

JANUARY 1983

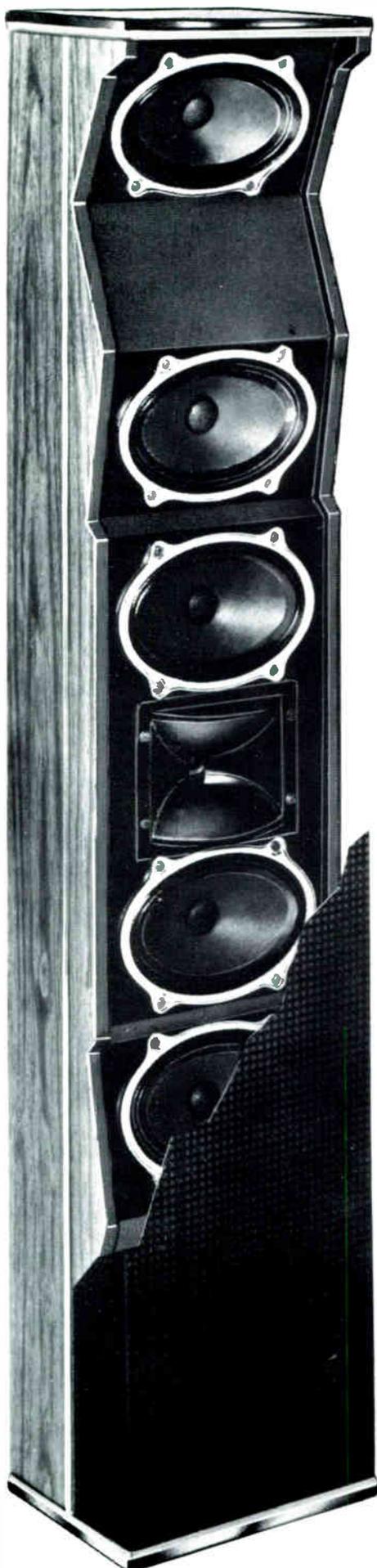
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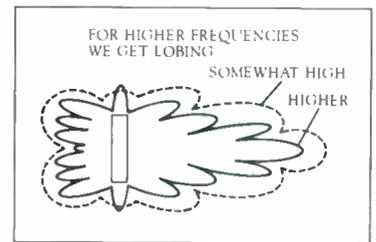
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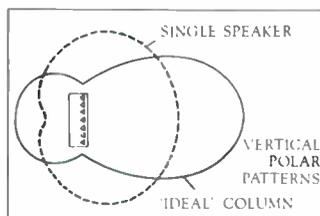
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JANUARY 1983, VOLUME 28, NUMBER 9

Founded 1955

## ARTICLES

- 4 A New Meaning for NATA
- 14 Electronic Key Systems & Dependability  
by Francis W. Callahan
- 28 Marketing Alarm Systems  
by John Sanger
- 40 Reinforcing Rock—Creatively: Part 3  
by William Gillette
- 52 Sound Level Meters—Part 3  
by Daniel Queen

## DEPARTMENTS

- 22 New Products  
Telecommunications
- 24 Tip & Ring
- 32 People
- 34 New Products  
Audio
- 56 Classified

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This month's cover: Lining up for the NATA Annual Convention. See story page 4.

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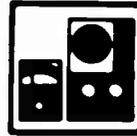
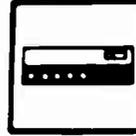
Sound & Communications (U.S. P.S. 943-140) is published by Sound Publishing Company, Inc., 156 E. 37th St., N.Y., N.Y. 10016. 212-685-3480.

President J.J. Brookman; Treasurer, R.F. Brookman, Secretaries, J.E.B. Lapidus, W.F. Brookman.

Subscription rates: U.S. — 3 years \$37.50, 1 year \$15.00. Canada and Mexico — 3 years \$48.00, 1 year \$18.00. Foreign and South America — 1 year \$25.00.

Controlled circulation postage paid at Easton, Pennsylvania 18042.

Postmaster: If undeliverable notify on Form 3579 address correction.



# ADVERTISERS

Alpha Paging Systems, Compage Div.....	10
American Zettler, Inc.....	41
Atlas Sound.....	25
Benjamin Electroproducts, Inc.....	44
BGM International.....	56
Bose Corporation.....	27
Cabletronix.....	56
Cetec Trutone.....	17
Columbia Scientific Industries Corporation.....	21
Communications Equipment Co., Inc.....	46
Communitron Corp.....	50
Crown.....	55
DeltaLab Research, Inc.....	36
Ditek Industries, Inc.....	56
Edecor.....	30
Edstan Doctors Registers.....	12
Electro-Voice.....	Cover 2
Fanon Courier Corporation.....	15
Florence Corporation.....	44
FSR Inc.....	42
HM Electronics, Inc.....	53,55
Ideal Wire Products Inc.....	56
ITT/DESD.....	13
MacKenzie.....	26
McGohan Electronics, Inc.....	56
Montgomery Mfg. Co.....	56
Music Supply Co., Inc.....	56
Oaktron Industries, Inc.....	Cover 3
Opamp Labs Inc.....	56
Pentagon.....	16
Projected Sound, Inc.....	46
Quadrent Associates.....	56
Quam-Nichols Company.....	7
RTS Systems Inc.....	33
San Diego Sound & Communications Co., Inc.....	26
Shure Brothers Inc.....	Cover 4
Signal Cable Company.....	1
Sound Products/3M.....	24,35
Talk-A-Phone.....	6
Tape-Athon.....	45
TekTone Sound & Signal Mfg.....	52
Tele-Path Industries, Inc.....	11
Telex Communications, Inc./Turner.....	43,47
Toa Electric Co., Ltd.....	29
Toa Electronics, Inc.....	39
Tone Commander Systems, Inc.....	49
University Sound.....	31
UREI.....	32
Wanlass Industries, Inc.....	48
Xtel.....	9

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# A New Meaning for NATA

WASHINGTON, D.C., Nov. 30/Dec. 3, 1982—The 13th Annual Convention of the North American Telecommunications Association (NATA)—the name change was voted in by the Board of Directors during the convention—was conducted on three levels, for the edification of the 4500 attendees: exhibits, seminars, luncheon speakers.

The name change—from Telephone to TELECOMMUNICATIONS—NATA President Edwin B. Spievack declared...“carries large significance for this association. The world has changed fundamentally and NATA has changed with it. Today, our members are providing far more than telephone equipment. They are offering a broad array of telecommunications equipment and services to the American consumer.”

## Exhibits

It was most strikingly apparent that the independent contractor of communication systems and products was into more than telephones. He was into computers, paging services and a world of peripheral equipment for enhancing the performance of the telephone apparatus installed within business and home. Such apparatus as cost accounting systems, code calling gear, call distributors, and hold systems for single-line phones was vigorously “pushed” by exhibitors.

The dominant product and system at the convention was the key system—from the 1A2 right on up and through the electronic key offering 125 phones with 10, 20 or 30 lines. Over a dozen manufacturers of key systems demonstrated new equipment, incorporating multiple-func-

tioning features intended to override and capture the marketplace from the small PBX. Additionally, there were the duplex intercom people heralding their new products as a reminder to the broad telecommunications marketer that intercom was not to be bypassed. It was evident in their vibrant approach that there are still some voice communications system applications which fall within intercom's purview, because no electronic system can deliver intercom, one-on-one, at a lower price per station/per system.

The key system builder, in 1982, was obviously driven to expand his product line with the January 1982 settlement of the AT&T anti-trust suit brought by the Justice Department, believing that the restraints Judge Greene placed on the divested BOCs in the selling of CPE



*Cutting the ribbon to open the convention is the newly named NATA President, Edwin Spievack. Left is the retiring President, Richard Long; on the right is Tom Carter*



gear spread wide a green pasture. Thus, several companies developed “home” key systems, in addition to seeking a position within the small business area.

A quick illustration: Iwatsu demonstrated a home phone unit—1-line/6 phones and 2-line/8 phones—with intercom and security features, at a selling price that rivals the department and specialty store offering. At the high end, one found Technicom, Melco Labs and Comdial, with features including music-on-hold, hands-free answerback on intercom, colored intercom buttons for easy identification, programable station number to assign station to intercom key number, and much more.

With so much built-in proficiency, coupled with current expressions of the “Office of the Future,” one could not but wonder if the telecommunications industry had been first invaded and then taken over by computer devices. One industry observer and astute commentator, who requested that he not be identi-

fied, remarked that the “Office of the Future” was in some ways meaningless: the future office was already here. The marriage of the computer with the telephone has produced a new tool for business and industry... a tool that speeds up work processes, at the same time keeping accurate records, immediately available when challenged. Thus, he noted, the CRT terminal beside the handset makes both of them more valuable tools for management.

Several company engineers, in their press conferences, used the term “Office of the Future” jocularly. They confessed to a poor reading of the term, because the key phone system has come further in the last five years, with innovative circuitry, component invention, and feature offerings, than even the creators of “Buck Rogers in the 21st Century” could imagine. The “Office of the Future,” one development engineer confessed, was in flux, awaiting an industry move toward definition of the term, and once parameters were established, the industry could

institute standards of equipment and functions.

The 1982 sales of key systems—from 4 stations to 100 stations—jogged along at a pace far ahead of the reported 8 percent gain in telecommunication systems generally, according to one wire and cable supplier. He reported that his sales of 25-pair cable in 1982 were the best year he’d experienced in the last three years. Obviously, there was a stirring move toward the keyphone, and an even bigger turnover of old embedded keyphone systems for the newer electronic features.

The range of peripheral equipment was stunning: from small SMDRs by a Tele-Total, to the big brothers by Sykes Datatronics. And all designed to give management greater control over costs.

#### Seminars

Enhancing the professionalism of practitioners within the industry is the desire of every trade association. NATA’s seminars were directed at three core elements: the emerging markets for equipment (such as the

home market, which is bent upon purchasing their own telephones); and the reshaped marketplace, as devised by the Federal District Court's divestiture action against AT&T.

Then, there are always financial management problems in any industry—but more so in the interconnect industry. Its youth—only 13 years old, as compared with AT&T, over 90 years old—is beset with problems of insufficient capital to handle the big jobs—1000-line PABXs and bigger—and the take-over activities of the supplying switchmaker, to preserve the sale, to hold on to the staked out share of the local marketplace.

Finally, there are the ever-present legal and legislative problems emanating from the federal and state regulatory commissions, which devolve into discussions on strategies for growth. One of the more important growth strategies today is the resale offering, as an extension of interconnect operations.

These three subjects were joined by a session on how to cultivate the daily, monthly and trade press, so as

to enjoy a measure of publicity. In telecommunications, where the corporate identity of an AT&T, GTE, ITT, MCI, Sprint, Comsat is a stand-out, the independent interconnect contractor is at some disadvantage. To meet some of the competition's press coverage, it was suggested that one meet with local business editors periodically and inform them of one's activities.

#### Luncheon Speakers

The keynoter—Ronney Harlow/president of Pritec, Chicago, and NATA secretary/treasurer—declared that momentum was still the best term to define the progress the interconnect industry had achieved. "I claimed then (last year), as I claim now, that the interconnect industry would continue to progress and grow with irresistible force, because an even stronger force, the world-wide consumer movement, was driving the whole telecommunications industry to produce innovations and advances at a rate exceeding the capacity of even the most powerful monopoly. Only a free market can produce the telecommunications for which America—and

particularly American business—is clamoring."

Harlow cautioned his audience, however, not to believe that they were home free with the Justice Department versus AT&T anti-trust settlement—they are not. There still remain two bedeviling issues, one generated by the Court, the other by AT&T itself.

He explained: "First, the successors to the Bell Operating Companies may emerge from the settlement in a form different from what was originally intended and proposed. Instead of being limited to origination and termination of traffic, they may be allowed back into the equipment business again, only this time with the option of selling as well as leasing customer-premises equipment, and with the additional option of dealing in equipment manufactured by both Western Electric and its competitors.

"Second, these successors to the Bell Operating Companies may very well continue to retain the name "Bell" in their names, even though their ownership is to be severed from the intact parts of the historic Bell System. Furthermore, there appears to be the possibility that the severed Bell Operating Companies may do some subcontracting for AT&T or American Bell, and thus completely blur the separation and divestiture. This too, is a radical departure from the original intent of the Consent Decree and seriously dilutes the effectiveness of the Decree as a remedy for monopoly."

