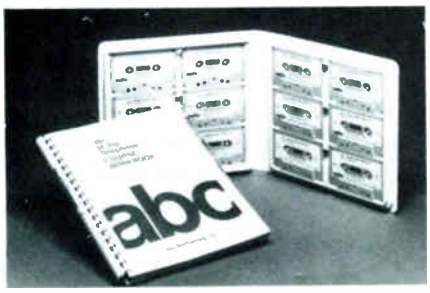
One of the problems of acoustics as a discipline is the lack of a standard, accepted body of writings thought essential by many in the field. The Benchmark Papers series of anthologies is an effort to give acoustics a literature, common to all its practitioners. The volumes have appeared one or two a year for a bit over 10 years, and each is devoted to a particular area of acoustics: underwater sound, musical instrument acoustics, and so on.

The second volume in the series, *Acoustics: Historical and Philosophical Development*, was edited by R. Bruce Lindsay, who is also editor of the *Journal of the Acoustical Society of America*. It is the most ambitious volume so far and the one of widest interest to specialists. This new volume on measurement and instrumentation also promises to be of interest to practically everyone who works in acoustics.

Edited by Harry B. Miller of the Naval Underwater Systems Center, this volume is limited by the fact that each of the previous volumes has included measurement and instrumentation papers dealing with the particular specialty. Even so, Miller includes papers by many familiar writers: Helmholtz, Tyndall, Sabine (Wallace Clement, and Paul), Nyquist, Lord Rayleigh, and Beranek. There are also more obscure researchers, such as Toepler and Dvorak.

The book is organized into six parts. The first deals with the earliest instruments for seeing sound: mechanical oscilloscopes, wave analyzers, and microphones. The anthology begins with a new translation of Jules Lissajous' 1857 paper on the vibratory motion of tuning forks. Every user of the oscilloscope knows the Lissajous patterns (every book on the oscilloscope reprints them), but how many today know they were discovered in research into the mass production of tuning forks?

(continued on page 48)



TeleTraining Cassettes Cover Telecommunications

Abc TeleTraining, Inc. has issued two new audio cassette series in fiber optic communications and transmission design. The tapes are intended for self-paced study as well as group training.

Fiber Optic Communication is a nine tape transcription from abc instructor, Robert Morris introductory workshop covering the basic principles, devices and processes in fiber optics pertaining to telecommunications systems. The content provides an understanding of fiber optic communications to those in planning, engineering, installation, manufacturing, or sales of fiber optic telecommunications systems.

Transmission Design for Special Services and Private Networks is a treatment of the fundamental concepts and methods in design and layout of PABX-CO trunks, FX lines and networks. The 12 tape album is transcribed from abc instructor, George Harford's workshop intended for common carrier companies, terminal equipment supplier personnel and others needing specialized training in design activities.

Both albums are edited transcriptions of actual three day workshops and include the complete course workbook. Three other workshops are also available in audio cassette albums. All series are $175 each.

From: ABC TeleTraining, Inc., P.O. Box 537, Geneva, IL 60134; (312) 879-9000.

Brochure On Designing Overhead Transparencies

A free brochure to help speakers produce effective overhead transparencies for successful presentations is now available from Hewlett-Packard.

Called "How To Design Effective Overhead Transparencies," the four-page brochure gives tips on keeping transparencies simple and direct, adding color and special effects, and considering the best viewing distance.

It tells how to design transparencies for about a dollar in materials by using a computer and a plotter, compared to paying a graphics service $50 for a five-color transparency. The speaker is shown how to develop special effects, such as framing, cardboard arrows, writing directly on transparencies, attaching overlays, and masking and highlighting for contrast.

In addition, the brochure suggests limits on the number of sentences and words per overhead and advises on the style, spacing and size of lettering.

Recommendations include keeping the maximum viewing distance no more than six times the width of the projected image and not revealing the transparency until the speaker is ready.

From: Inquiries Manager, Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303; (415) 857-1501.

Walker's "The How To Buy A Phone Book"

An influx of requests from end users has led to Walker Telecommunications Corporation reprinting 5,000 additional copies of "The How To Buy a Phone Book," a free 24-page booklet that offers advice on shopping for phone systems.