Harlow frets, he freely admitted, that with AT&T creating "American Bell" to handle the sale of telecommunications equipment, even the divested telcos may become sales outlets for equipment. Then it is conceivable that the areas separating AT&T, the BOCs and the interconnect industry may be merged. "I think you can see where all this is leading: the distinction between the so-called monopoly and the so-called interconnect industry could well break down of its own accord."

"Indeed, we may even see the day when we'll simply have to invite AT&T to join NATA. As a matter of fact, it might not be such a bad idea right now. Since the membership dues in NATA are based on the member's annual gross revenues, such a move might be a very prudent way to improve the financial soundness of

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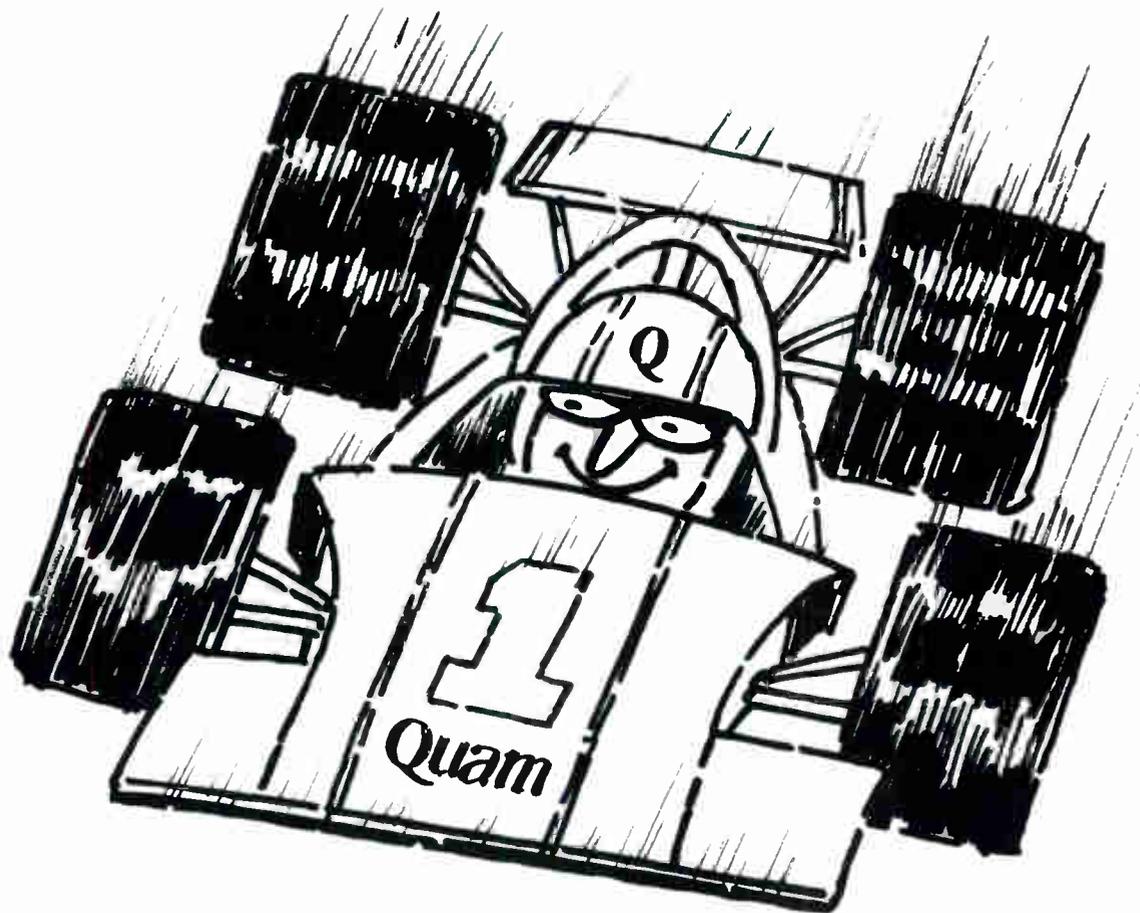
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our association.”

Harlow's suggestion met with immediate approval.

#### *Edwin Spievack/Executive Director*

The once-upon-a-time General Counsel to NATA, and now its President and Executive Director, Edwin Spievack, remarked that 1983 will see another beginning for “our industry” in an ever-present changing industrial and political scene. Specifically...“We now face the inevitability of a restructured telecommunications industry. While we cannot alter the circumstances of the changed marketplace in which we will be required to do business, we can still choose our responses to those circumstances. There are clearly choices which reside within this industry's and this association's control. These choices will be based on the unique awareness experience and history have imparted to us, and on the farsightedness we gain from our continuing work to ensure the future of this industry.

“We will look to the policy and plans this industry and its association require to reflect the changing competition and structure of our endeavor...We will look, with renewed energy, to the external regulatory and legislative activity which impacts this industry...as we strive for change within the industry and ourselves, we will devote a renewed attention to our sources—to the relationships with which we have grown, and which are likely to stay with us through future change. Until our own technological genius could emerge, we sought and received foreign support for our emergence. Our domestic economy served up fruitful opportunities for all of us—then and now, even as the benefits have not always been reciprocal.

“The bottom line for us is—and has always been—a fairly competitive market. We will never accept less. We certainly will not tolerate the resurgence of predation or discrimination practiced with the support of government policy parading either in the name of regulation or deregulation. Our aggressive position with respect to these matters has always reflected our dynamic relationship to the market in which we have sought a place. That place has never marked us for friendly regard, but it has earned for us a

vaulting respect that grows with time...We, more than any, understand the consequences of resistance to change—and we, more than others, understand the benefits of change. We welcome it, and court, it, because we, more than others, have lived and disciplined ourselves for it.”

#### *James E. Olson*

The Vice-Chairman of AT&T, and the overseer of the American Bell operation, James E. Olson, delivered a brief overview of what to expect of “Baby Bell”...a “fully separated” entity...having no sharing of facilities with AT&T. Thus, American Bell...“have set up their headquarters staff and much of their field organization. They've introduced their Net 1000 Service. They've set up their own data systems.”

Net 1000, according to Olson, “is a tremendous breakthrough in communications and data transmission. It will change the ways companies communicate and do business, and it will accelerate the growth of the Information Age.

“American Bell Consumer Products will sell all the varieties of telephones now available from the Bell System, plus other terminal equipment and special services yet to see the light of day...The home and business markets for customer-premises equipment and systems have enormous potential. That's why your association has grown so impressively.

“You have a slogan on your convention program, quote, ‘We are the competition.’ Well, American Bell is part of the competition, too. We intend to be formidable competitors. And we will be fair competitors. There is a big and growing market out there, with enough room for all. Competition can only benefit all of us, and benefit the public as well.”

Olson acknowledged that the Consent Decree had some failings and that conflicts did exist between the Consent Decree and the FCC's Computer Inquiry II decision. Mainly, the Computer Inquiry II decision says new Bell customer-premises equipment—not tariffed, not regulated—can only be sold by a separate subsidiary. Existing equipment in customers' homes and businesses must be handled by the Bell Operat-

ing Company, because *that* equipment is still tariffed, still regulated.

“On the other hand,” Olson noted, “the Consent Decree says that the already installed, ‘embedded’ customer equipment has to go over to AT&T at divestiture—in early 1984. But because of Computer Inquiry II restrictions, it will have to be administered in an AT&T organization separate from American Bell.

“This kind of approach will be confusing for customers, employees—even competitors. And we think it needs to be changed, soon. We think the common sense solution is for the FCC to detariff that already installed, ‘embedded’ customer equipment before the end of the next year, so that it can be transferred to American Bell at the time of divestiture. Then customers won't have to deal with two separate AT&T organizations for Bell telephone equipment.

“We're going to be competitors through American Bell, but we can work together, too, just as you do through organizations such as NATA.

“The Bell operating companies also recognize it's in their best interest to work successfully with all customers and equipment providers. Added equipment usually means greater use of their facilities. That's their lifeblood, and they know it.

“All of us are in a great, expanding market, with all the opportunities any of us could ask for. Competition opens up the market—you've helped prove that. And the process has only begun. By competing actively and fairly, we'll also be working together to expand the communications market even more, for our mutual benefit, as well as for the benefit of the customers we seek to serve.”

#### *V. Orville Wright*

The President and Chief Operating Officer of MCI Communications Corporation, V. Orville Wright, contributed his thinking about the recent Consent Decree and the ensuing competitive arena for all sources of telecommunications products and services, other than the Bell Operating Companies, by noting... “Major events and developments have taken place, and many more are in the making. They're presenting all of us with unsurpassed challenges and opportunities. But the price of success in

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opening up this industry is constant vigilance and forceful action.

"...Bell Operating Companies, although no longer within the AT&T corporate veil, will be strong companies whose viability will be ensured in the short run by their status as franchised, monopolistic providers of local exchange services. In addition, they will compete with many of us as vendors of customer-premises equipment and providers of cellular radio service. But we must be sure that they aren't allowed to leverage their position in these competitive markets through their monopoly power. If they try, we must initiate anti-trust action."

Wright observed: "What will the changes about to be wrought by AT&T's divestiture mean for us as suppliers of alternative products and services? For some, it will be an opportunity to go into a new business; for others, it will be an opportunity to expand in the business we are in. As suppliers of alternative products and services we must take the actions necessary to make this industry more competitive. For the good of the nation, the incestuous relationship that has existed in the Bell System is coming

to an end. If this nation is to be a factor in the world's telecommunication market, then we must have a competitive domestic market for customer-premises equipment and central office equipment. No longer can this nation afford to have the majority of our telephone equipment designed by Bell Labs, built by Western Electric, bought by Bell Operating Companies, and placed with users as a part of a monopoly service. From our suppliers we must get the best product stream for the best price.

"...Competition in our industry will become more intense. More companies will enter the equipment side of the business, for example, alongside those of you and your foreign counterparts already manufacturing and marketing equipment that directly competes with Western Electric's. There is a ready market for your products, but it will be the most innovative and cost effective suppliers that survive and grow."

Wright pointed to a marketing challenge, newly arisen: "We will have to re-educate the American public. There is throughout the land the natural inclination, instilled over

many decades, to call Bell for your phone needs." He suggested a vigorous merchandising effort to widen the customer's perspective about telecommunications, and to note and include alternate sources of supplies and service.

Wright concluded, "The competitive future we have dreamed about is rapidly approaching. Competition will reshape this industry over the next several years. We all can be a part of it. The opportunities are there. What we have to do is offer the best product for the lowest price—and the future will be ours."

#### *William F. Baxter*

William F. Baxter, Assistant Attorney General, Anti-Trust Division of U.S. Department of Justice, deserves major credit for settlement of the AT&T anti-trust case. The settlement promises greatly improved opportunities for participants in the telecommunications industry.

Immediately after his appointment in 1981, Baxter scotched a weak consent decree then being considered by the Carter administration. Throughout 1981 he withstood enormous political pressure generated by AT&T, and almost single-handedly prevailed upon the Reagan administration to keep the case alive in court.

As a result, Baxter forced AT&T to the bargaining table and achieved a fundamental remedy...divestiture of the Bell Operating Companies, an agreement every observer thought impossible.

Baxter's remarks were not concerned with an enlightend exposition of the Consent Decree. Rather, he declared his displeasure and disappointment with several points in Judge Greene's decision, one especially, dealing with the BOCs right to sell complex customer-premises equipment in two years.

He urged his audience to be vigilant in the next two years, monitoring the activities of AT&T and the BOCs for violations and patent infringements upon the terms of the Consent Decree, and to forward these reports either directly to the Justice Department or through the offices of NATA. But, he cautioned, do not cry wolf too often, if one believes in a future of the telecommunications industry and the pri-

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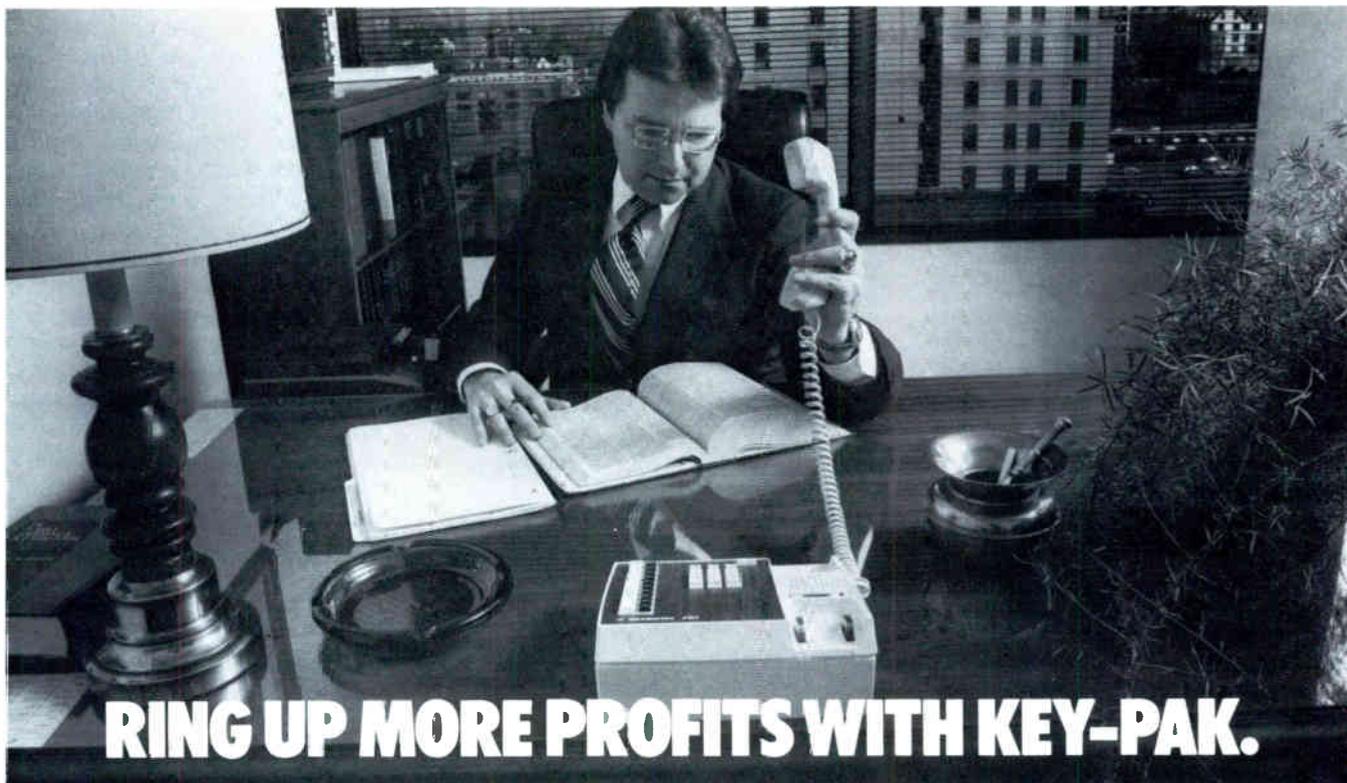


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vate suppliers part in it.

\*\*Albert H. Kramer was appointed General Counsel of the North American Telecommunications Association. Kramer has been NATA's Acting General Counsel since August 1982, when Edwin Spievack stepped down to become Acting Executive Director of NATA. During the Carter Administration, Kramer was director of the Bureau of Consumer Protection of the Federal Trade Commission. Since October 1981, he has practiced with Cohn and Marks, a Washington, D.C. law firm. Before joining the FTC, Kramer was with the Washington, D.C. law firm of Arnold and Porter (1975 to 1977) where his practice included general and anti-trust litigation before federal courts and regulatory agencies.

\*\*NATA petitioned the FCC (December 1/82) for a declaratory ruling requiring the seven regional Bell Operating Companies to establish separate subsidiaries for the offering of unregulated customer premise equipment after divestiture.

Noting that the FCC's Computer II plan expressly applies the separations requirements to the integrated Bell System (including the BOCs) now, NATA argued that the anti-trust settlement "in no way affects the continuing application of the separations requirements to the BOCs,

either before or after the divestiture by AT&T."

#### NATA Notes

\*\*Richard Long was the 1982 recipient of the Tom F. Carter Award, in recognition of his work on behalf of the Association. Long was first elected to the NATA Board in 1974, served two terms as NATA President (1975-1977 and 1979-November 1982) and was NATA's Executive Director from November 1979 until July 1982. In addition to serving as NATA Chairman, he is Executive Vice President of Inter-tel, Phoenix, AZ.

\*\*Four New members have joined the NATA Board of Directors: James P. Healy, President/Executone Telecommunications-San Diego, Inc; Paul Pearson, President/Midwestern Telephone, Inc. (Joplin, MO); David C. Perdue, President/ATS Telephone Systems, Inc. (Memphis, TN); and Gerald Poch, Vice-President/TIE/Communications, Inc. (Shelton, CT). Healy, Pearson and Perdue were elected to 3-year terms. Poch will serve a 2-year term.

Re-elected to 3-year terms were: John Bakas, Manager/Technical Planning Support/RCA Service Company (Cherry Hill, NJ); Edward Brody, Chairman, Executone, Inc. (Jericho, NY); H. Mac Eaton, Vice President/ITT Corporation (Har-

risburg, PA); Ed Eddy, President/NEC Telephones, Inc. (Melville, NY); John Hinkle, President/Centel Business Systems-Fish Division (Houston, TX); and Michael Morris, General Counsel/Rolm Corporation (Santa Clara, CA).

\*\*Chester W. Lytle, Sr., President/Communications Diversified, Inc. (Albuquerque, NM), has been named Chairman of the Business and Financial Review Committee of NATA. The new 8-person committee will be responsible for overseeing the internal operations and affairs of the nationwide trade group, representing more than 350 manufacturers, suppliers and distributors of competitive telephone and telecommunications equipment.

"The smallest of these companies will rank 30th on the Fortune 500 list of corporations," NATA's petition read. "Within their respective service regions, each of these carriers will possess the ability to engage in anti-competitive activity through control of bottleneck facilities and the ability and incentive to cross-subsidize their competitive products with revenues derived from monopoly service," the petition continued.

After divestiture, expected in early 1984, each of the 7 BOCs will have estimated assets of between \$13.3 billion and \$18.5 billion. Their local service areas will range from two to 15 states, including almost all major metropolitan areas in the U.S.

NATA urged the FCC to resolve the doubts about the BOCs' status expeditiously, affording the Commission and interested parties enough time to review and approve the BOCs' plans for capitalizing their separate CPE marketing entities before divestiture occurs.

NATA's petition on the divested BOCs is the latest in a number of recent legal pleadings by the association.

Among the pleadings: opposition to AT&T's proposal for the sale of embedded CPE; appeal of the anti-trust settlement; declaratory ruling from the FCC prohibiting Michigan Bell (and other BOCs) from violating Computer II rules by serving as CPE "brokers" for American Bell; and a complaint asking the FCC to prevent AT&T from continuing to impose discriminatory "Maintenance of Service Charges" on competitive interconnect vendors. □

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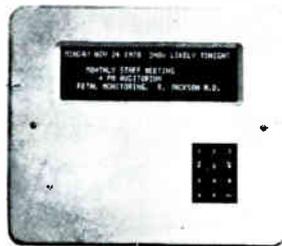
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# Electronic Key Systems & Dependability

by Francis W. Callahan

**M**aytag repairmen move over! Make room for the next generation of idle craftsmen—electronic key system technicians. Well, not quite; but the evolution of solid state and digital technology has produced a very reliable product in the new era of key and hybrid systems

What is it about these systems that makes them almost maintenance free? Two principal factors: non-mechanical components and modularity.

Take the TIE Ultracom, for example. It uses a Touch Tone pad that is a marvel of simplicity. About the thickness of a credit card calculator, the unit has only one part that moves—a dimpled latex membrane under the keys that flexes ever so slightly when the keys are depressed. The membrane makes contact with a solid state circuit, and from that point on the only motion is a flow of electrons. Comparison with the Western Electric Touch Tone pads in place on most 1A2 equipment demonstrates the dramatic simplification in design that has taken place in just this one component.

Augmenting solid state circuitry is modularity. That is, most components are “plug in” units that can be easily replaced if defective or worn. The Ultracom’s cradle switch is a good example. It uses a micro-switch which is encased in a sealed packet and joined to the rest of the telephone’s wiring via a plug-type connector. If it becomes necessary to replace the switch, the operation takes less than a minute to perform.

---

*Francis W. Callahan, Director of Callahan Technical Counsel, is a consultant specializing in telephone system design, networking, and implementation.*

Not only have these design improvements created systems that are easy to repair, but also they have produced products that are significantly more dependable than 1A2 equipment—quite an accomplishment, given the rugged construction of Ma Bell’s legendary telephone instruments! But Larry White, Field Service Supervisor for Toshiba Telecom, in Armonk, New York, states that whereas the failure rate on 1A2 units is about 1%, the rate for electronic key equipment is 1/1000 of 1%.

Has this impressive improvement in operational dependability produced a less durable product? Can the new, lightweight instruments, for example, survive user abuse? In response to that question, White relates a recent incident involving a Strata III telephone that fell off of a moving delivery truck and under the wheels of an oncoming car. Although the phone’s casing was cracked, the fiberglass circuit board absorbed the crushing impact and sustained no significant damage.

Even the ordinary “handset slammers” out there have not inflicted much damage on the new telephones. Susan Barrett, Service Manager for TSI in Rye, New York—a TIE distributor—explains that in the past three years very few, if any, service calls have been occasioned by such rough handling.

So there we have it: the electronic systems are durable, dependable, and maintenance free...well, almost.

There are just a few problems. One such I have dubbed “electromagnetic vulnerability” or EMV. The Achilles heel of digital circuits, EMV refers to their low tolerance for electrical power surges or “spikes.” Circuit boards must be protected from extreme fluctuations in the voltages running through them. Con-

tractors are well advised to determine whether or not the system they are considering offers some form of “spike protection.”

Some systems, such as Strata III, incorporate protective devices (“posistors”) into the systems at the factory. Others can be field-fitted with similar devices available from various sources. Either way, the inclusion of these protective devices is good insurance against sometimes costly repairs.

Other problems stem from user error. If someone attempts to make changes in the system’s programming by modifying the back plane wiring, serious malfunctions can result from incorrect strappings. To insure against this eventuality, Larry White suggests purchasing optional circuit cards with Strata III which provide dip switch programming control. If errors are made, these optional programming cards insulate the common equipment from catastrophe.

On some systems, if the user decides to unplug his telephone while the receiver is off-hook, a power surge can be created which will blow a fuse on the circuit board. Likewise, if the hands-free feature is engaged when a phone is unplugged, problems can arise. These kinds of user-instigated maintenance problems—though less frequent than the “spilled coffee syndrome”—nevertheless can affect the smooth performance of electronic systems and generate service calls.

Despite the fact that these advanced systems are generally easier for field technicians to trouble-shoot than are 1A2 systems, the most frequently encountered maintenance problem, according to one manufacturer, is incorrect technician diagnosis. However, in defense of the technicians, Field Supervisor James Barrett at TSI points out that

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- RINGING TONE to signal called and calling stations
- TALK, LISTEN and TRANSFER indication lights
- VOLUME CONTROL for incoming voice and tone signals
- STATION NAME CARD to identify stations in system

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- PA-100 PAGING ADAPTER**, 3¼" x 1⅞" x 6½", Weight 2 lbs.
- 5PW-100 FIVE PAIR EXTENSION CABLE**, 100 ft length - Weight 6 lbs
- 5PW-50 FIVE PAIR EXTENSION CABLE**, 50 ft length - Weight 3 lbs.

### CABLE REQUIREMENTS:

Interconnecting cable consists of five twisted pairs with connectors which plug into a connector on each intercom station. Maximum cable length from first station to last station is 1000 feet.

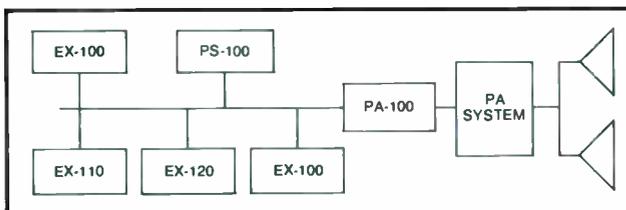
### POWER SUPPLY REQUIREMENTS:

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electronic key and hybrid systems do not provide an alarm panel which automatically identifies the offending component. The technician must rely upon the manufacturer's servicing flow charts, which do not always conform to real-world situations.