The book provides an overview of the telephone system selection and installation process. It points out the importance of telephone communications and the potentially high of inefficient, poorly planned systems. Its practical tips include advising readers to check their own systems by calling their own organization and seeing how easy or difficult it is to get through to a particular person.

Besides advice on shopping for phone systems, the booklet includes an easy-to-read glossary defining important terms such as BLF, DSS and OPX.

Walker Telecommunications Corp. is a high technology company specializing in business and advanced communications equipment.

From: Walker Telecommunications Corp., 200 Oser Ave., Hauppauge, NY 11788; (516) 435-1100.

SUPPLIES • SERVICES • SUPPORT

POCKET-SIZE SOUND LEVEL CALIBRATOR

A pocket-size, battery operated sound level calibrator, Model SLC-1, which provides direct calibration of sound level meters and other sound measuring systems is available from Spanta Inc. of Franklin Lakes, NJ. The Model SLC-1 is designed to fit 1-inch and 1/2-inch microphones.

Calibration frequency of the sound level calibrator is 1000Hz, providing the same calibration value for all weighting networks, A, B, C, D, and Linear. The pressure of 94 dB is convenient for calibration, and the sound pressure is independent of the microphone's volume, so that exact fitting of the microphone in the calibrator coupling is not critical.

Calibration accuracy of the Spanta sound level calibrator is ±0.3dB.

If you use a portable sound level meter, acoustic spectrum analyzer, or similar equipment, and you want to check the absolute level calibration of that equipment, then the Spanta SLC-1 may be a useful accessory. Since it operates at 1 kHz, one need not be concerned whether the microphone and preamp circuit are subject to any of the standard weighting filters.

Contact: Spanta Inc., P.O. Box 193, Franklin Lakes, NJ 07617; (201) 337-0044.

Reader Service #13

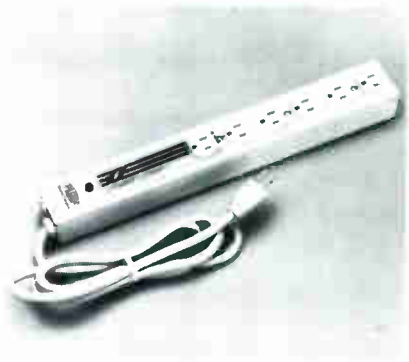
CHANNEL ACCESS TEST SET

Wilcom Products, Inc. has introduced the Model T308 PCM Channel Access Set with added features as Model T308-01A, at no additional cost. The test set now includes a count of Frame Error/Slips up to 9999 reset by keyboard command, indication of Bi-Polar Violations (BPV) and the presence of excessive jitter.

A new Model T308-05 adds a standard 1-3/4-inch panel to the T308-01A with T1C Mux/Demux capability for evaluation of any of the selected channels in digroup A or B at the DS1C line code rate. In the Drop and Insert Mode this is done on a working system without affecting the other channels. Framing Errors, BPV, Remote Alarm and no PCM indicators are also provided at the DS1C bit rate. Rack mounted, C.O. −48 Vdc powered and Bantam Jack versions of Model T308 are also available.

Contact: Wilcom Products, Inc., P.O. Box 508, Laconia, NH 03247; (603) 524-2622.

Reader Service #14



PILGRIM ELECTRIC'S SMART STRIP

Pilgrim Electric Company has introduced the Smart Strip for all the peripherals in a computer system.

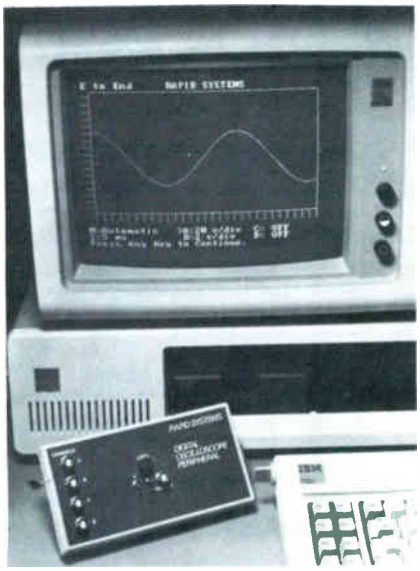
The first outlet of the Smart Strip is energized whenever the line cord is plugged into a live outlet. Named the Smart Socket, its current is continuously monitored by a current sensing circuit. When the selected master switch is turned on and more than 0.2 Amps flows through the smart socket, other outlets automatically turn on after a brief time delay. The time delay prevents nuisance tripping. When the master switch is turned off and a current of less than 0.1 Amps flows through the Smart Socket, the other outlets automatically turn off.