In addition to these few situations which affect the performance of electronic key systems themselves, there is an array of peripheral devices and features coming on the market which is bound to spawn maintenance problems of its own.

Station Message Detail Recording (SMDR) and Least Costly Routing (LCR) are two significant sub-systems which, although they have been available on PBXs for many years, are only just becoming available on key and hybrid systems.

Iwatsu's Omega IV, for example, can provide non-sorted, non-costed SMDR now. However, according to Bob Beck, Engineering Production Manager, a peripheral unit will soon be available for interfacing with Omega IV which will not only cost calls via V & H coordinates but also

will create a menu of valuable management reports.

Another similar unit is manufactured by Paige Dixon Associates, Inc., of Glastonbury, Connecticut. Peter E. Walker, President, explains that the minor amount of service-related events affecting their Call Elf system over the past year stems mostly from the printers attached to the Call Elf rather than from the processors themselves. The necessity for changing the printer's ribbon often generates a service call when the operator botches the job or simply forgets how to thread the ribbon.

As the SMDR machines become more sophisticated, a certain amount of maintenance will be required just to keep the rate tables current. Richard Durante, Director of Customer Service for TIE, explains that whereas now such updates are accomplished by a technician physically removing a chip and replacing it with a new version, by the end of this year TIE's Ultracom CX system will perform these rate-table updates remotely.

Durante goes on to explain that a package will soon be available for Ultracom CX which will provide "true Least Costly Routing." The processor will select circuits for calls depending upon the time of day when the call is placed. A real-time clock will be incorporated into the memory chips to enable the system to place calls over the most heavily discounted pathway.

Because SMDR and LCR are relatively new innovations for the key and hybrid systems, field maintenance data at this time is sketchy. It appears likely, however, that once the initial "bugs" are worked out, these sub-systems will be as dependable and durable as the basic systems themselves.

All things considered, it appears that maintenance and repair indexes for later generation telephone systems will continue to decrease. In fact, one distributor laments the loss of service revenue and explains that this loss is passed along to the consumer through substantially higher unit pricing for components of these systems. So be it—nothing in this life is free—but at least the user of telephone equipment will benefit in the long-run from dependable systems with minimal downtime. □



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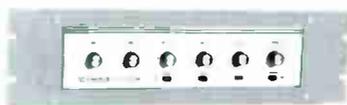


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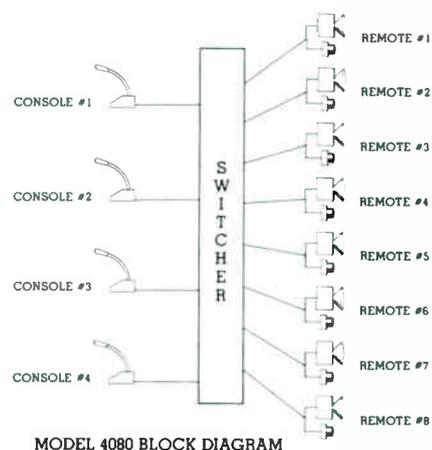
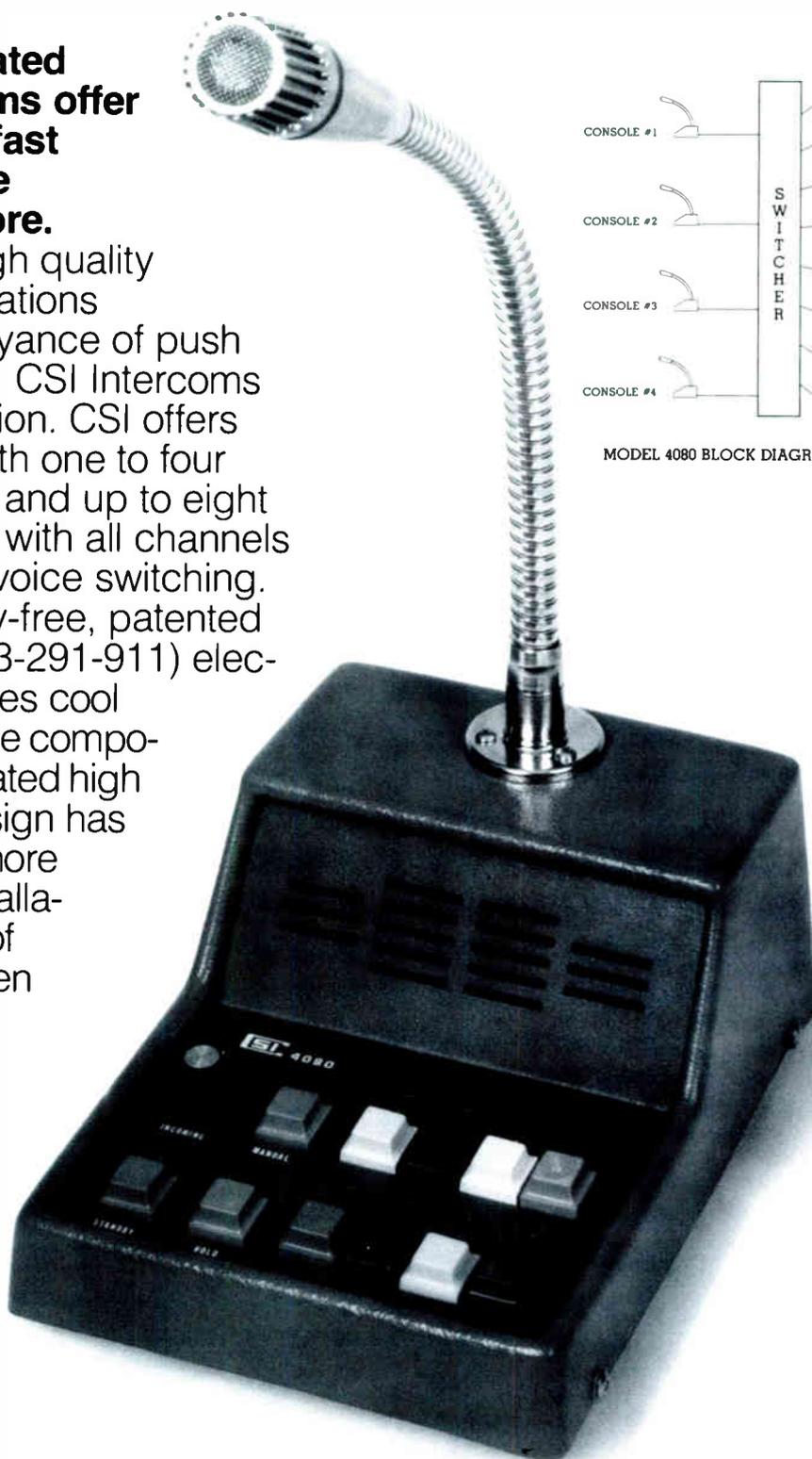
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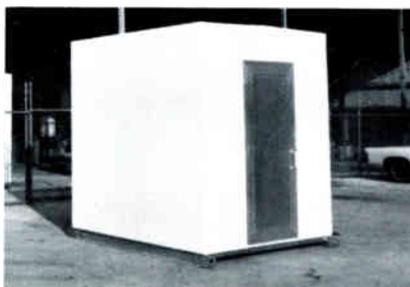
advanced signal-compression technique to maintain sound levels within acceptable ranges without causing distortion. Modern electronic noise cancelling circuitry minimizes the effect of background noise. The Quick-Disconnect feature automatically holds the call on-line during brief periods away from the telephone for file retrieval or consultation. For installation on key telephones, the headset is available with the JackSet adapter.



□ For more information write 331 on the inquiry card. Or write: Plantronics, 345 Encinal St., Santa Cruz, Cal. 95060.

## EQUIPMENT SHELTERS

Available in standard designs or custom-built, modular fiberglass equipment shelters can be delivered on-site, completely assembled and ready to use. Quality materials include polyester resin and chopped fiberglass. The shelters are weatherproof, airtight, dust-free and watertight.



□ For more information write 332 on the inquiry card. Or write: Rohn, P.O. Box 2000, Peoria, Ill. 61656.

## PHONES



Offering a full spectrum of features in a single, compact instrument, Maxcom telephones may be used in systems connected to private branch exchanges or central offices, or in key systems that provide each phone with direct access to multiple lines. Various models offer combinations of features, selected from a list that includes single or multiline configurations, integrated hands-free speakerphone, 16-number auto-dialer, digital display with clock and "stopwatch" features and last number redial. There is also a transfer access key that automatically generates the momentary "on-hook" condition generally used to access PBX features and custom-calling features

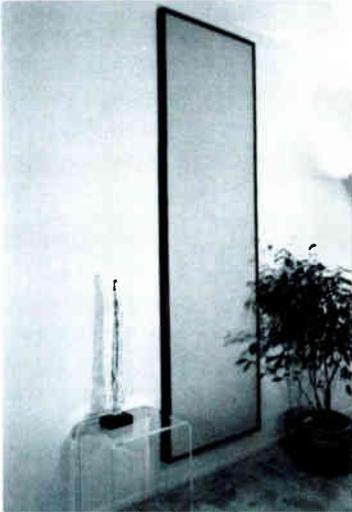


on central offices. All models incorporate the SureTouch dialer which uses integrated circuits in place of electromechanical parts. One model is a single-line telephone with optional transfer access key and optional message waiting lamp; it is intended for PBX applications.

□ For more information 333 on the inquiry card. Or write: Comdial Telephone Systems, 1180 Seminole Trail, Charlottesville, Va. 22906.

## ACOUSTIC PANELS

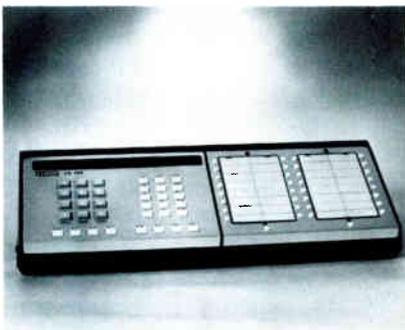
Especially designed to reduce reverberant sound and create a comfortable acoustic environment for teleconferences, ACE (Acoustical Conditioning Panel) Systems absorb flutter echoes and reverberant sound energy to reduce the hollowness often associated with speaker-phones. The panel/frame system has an adjustable-depth rear chamber that permits the panel to be tuned for maximum absorption.



Lightweight and easy to install in wall or free-standing mountings, the panels come in a variety of colors and frame finishes.

□ For more information write 334 on the inquiry card. Or write: Myrlen, Inc., P.O. Box 353, Mt. Freedom, N.J. 07970.

## AUTOMATIC DIALER



Model AD 200 can hold up to 32 telephone numbers, with more than 16 digits per number for international phoning. The dialer includes an 8-digit calculator with full memories, a 24-hour alarm clock and a stopwatch for indication of elapsed time. The device has a volume control for adjusting the voice from

the speaker. Other features include display of the number being dialed, adaptability to both rotary and touch dialing, and automatic redial of last number up to five times. The AD 200 can prolong the access pause for PABX systems. It has a rechargeable Ni-Cad battery for back-up in case of power failure.

□ For more information write 335 on the inquiry card. Or write: GTS Co., 264 Michelle Court, S. San Francisco, Cal. 94080.

## KEY SYSTEM

A microprocessor-controlled electronic key telephone system, intended for small offices, provides expansion capability from an initial 4 lines/8 stations to an ultimate capacity of 12 lines/32 stations. The Reliant 32 employs advanced centralized and distributed computer processing. The control program includes a broad spectrum of standard features, such as call forwarding, speed dialing, camp-on (which automatically connects the user station to a busy line once it again becomes available), various classes



of toll restriction to prevent unauthorized toll calls, and auto-timed transfer of unanswered calls.

□ For more information write 336 on the inquiry card. Or write: Walker Telecommunications Corp., 59 Remington Blvd., Ronkonkoma, N.Y. 11779.