Smart Strips are available with four and six outlets and are rated 15 Amps, 125 Volts, 60 Hz, 1875 Watts continuous duty. Units include red pilot light, push to reset circuit breaker, six foot 14/3 SJT line cord with molded plug and keyhole-slot mounting brackets.

The Model MS-4 (four outlets) retails at $95.25, and Model MS-6 (six outlets) retails at $99.50.

Contact: Pilgrim Electric Company, 105 Newtown Road, Plainview, NY 11803; (516) 420-8990.

Reader Service #15



DIGITAL OSCILLOSCOPE PERIPHERAL

Rapid Systems has announced the Digital Oscilloscope Peripheral for IBM, Apple, and Commodore personal computers. The Peripheral plugs into the personal computer, the supplied disk slips in, and the personal computer becomes a Digital Oscilloscope.

Rapid Systems' new Perpheral provides a digital oscilloscope; the personal computer provides control and analysis. The Rapid Systems Peripheral is a 4-channel digital oscilloscope, with a 2 mHz sampling rate, 500 kHz analog band width and diode protection on all inputs. Graphics display is color enhanced, using up to 138 x 288 pixels for data display (up to four traces) and four lines of text for initial (default) values of the scopes parameters. A menu driven operation provides keyboard control of gain parameters for channels A, B, C, and D, time base values, number of channel, and trigger mode. All the post processing capabilities of the personal computer are available—to store and retrieve wave forms from disk, to analyze and process the information, and to compute and word process.

Prior to the introduction of the Rapid Systems Digital Oscilloscope Peripheral, data acquisition hardware was available for personal computers, but users were required to develop their own software. Formerly, it was impossible to buy an oscilloscope peripheral, plug it in and go to work, and what was available was expensive. The Rapid Systems Digital Oscilloscope Peripheral offers an oscilloscope system requiring only the user's personal computer.

Contact: Rapid Systems, 5415 136th Place S.E., Bellevue, WA 98006; (206) 641-2141.

Reader Service #16

MUSIC SUPPLY'S SPEAKER SUPPORT TRUSS

Music Supply Co., Inc. provides a speaker support truss, model SST-1, for use when installing an eight-inch speaker in a 'X 4' (or 2' X 2') lay-in type suspended ceiling. The truss is light weight but strong due to its design and construction.

An enclosure, model SE-1 is available for jobs requiring a back box. The SE-1 is a back box.

They are designed for each of installation with complete pictorial instructions with each order. Both the SST-1 and the SE-1 are all steel of one-piece drawn construction. Each is "nestable;" therefore, they take up less than 10 percent of the warehouse or truck space compared to the typical two-piece welded back box.

They are U.L. Listed for use in air return plenums. When used with any speaker, transformer, and grill assembly that is U.L. Listed, the complete assembly is then considered to be U.L. Listed.

One of the less glamorous, and most common, tasks for a sound contractor is the installation of ceiling speakers. The SST-1 would appear to take some of the effort out of the job by providing a strong support for typical eight-inch speakers that fits in the average suspended ceiling. The SE-1 back box can be fitted over the speaker, providing an enclosed installation where necessary. The Music Supply Co. literature claims a break-down strength of 150 pounds for the SST-1 when suspended in a typical T-bar ceiling.

The literature also lists numerous screw-on and torsion spring type baffles, which the SST-1 can be used with.

Contact: Music Supply Co., Inc., 809 N. Madison, Dallas, TX 75208; (214) 946-8450.

Reader Service #17

BOOK REVIEW

(continued from page 44)

Lissajous turns two tuning forks at right angles to each other, so that one vibrates horizontally and other vertically. Shining a spot of light from one finger of one fork, to one finger of the other fork, he produces a visual trace of frequency, amplitude, and phase relationships. The clear drawings of these audio microscopes, are fascinating.