## WIRE SPRAY

Maintenance procedures for telephone terminal housings often reveal degraded wirework. The resulting shorts, crosses or noise problems now can be reduced and overall system life extended with 4015-ES Conductor Insulation Spray. It may be applied to all wirework (especially cracked or damaged insulation) in three heavy coats. Each application is sprayed onto the wires from a distance of ten inches and allowed to dry approximately 5 minutes before the next

coat is applied. Before the final (third) coat is sprayed, all wires should be in their final position (not touching the terminal cover or sides) and wirewraps installed. Spraying can be performed without interruption of service.



□ For more information write 337 on the inquiry card. Or write: 3M, TelComm Products Div., P.O. Box 33600, St. Paul, Minn. 55133.

## DUCT RODS

A line of strong yet flexible duct rods is made of specially compounded durable, moisture and corrosion-proof plastic, assuring even rod duct bends. The smooth surface eliminates the scratches or splinters associated with conventional fiberglass or wood rods. A special quick-run-up thread makes joining rod sections faster and, since the rods are light in weight, they are easy to handle and carry to and from the job. The coarse threaded male ends are extremely durable and withstand rough usage. Rods are available in 3', 4', 6' and 8' lengths. Solid brass fittings on the same tough, flexible plastic shafts are also available.



□ For more information write 338 on the inquiry card. Or write: Tribar Corp., 1845 Forest Drive, Williamstown, N.J. 08094.

## TIP & RING

**BUCKEYE TELEPHONE & SUPPLY COMPANY/COLUMBUS, OH**, has been appointed a distributor for Western Electric Company. The agreement covers all Western Electric products with the exception of engineered systems and certain customer-premises equipment. This will also make Western equipment available through Buckeye Supply-West, in which CP National Corporation of San Francisco is a joint-venture partner with Buckeye.

**HARRIS CORPORATION/DIGITAL TELEPHONE SYSTEMS DIVISION HAS ESTABLISHED A NETWORK OF 55 AUTHORIZED DISTRIBUTORS TO MARKET THE NEW HARRIS 110 PBX.** The Harris 110 PBX can serve both general businesses and hotels/motels with up to 110 lines and 20 trunks. Distributors have been appointed since May in 23 states,

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covering most of the major metropolitan areas. Many of these distributors also handle the Harris D1200 PBX, which serves installation with up to 1000 telephones, and features tandem networking, least cost routing and SMDR.

**WESTERN UNION CORPORATION AND E.F. JOHNSON COMPANY/WASECA, MN, JOINTLY ANNOUNCED THE EXECUTION OF AN AGREEMENT FOR THE MERGER OF JOHNSON AS A NEWLY ORGANIZED WESTERN UNION SUBSIDIARY.** Upon consummation, each share of Johnson common stock will be converted into one share of Western Union common stock. Consummation of the merger is subject to the approval of the Johnson shareholder. Both companies expressed the view that the merger would be effected within two months.

Robert M. Flanagan, chairman and CEO of Western Union, said: "We believe (E.F. Johnson) is well placed to be a major equipment supplier to the emerging cellular mobile telephone market, which we have identified as one of Western Union's major opportunities for providing new telecommunications services in the next decade. Western Union's nationwide sales and maintenance organization provides a direct, day-to-day link with the consumer that we believe will greatly assist E.F. Johnson in its penetration of the cellular market."

Richard E. Horner, chairman and CEO of the Johnson Company, said, "The merger will strengthen the product offerings of the combined companies. We expect this merger to bring increased financial, managerial and technological capabilities to our efforts in the mobile communications field, particularly in the cellular mobile telephone markets."

**THE SENATE COMMERCE COMMITTEE STAFF IS WORKING ON A SHORT-FORM TELECOMMUNICATIONS BILL TO REPLACE THE MORE COMPREHENSIVE BILL WITHDRAWN BY REP. TIMOTHY WIRTH.** The bill would be simple, containing five provisions on which there is strong consensus on both the House and Senate sides of the Congress: a uniform charge for access by interexchange carriers to

the local loop, similar to that proposed in the earlier Senate Bill, S 898; a mandate that national security be considered in designing a post-divestiture telecommunications system; a requirement that intrastate toll service come under FCC, rather than state, jurisdiction; a provision ensuring AT&T employee protection; and a provision allowing the FCC to forbear from regulation when adequate competition exists.

Some Senate staffers said that the draft bill is intended for introduction this Congress, but would not predict when it would be offered.

Rep. Wirth is unlikely to approve any part of the bill, congressional sources say, because he doesn't want to lose the chance for a more comprehensive bill next session. But Republican and Democratic staffers in the House agreed that Wirth and probably every other member of the House Energy and Commerce Subcommittee on Telecommunications, which Wirth chairs, would approve of the Senate-proposed provisions on their merits.

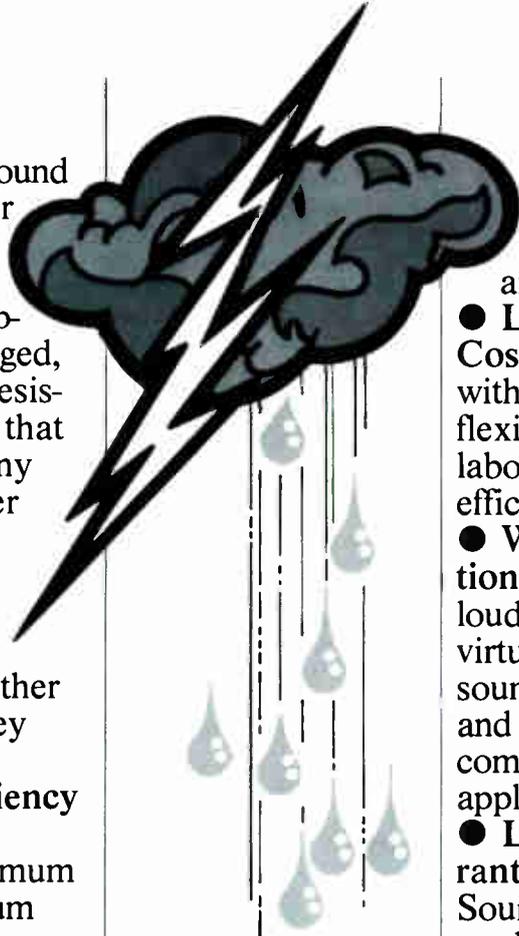
**TELECOM EQUIPMENT CORP./LONG ISLAND CITY, NY, HAS BEEN REORGANIZED AS TELECOM PLUS INTERNATIONAL, INC.,** according to an announcement by Thomas J. Burger, president. Burger explained the name change, saying, "As a national company with local responsibility, we required a common national image, coupled with local market identity to project the necessary cohesiveness and commonality of purpose for Telecom Equipment Corp. and all its operating companies." Burger said that "telecom" is a universally used and accepted contraction for telecommunications, while "plus" connotes that the company will not be limited to telephones alone.

To illustrate that point, Telecom Plus is a licensed radio common carrier currently providing voice paging and mobile telephone communications throughout Puerto Rico. The company is presently building an island-wide microwave network for voice and data. Additionally, Telecom Plus recently signed agreements with General Electric to sell and install their line of microwave equipment, and with NEC Information Systems, Inc. to

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sell that company's line of Astra business computers.

**TIE/COMMUNICATIONS, INC. HAS CONTRACTED TO BUILD A THIRD FACILITY** in Seymour, Connecticut, according to a joint announcement by TIE president Thomas L. Kelly, Jr. and Shevach Saraf, plant manager of Harmer Simmons Power Supplies, Inc. Earlier, TIE joined with Harmer Simmons in the manufacture of power supplies. Kelly said the new plant will be 40,000-square-foot big, with expansion capability up to 100,000 square feet to accommodate future growth, and will initially employ 120 workers.

**FROM NATA'S WASHINGTON UPDATE FOR NOVEMBER 15/82: "COMMISSIONER JOSEPH FOGARTY ASKS COLLEAGUES TO AMEND COMPUTER II DEREGULATION PLAN TO ALLOW BOCs TO MARKET CPE FREE OF SEPARATE SUBSIDIARY REQUIREMENT** — both before and after divestiture. NATA pledges to fight move if it materializes. In 11/1 memo to fellow Commissioners, Fogarty says BOCs should be treated like 'independent' carriers, be allowed to sell new unregulated CPE as early as Jan 1, 1983. Computer II now says that after Jan. 1, 1983, new Bell System CPE can be marketed only on unregulated/non-tariffed basis and only through separate subsidiary. Anti-trust settlement allows BOCs to market own new CPE after divestiture (early 1984) but leaves BOC separate subsidiary question to FCC, which remains publicly ambivalent on subject. NATA, other competitors expected to argue that unless BOCs structurally separate regulated and unregulated activities, cross-subsidization and other anti-competitive consequences will result."

**BURNUP & SIMS INC./FT. LAUDERDALE, FLA., HAS AGREED IN PRINCIPLE TO ACQUIRE CORADIAN CORPORATION/ALBANY, NY.** Under the agreement, Burnup & Sims Inc. — a telecommunications and cable TV service company — would acquire a 40% interest in Coradian through the purchase of newly issued stock at \$1 a share. It would also get a 2-year option at \$1 a share to give it 51% of Coradian. Coradian is an interconnect distributor. The value of the transaction was not disclosed.

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# Marketing Alarm Systems

by John Sanger

**A**s a sound and communications dealer, you may already be installing alarm systems—or, at least, considering entering the alarm market. If you are already in the market, should you stay and expand alarm installations? If you are not currently installing alarm systems, but have considered it, should you enter the market?

Unfortunately, there are no simple answers to these questions. The decision to stay in and expand or enter the market is one that must be carefully evaluated and based on your individual company's growth plans. This and subsequent articles related to security systems will attempt to provide accurate and useful information that will aid you in making that decision.

For the past several years, new companies have been entering the alarm market. Research shows that for the new businesses started, almost an equal number close their doors. A variety of indicators in the alarm industry show that about three out of every ten alarm companies go out of business each year, but the influx of new companies has caused the industry to show a net gain annually.

In Oklahoma City, for example, alarm dealer competition is significant. With a population of about 400,000, it has over seventy companies involved, to some degree, in the sale or service of alarms. The growth in the total number of alarm companies each year has been small. However, while the numbers remain fairly constant, there has been a rather significant change in the businesses. In other words, while the total number of companies may have increased by two or three, there are a dozen or more new names on the roster.

Economic conditions are a factor to be considered, too. Oklahoma has not been affected by the recession as much as other areas. Even so, the number of failures and new entries into the market are important.

Do not be misled by the foregoing comments and assume that the

market conditions are poor. Quite the contrary, actually: the market for security products and services is good—for those who properly plan their market entry or expansion. Improper business planning, in any industry, can result in disaster.

At the beginning of this decade, researchers and forecasters were predicting a fifty percent increase in spending for security systems between 1980 and 1985—from \$330 million to \$500 million. Current indicators confirm those predictions. An increase in consumers' security awareness and an increase in the crime rate continue to spur market growth.

Table 1 shows the number of reported burglaries that occurred during 1980, the population and other data for four geographic areas. Statistical data should be interpreted very carefully, though.

While the table shows that the South had the largest number of burglaries—and, therefore, the largest percentage of the total—it should be noted that it also had the largest population. Perhaps a more realistic analysis would be to view the data as it relates to the population.

Based on a ratio between burglaries and population, the North Central area had 13.7 burglaries for every 1,000 people. The South, which, from the data presented in the table, appears to have the greatest number of burglaries, had 16.6 burglaries for every 1,000

residents; the Northeast and West complete the list with 16.8 and 20.8 burglaries (per 1,000 inhabitants), respectively.

Some law enforcement officials estimate that the number of burglaries reported to the police may be only half as many as actually occur. A recent Gallup Poll indicated that for every five burglaries reported, seven were actually committed.

If we interpolate the data presented in the FBI's *Uniform Crime Reports*, we can focus more closely on the extent of the reported burglaries. If the average family consists of 2.8 persons, as has been estimated, then, in the North Central area, 13.7 burglaries were committed against every 357 families—or, stated another way, 1 in every 26 families was a burglary victim. In the South, it was 1 family in every 22; in the Northeast, 1 in 21; and in the West, 1 in 17.

The Gallup Poll provided some additional information. The results of the poll also show that one person in four was the victim of some type of crime. Further, about half of the people surveyed said that they were afraid to walk alone at night in their neighborhoods.

These data are mentioned merely to point out the type of information that should be evaluated when analyzing the potential market for security products and services. We have not considered the market for holdup, medical alert or fire alarms.

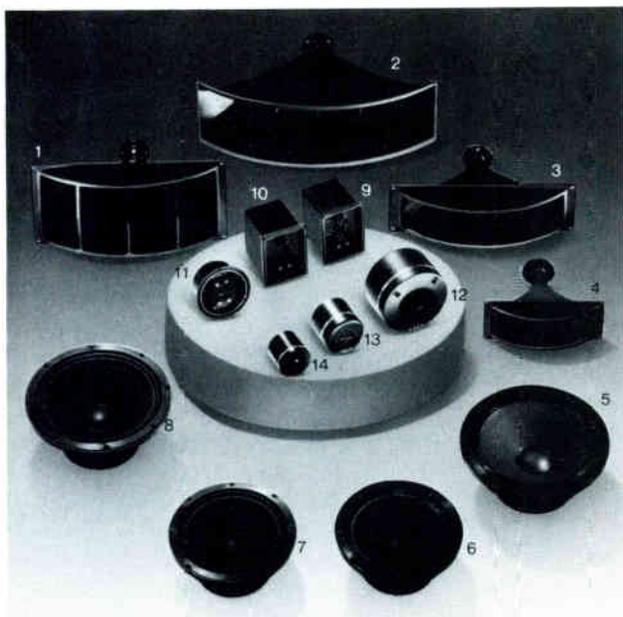
People may be aware of the crime

**Table 1. REPORTED BURGLARIES BY AREA (1980)**

AREA	POPULATION	REPORTED BURGLARIES	% OF TOTAL	CHANGE FROM 1979
NORTHEAST	48,996,504	823,357	22	+14%
NORTH CENTRAL	58,621,703	803,799	21	+13%
SOUTH	74,767,293	1,239,071	33	+17%
WEST	42,963,764	892,966	24	+11%

(Source: FBI *Uniform Crime Reports* for 1980.)

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problem and the need for protective devices. However, they may not be aware of the large variety of products and services that are available—or, for that matter, who provides those products and services.

Marketing security products and services is a unique endeavor. Most people try to avoid thinking about becoming a crime victim, yet media reports of robberies, burglaries, rapes and other crimes abound. Persuading the consumer to think about preventive and protective measures is the first obstacle to be overcome. In effect, then, alarm dealers are attempting to persuade potential customers to purchase a system that will help prevent, or protect them from, a situation that may or may not occur.

Another viewpoint of the market is that, during bad times when crime is increasing, protective systems are almost a necessity—even though the economy may not be good. Conversely, with a prospering economy and available disposable income, an alarm system becomes somewhat of a luxury item—and, in some instances, a status symbol. While general economic conditions will have an effect on all industries, they may not have as pronounced an

effect on the alarm industry.

High interest rates and tight money are certainly problems for many, if not most, businesses. The decline in new construction, residential and commercial, may affect some alarm companies, if that was their primary market. Alarm dealers must remain flexible enough to seek new sources for sales when a part of their market declines—switching from industrial to institutional or governmental systems, for example.

The residential security market has been constantly increasing for several years. Homeowners are less reluctant to spend money for security systems. Inflation has made their property increase in value, with certain items, such as collectibles, gems and precious metals, increasing markedly. It has become more important to protect those valuable items.

The residential market is changing—and so is the equipment that goes into a residential security system. No longer is a residential system merely a modified version of a commercial alarm. Specific equipment has been designed to accommodate the needs of residential customers, making the system

attractive, functional and economical.

Estimates vary on the penetration into the residential security market. Many in the alarm industry believe that only three to five percent of the homes in the United States are outfitted with alarm systems.

There are a number of questions yet unanswered about the residential market. Who will buy the systems? Only the wealthy? Does the middle-class American feel threatened enough to invest in a protective system? And, more importantly, how can the market be penetrated and to what degree?

Numerous penetration attempts have been made by a variety of marketers. Large, national retail chain stores have attempted to market security products over-the-counter as well as through their present home-improvement programs. At best, these efforts have been only moderately successful. Some have abandoned or reduced their marketing efforts.

Retail hardware and electronics stores have added alarm equipment to their product lines. Here, too, while the products are selling, they are not selling as well as expected. While a portion of the alarm market is comprised of do-it-yourselfers, the predominant portion appears reluctant to attempt the task of installing a system—preferring, instead, to have a complete, *professional*, installation.

Is there really a market? Absolutely—in both commercial and residential alarm sales.

The successful alarm dealer is one who educates the prospect on the need for a security—or, more appropriately, *loss prevention*—system. Once the need is established, the dealer merely continues the educational process by showing the prospect how his loss prevention system will fill that need. In effect, then, the successful alarm dealer's task is nothing more than identifying and solving loss prevention problems.

Because of their existing customer base, sound and communications dealers are in a unique position to begin marketing security products and services. From that base, expansion will depend on the goals and marketing aggressiveness of the company. □

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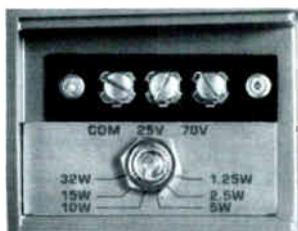
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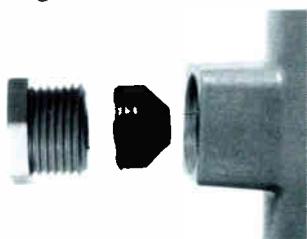
# HOW TO PICK A PAGING SPEAKER.

First of all, look for a paging/talkback loudspeaker with a built-in 70- and 25-volt line transformer. Only University Sound's CFID-15T (15 watt) and CFID-32T (32 watt) paging speakers give you that kind of choice.



Next, look for features like the six screwdriver-selectable wattage taps of the CFID series.

That's more than you'll find in any other loudspeaker line. And University horns are the only ones with the exclusive Lexan® gland nut connection. In addition to providing a weather-tight seal for 22- or 14-gauge cable, the gland



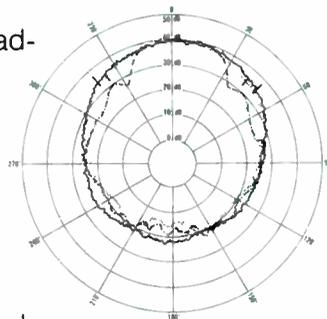
nut allows easy mounting on any standard half-inch conduit.

How about sound quality? For a paging speaker to reproduce critical low frequencies, bigger is definitely better.

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you see in the polar curve shown here. For voice/music systems requiring even broader frequency response, the CFID-32T is the logical choice, with a bell area 30% larger than competing models.

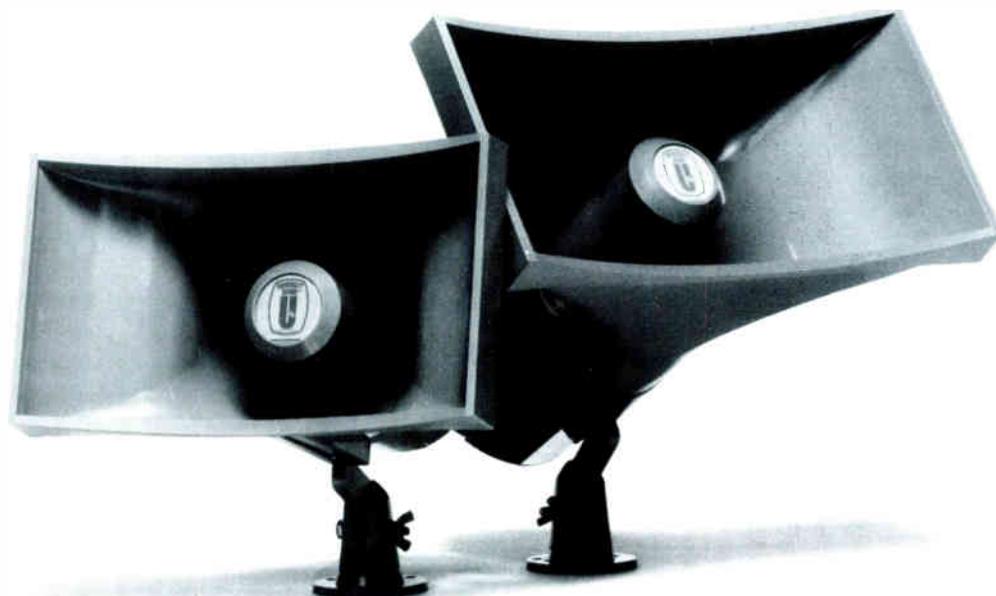
Finally, check for additional features like University Sound's weather-resistant horn/housing construction; field replaceable voice coil assembly for on-site repair in less than two minutes; and the versatility of flush or surface mounting.



The University Sound CFID-15T and CFID-32T—everything you need to know about picking a paging/talkback loudspeaker. For more information, contact Charles Round, Sales Manager, University Sound, 1515 South Manchester Avenue, Anaheim, CA 92803; 714-774-0251.



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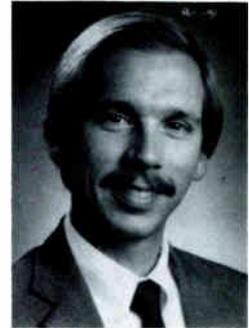


# PEOPLE

**Laurence H. Estrin** will be staff marketing and product consultant for HM Electronics, Inc., San Diego, Cal. He will concentrate on new products for entertainment industry applications. Estrin's audio installations include Radio City Music Hall, the Academy Awards, Super Bowl broadcasts and President Reagan's inauguration.

**Tom Carlile** is now president of Gauss Loudspeakers, Sun Valley, Cal. He had been president of New West Audio Marketing, Inc. Gauss has also announced the appointment of **Hans Freytag** as European sales manager. Gauss Loudspeakers is part of the professional audio products division of Cetec Gauss.

Mark Telephone Products, Inc., Santa Clara, Cal., has named **Steve Baran** product manager. He will be in charge of sales promotion for the firm's high technology equipment



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And, 750 watts in mono! That makes the UREI 6300 the most powerful amplifier of its class. More important than its compact size is its clean sound... in fact, you could compare the sound to the most esoteric *audiophile* amplifier. But, the 6300 is built to give the same performance day after day, night after night.

The 6300 was designed for the rigors of the working sound professional. The rugged chassis and extruded front panel make the 6300 extremely roadable and the continuously variable fan helps assure reliable operation. A totally modular chassis assures fast, easy service in case of difficulty with this rugged and reliable amplifier.

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Canada: E. S. Gould Marketing, Montreal

for telephone cable pressurization systems, which includes digital pressure gauges, flow transducers, distribution panels and underground duct probes.

Anixter Communications, Skokie, Ill., announces that **Ben Forrester** has been appointed a vice president. Formerly national sales manager for Scientific Atlanta, he will be responsible for national MSO sales,



sales training and development of electronic product sales for Anixter, a leading marketing organization in the telecommunications and cable TV fields.

The new marketing manager at Crown International, Elkhart, Ind., is **Charles W. Gushwa**. He will be in charge of marketing and promoting electronic audio-range components for the firm's industrial, professional and home audio divisions.

**W. A. Hendrickson Co., Inc.**, Scituate, MA, is celebrating its 60th year as an electronic manufacturers' representative. Founded by William A. Hendrickson, Sr. in 1922, it was one of the first electronic rep firms in the country. After World War II, William Hendrickson, Jr. and Robert Hendrickson, Sr. took over the management, which was joined, in 1980, by Rob Hendrickson, as the first of the third generation to become part of the firm.



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# NEW PRODUCTS

## POWER AMPS

The PC2002 and PC2002M are electronically identical 2-channel power amplifiers. The PC2002M also includes a pair of large peak-reading meters that display power output in watts or dB (referenced to 0 dB = 100 watts into 8 ohms). With 16 output transistors per channel, the amps can deliver clean, solid power to demanding loads, including multiple low frequency bins.