Helmholtz reflected from a tuning fork to a violin string, and so observed non-sinusoidals. Dayton C. Miller developed this idea into his phonodeik, which used a horn to capture acoustic signals, and so did not require that the sound source be placed actually in the device. This moving beam of light was adapted from a laboratory instrument to the sound film recorders by RCA. We see constantly throughout this anthology that measurement instruments were often developed into recording devices.

Arthur Gordon Webster continued work on the mechanical oscilloscope well into the era of electronic amplification. In fact, he urged the use of his instrument as a mechanical analogue of electric behaviors, just the reverse of today's custom.

The second part of the book is devoted to microphones as precision measuring devices, and many of these papers are by E. C. Wente of the Bell Laboratories, whose basic designs for both condenser microphones and electrodynamic microphones and loudspeakers are still used today. The third section of the anthology traces the development of schlieren photography of sound waves. When a sound wave passes through an elastic medium it creates compression and rarefaction waves which act as lens irregularities can be photographed. Looking a wave propagation in a ripple tank is a variation of the same method. It turns out W. C. Sabine used schlieren photography in some architectural studies. The fourth section of the book deals with reciprocity calibration of microphones and loudspeaking horns.

In the fifth part of the anthology we follow measurement of normal-incidence absorption and acoustic impedance. Here a reprinted 1921 paper by Kennelly and Kurokawa shows complex impedance. This should be a humiliating sight for an industry that hasn't come to grips with the concept in 1985. This reactance-resistance plot, printed on page 338, is the earliest depiction of impedance on the complex plane known to this reviewer, and in fact predates much of Nyquist's work.

The last section of the book contains a group of modern papers on measurement of phase and transient behavior of loudspeakers. How unaccountable none of the rich literature on loudspeaker frequency response is printed here! That work begins with Bostwick's 1924 paper in *Bell System Technical Journal* and would be a welcome companion to the papers the editor has selected for this section.

Jules Lissajous to Richard Heyser. How appropriate this anthology begins with the one, who first looked at frequency and phase of sounds, and finishes with the other, who has given us a modern instrument depicting time, energy, and frequency—the reader interested in acoustics will find in these papers on measurement a thread that follows the entire scientific history of audio.

SALES & MARKETING

(continued from page 12)

ware . . . everyone is selling hardware. Don't sell color . . . everyone is selling color. Sell functions that complement an organization's flow of written and vocal traffic within its four walls: handsfree, intercom, automatic dialing, conference calling, and toll restrictors (to keep down private message calling). Remember, almost 75 percent of vocal traffic within an organization is person-to-person within the four walls. A two-track system is the only way to go, to accommodate the outside call. One instrument is out of the "circuit" when it is on intercom; and the outside call is a missed call.

If interconnection is one wing of your business flight, a fallback product position must constitute the other wing.

And if sound system engineering was abandoned because interconnection was the greatest thing to come down the pike since chocolate layer cake, get back in. The four-figure jobs, small by comparison to the interconnection sales ticket, are the stabilizing factors to an operation. Moreover, they keep the door open while the interconnection submission slowly perks at the prospect's location.

An important fallback position is the development of a specialty in system work: perhaps a security system that incorporates commercial video products. Maybe, the cellular radiophone market has a great attraction, and the local industry economics warrant instituting a cellular radio sales/service operation.

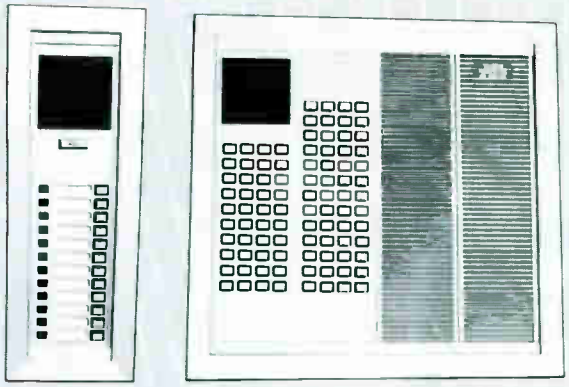
In summary, as a general contractor/dealer in audio and telecommunications circuits, the thinking today has to be pragmatic. Don't handle the product/system that cannot develop a profit factor of plus two in 60 days or less! Always develop a fallback position in either a system, product, or service that will sustain your operation, especially in slow times!

THE TEKTONE COLLECTION

Six simple steps – engineered to meet all your intercommunications needs.