Each channel will deliver 240 watts into an 8-ohm load. By sliding a rear panel mono switch, the amplifier outputs can be bridged to deliver 480 watts into 16 ohms or 700 watts into 8 ohms. Because harmonic distortion measures below 0.007% (20 Hz to 20 kHz) and intermodulation distortion below 0.01%, the units sound clean and natural, even at maximum output levels. With separation of better than 80 dB wideband (95 dB at 1 kHz), the two channels may be used for different programs (or two bands of a bi- or tri-amped system). The amplifiers contribute negligible hiss, since their noise is more than 110 dB below maximum rated output. With or without the meters, a clipping indicator LED is standard on each channel, warning that the level should be turned down. In addition, newly designed protection circuitry senses DC on the output as well as thermal overload, shutting down the amp to prevent speaker or amp damage. Protection status is displayed by three LEDs. Each channel has two unbalanced phone jack inputs and two electronically balanced XLR inputs. The paired connectors permit "looping" signal to additional amps, and the choice of inputs affords compatibility with almost any equipment. XLR pin 1 "ground lift" switches help eliminate buzz or hum caused by ground loops in complex systems. Input

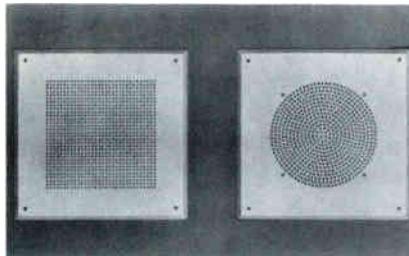
levels are precisely adjustable with 1-dB step attenuators, and rubber control locks can be fitted to discourage casual tampering once the system gain is established.

The amplifiers have heavy-duty, box-type steel chassis that resist twisting and bending for greater mechanical and electronic reliability. Electronic servicing is simplified by modular, rugged glass-epoxy circuit boards.

□ For more information write 339 on the inquiry card. Or write: Yamaha Combo Products Div., P.O. Box 6600, Buena Park, Cal. 90622.

## BAFFLES

For systems using 8-inch loudspeakers, two square white steel ceiling baffles are made of corrosion-resistant 22-gauge Zincrometal steel and finished with white baked epoxy. Both are 11½-inches square with mounting holes on 10-inch centers. Model BS8WS has a square hole pattern, four mounting holes and four hidden loudspeaker mounting studs. Complete mounting hardware and gasket are included. Model BS8W has a round hole pattern, with eight mounting holes, and is supplied with complete mounting hardware. The baffles may be ordered in factory pre-assembled baffle, loudspeaker and line-matching transformer combinations.

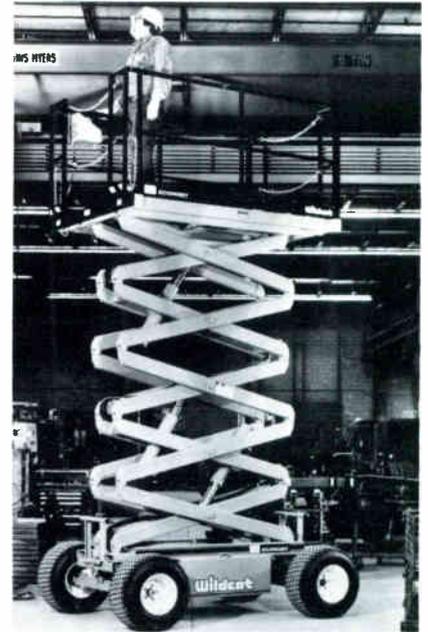


□ For more information write 340 on the inquiry card. Or write: Quam-Nichols Co., 234 E. Marquette Rd., Chicago, Ill. 60637.

## WORK PLATFORM

The "Wildcat" work platform, Model SPL-26-60, is a self-propelled scissors construction that can raise workmen to the desired height, even with a 20% grade. Outfitted

with puncture-proof tires, the unit travels easily over semi-rough terrain and construction rubble. The Wildcat is only 62 inches (1.6 m) wide for easy maneuvering in narrow factory aisles. The model shown raises to 26 foot (7.9 m) platform height—and can be equipped with an optional 3-foot (91 cm) slide-out deck extension to provide overall larger platform area for workers and materials. The self-propelled scissors line offers three-speed "forward" and "reverse" power. The 24-volt DC heavy-duty battery package powers the platform for eight hours.



A 24-hour self-timing charger is built in, as are fork-lift pockets at both ends. Working heights up to 32 feet, and capacities to 1000 pounds may be specified.

□ For more information write 341 on the inquiry card. Or write: Economy Engineering Co., P.O. Box 1507, Bensenville, Ill. 60106.

## MICROPHONES



The PE-250, a cardioid pattern moving coil mic, features high sound pressure capability, excellent high frequency response and a wide angle of uniform acceptance "on axis." A small lightweight diaphragm couples with the large acoustically tuned case to combine sonic accuracy with "off axis" low frequency control. The PE-150 is an electret condenser microphone that provides battery or phantom power operations without the need to remove the battery. If the phantom supply fails, the switchover to battery power is automatic and noiseless. Superior transient response makes this mic a natural for dense musical sounds at moderate sound pressures. The PE-120 and PE-80 feature a 200-ohm balanced output. The lightweight electret condenser diaphragm provides good transient response, and a built-in switchable 10-dB pad placed between the capsule and amplifier extends the maximum sound pressure capability to 139 dBspl. The PE-120 comes with all the system parts packed in the case: two capsules, cardioid and omni-directional, two windscreens, one of sturdy wire mesh for maximum protection and a light foam version for minimum interference with the sound. The PE-120 system also includes a clip-on mic holder, a pre-wired 3-conductor XLR mic cable and a battery. The PE-80 is designed for engineers who require only the cardioid pattern. This mic is identical in every way to the PE-120, the only difference being the accessory omni-directional capsule which is not included in the PE-80 system package. The PE-50

uses the same cardioid capsule as the PE-120 and PE-80, in a permanent mount. A non-interchangeable capsule model, the PE-50 offers professional quality PE system mic performance to the user with the 2-conductor mic input. The PE-50 amplifier is wired "high impedance" for proper matching to phono jack inputs, and the pre-wired cable is permanently attached.

□ For more information write 342 on the inquiry card. Or write: TASCAM/TEAC Corp., 7733 Telegraph Rd., Montebello, Cal. 90640.

## ALARM TESTER

The 625 24-Hour Communicator Test Timer is a digital recycling timer that automatically tests alarm installations hooked up to central stations by cable, phone or radio. Used with digital dialers, radio communicators and other user-to-central station links, it tests by automatically activating the communication device once every 24 hours, thus providing the central station with a daily operating "check" of each link. The highly accurate module uses the AC line as a frequency standard, and features battery backup capability. Even during power failure, daily monitoring continues and costly visits to reset are avoided. A single set/test button makes for simple installation and operation.



An LED indicator signals that the timer is locked to the AC frequency standard, and that it is using AC as its power source. The LED extinguishes in the battery backup mode. A form "C" NO/NC relay and an operating range of 6 to 18 VDC (backup) make the 625 timer compatible with all types of communicators. Measuring 3.25" square, the module is easily installed in a control panel or communicator.

□ For more information write 343 on the inquiry card. Or write: AES Corp., 103 Foster St., Peabody, Mass. 01960.

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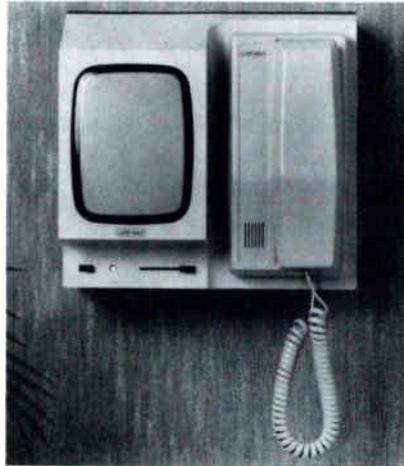
the special December issue of Sound & Communications, featuring the Annual Economic Roundup? This unique survey reports on the year's financial activities in the areas of Audio; Intercom & Engineered Cable Systems; Interconnect; Radio; and Security.

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## SECURITY SYSTEM

The Tek-View intercom system is a combination building entry intercom and video monitoring system suitable for apartment house buildings, office buildings, or any place where positive caller identification is required. Inside stations combine a six-inch video monitor, a two-way intercom telephone handset, a brightness control slide bar, an on-off switch and indicator light, and an electric door release button. At the entrance, the camera is built into the entrance pushbutton panel, and protected by vandal-resistant Lexan. The entrance panel can contain any number of selective call

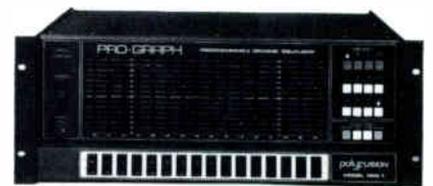


buttons, and has a built-in light assembly. The camera is secured by a special locking mechanism, to prevent theft. The system is powered from a single low-voltage power supply, using Class II wiring. Inside stations are available in flush, surface, or table-top mounting.

□ For more information write 344 on the inquiry card. Or write: Lee Dan Communications, Inc. 155 Adams Ave., Hauppauge, N.Y. 11788-3699.

## GRAPHIC EQUALIZER

Model PEQ-1, the Pro-Graph, is a sixteen-band programmable graphic equalizer capable of storing 64 response curves in its memory. Each curve is easily created or manipulated via step up/step down buttons under each frequency band. The variable intensity screen is comprised of a lighted graticule and a matrix of 240 LEDs, which produce a display easily visible from across the room. An A/B switch is provided to allow instantaneous comparison of the direct signal and the equalized signal. The PEQ-1 offers both balanced and unbalanced inputs and outputs; special circuit technology ensures extremely low noise and distortion. The unit comes equipped with two computer I/O ports, allowing it to be remotely controlled by the optional PRC-1 Remcon unit, an automated mixing board, a computer, or other Pro-Graphs, in a "daisy chain" arrangement. Frequency response is  $\pm 1$  dB, 10 Hz—20 kHz.



Signal-to-noise ratio is 105 dB; noise -85 dBm; output level +20 dBm max. Input impedance is 10K ohm balanced, 100K ohm unbalanced; output impedance is 600 ohms balanced or unbalanced.

□ For more information write 345 on the inquiry card. Or write: Polyfusion Inc., 92 Benbro Drive, Buffalo, N.Y. 14225.



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# Reinforcing Rock - Creatively

by William Gillette

## Part 3

The Music Box, Mishawaka, Indiana, is an old movie theater converted into a nightclub, which features a broad spectrum of high-energy contemporary live music. The club owner wanted a permanent sound system that would provide highly uniform coverage of his rather long and narrow, reverberant room. The intent was to achieve performance so good that word-of-mouth would quickly squelch any rumors that groups were "being stuck with a house system."

Because of the proscenium arch over the stage area, Electro-Voice proposed an untraditional (for rock-and-roll) central cluster system to cover the basic portion of the frequency range above 125 Hz, with floor-mounted sub-woofers operating between 40 and 125 Hz. (Mounting the subs on the floor provides maximum output and a highly visceral effect on the dance floor immediately in front of the stage.)

Figure 16 shows a view from the balcony, where the throw from the cluster is in excess of 80 feet. In contrast, the distance from the cluster to the dance floor area is only 28 feet. The usual split stack of speakers pointed straight ahead would have a hard time providing uniform coverage: the front rows would be blown away and the balcony audience would be swamped with room reverberation and poor vocal clarity.

The system block diagram is in Figure 17. Major speaker and elec-

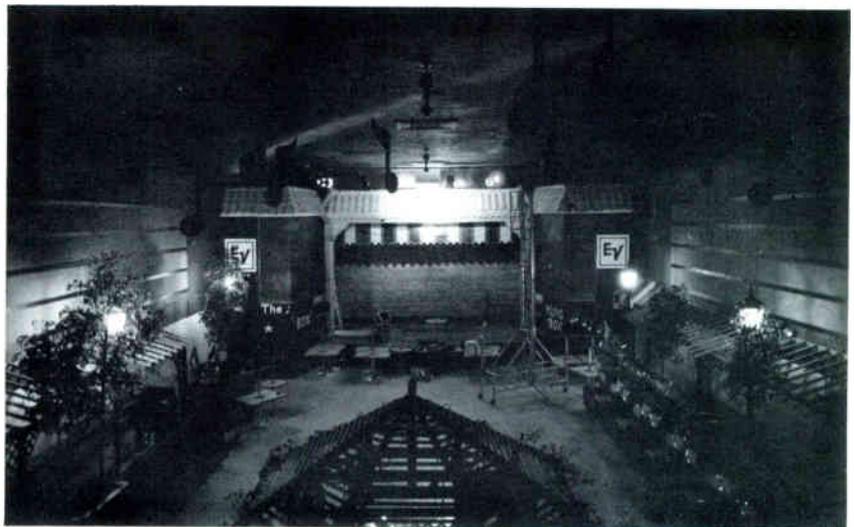


Figure 16.