1 Tek-Select office intercom systems... ● featuring the SM210 master with remote LED indication, total selectivity & hands-free reply.

2 Apartment house intercom systems— standard AM series or custom made CM ● series. Available with a variety of remote stations.

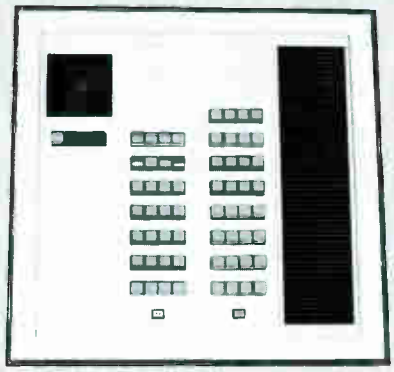


3 Tek-Sound AM/FM Master ● Radio Intercom Systems.

4 Tek-Entry Telephone Entry Systems. Complete, ● automatic call and entrance control.

5 Tek-View VM-102A for security and communication combined. Ideal for ● high rises, homes or apartments.

6 Tek-Lite NC-150 UL listed Nurse Call system. ●



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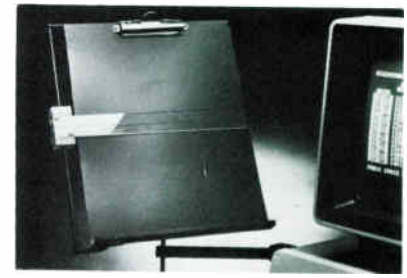
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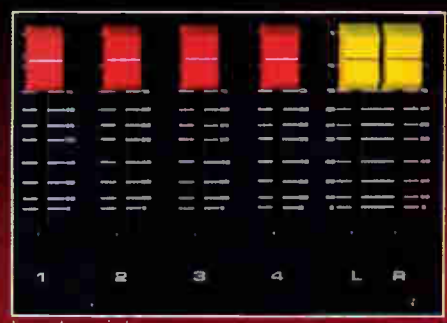

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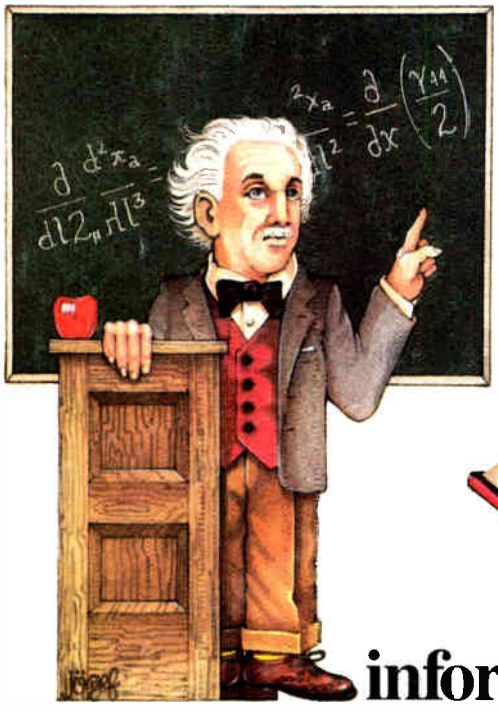

information

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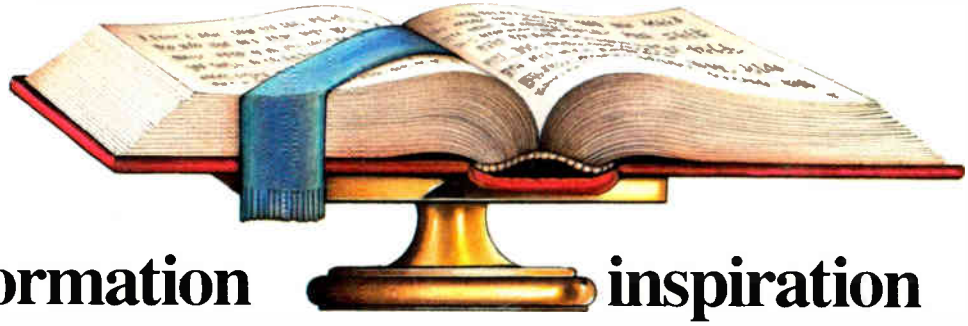

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