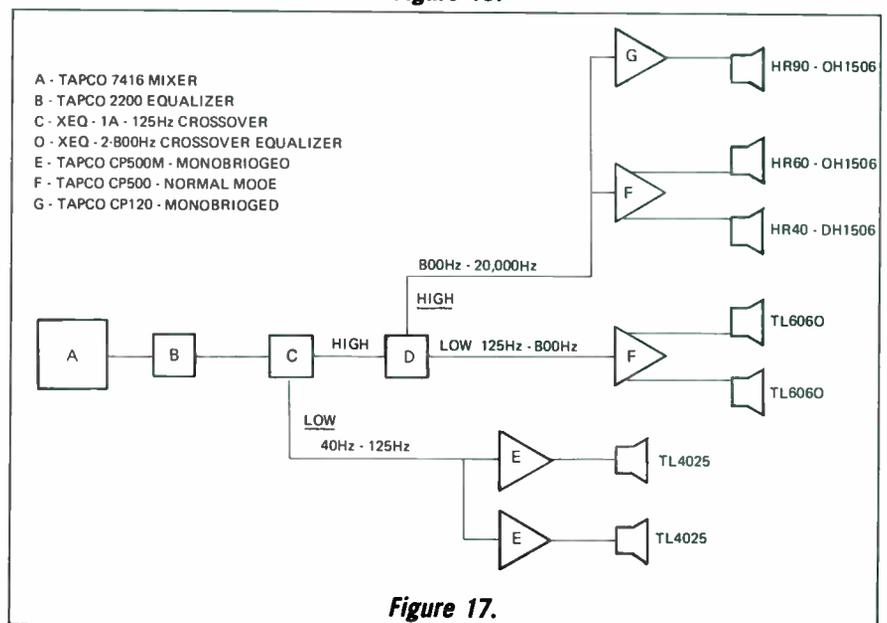


Figure 17.

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Quantity	Model	Description
3	E-V DH1506	High-frequency driver
1	E-V HR90	90°X40° short-throw high-frequency horn
1	E-V HR60	60°X40° mid-throw high-frequency horn
1	E-V HR40	40°X20° long-throw high-frequency horn
2	E-V TL606D	Mid-bass speaker system (optimally vented, including two 15-inch EVM15L Series II woofers)
2	E-V TL4025 (custom built)	Sub-woofer (horn loaded; equipped with one EVM15L Series II)
1	E-V XEQ-2	Electronic crossover, with X800 800-Hz crossover-frequency module and EQA horn-equalization module
1	E-V XEQ-1	Electronic crossover with 125-B3 125-Hz crossover-frequency module
1	E-V/TAPCO 2210	Octave-band two-channel equalizer
4	E-V/TAPCO CP500	Stereo power amplifier (255 watts per channel into 4 ohms, average sine wave power)
1	E-V/TAPCO CP120	Stereo power amplifier (61 watts per channel into 4 ohms, average sine wave power)
1	E-V/TAPCO 7416	16-in, 4-out mixing console

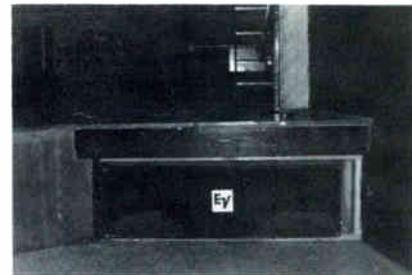


Figure 18.

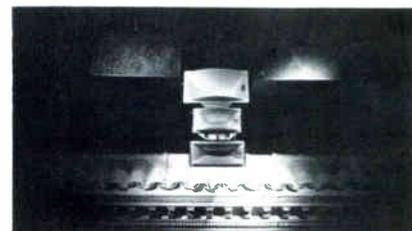


Figure 19.

One of the TL4025s is shown in Figure 18. The cluster which handles the range above 125 Hz is shown in Figure 19.

#### Aiming the Horns

Horns were aimed as shown in Figures 20 and 21. The important thing to note is that *only one horn covers each audience area*, in order to virtually eliminate the interference effects documented earlier.

All system components are stock E-V or E-V/TAPCO products, with the exception of the custom-built TL4025 sub-woofers. A TL4025 is half of a TL4050, a folded-horn system scaled up from the Sentry IVB low-frequency section (LFSA) to accommodate two 15-inch EVM15L Series II woofers instead of the

LFSA's two 12-inch woofers. The TL-4050 can provide solid bass down to 40 Hz and a maximum acoustic output of 84 (!) watts. That's over 100 times that of a typical "high output studio monitor speaker system." On its side, each TL4025 slips neatly under the stage.

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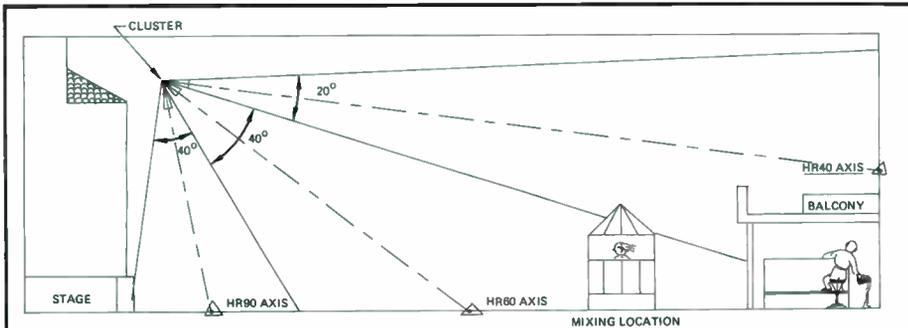
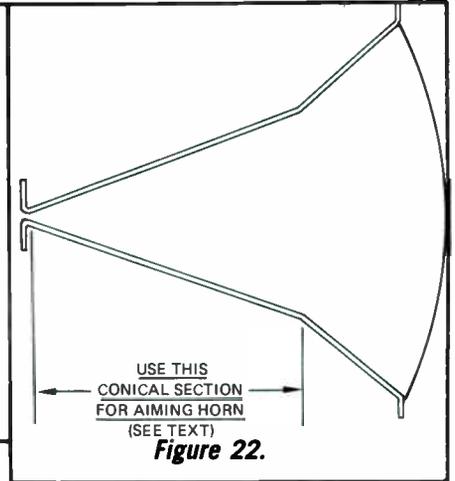


Figure 20.



Such a design demands constant directivity horns, such as the E-V HR series, whose coverage angles are essentially constant over their entire operating range.

From a practical viewpoint, the horns can be aimed visually, using the major conical (flat) portions of the horns as a guide. This is an important concept. The conical sections define the horn's 6-dB-down coverage angle. See Figure 22. For example, the vertical angle between

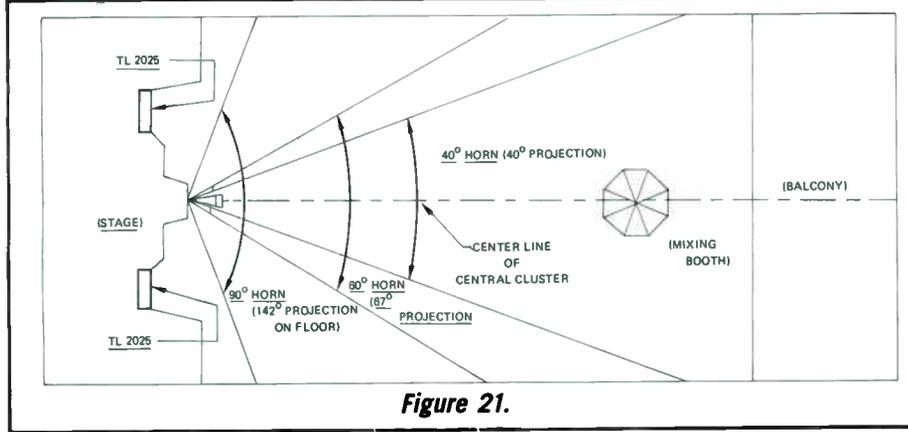


Figure 21.

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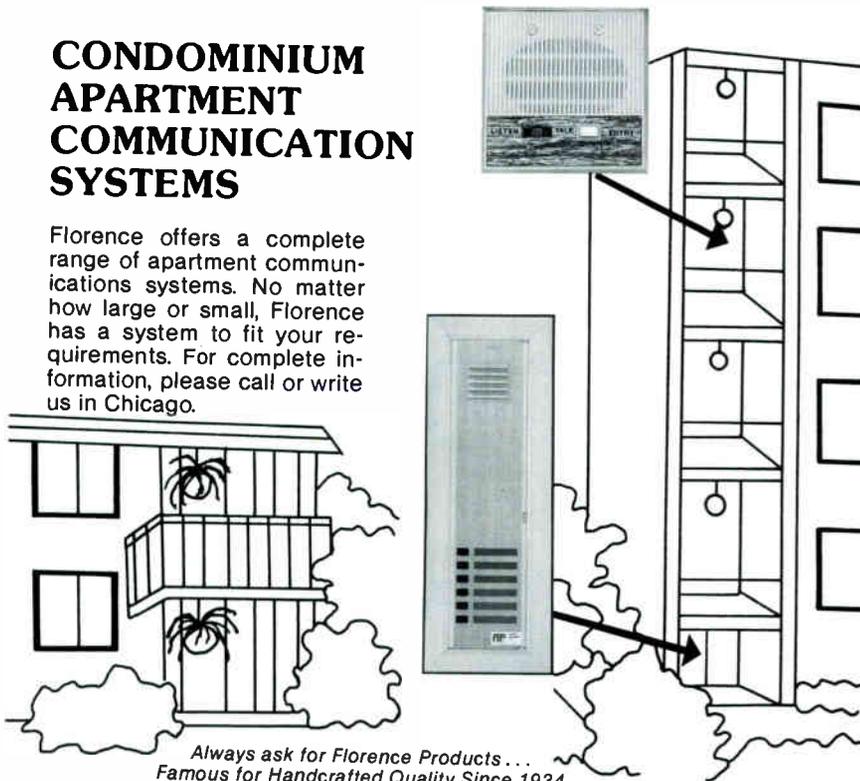
the short-throw HR90 and the mid-throw HR60 was adjusted while walking backwards, viewing the cluster, from a point within the HR90's coverage angle to a point within the HR60's coverage angle. The relative vertical angle between each horn was set so that just as the "top" conical section of the short-throw HR90 was leaving the viewer's line of sight, the "bottom" conical section of the mid-throw HR60 was coming into view. This results in a vertical angle of 40° between, so that the horns' 6-dB-down vertical coverage angles are approximately tangent and intersect at ear level. When all horns are aimed in this fashion, interference between any two horns is minimized and very uniform coverage can be achieved.

### Basic Level Adjustment

In a tri-amplified system, the first task is to set the relative levels among horns, mid-bass systems, and sub-woofer systems. While it was tempting to do this by ear and our favorite cassette of the Amazing Rhythm Aces—an accepted way to EQ and adjust a rock-and-roll sound system—we decided to use the instrumentation employed by the professional sound reinforcement contractor. Specifically, we used an Ivie IE-30A real-time spectrum analyzer. The Ivie was driven with the output of three omnidirectional condenser microphones (custom manufactured at Electro-Voice). In this way, it was easy to assess the overall uniformity within, say, the beam-width of a given horn, without "walking the house" to get a feel for the average. The output of the three mikes was summed by a White Instruments Micplexer. This device averages the amplitude of each mike's output, so that the average sound pressure level—without regard to the relative phase of each mike's output—can be measured. (Simply running the three mikes into a mixer and using that output would give misleading results. For example, if two microphones were located in the room in such a way that the sound pressure levels at their diaphragms were of equal amplitude but exactly out-of-phase, the output of the mixer would be zero. In contrast, there would be plenty of output indicated by the Micplexer, since it sums only the amplitude of the signals.)

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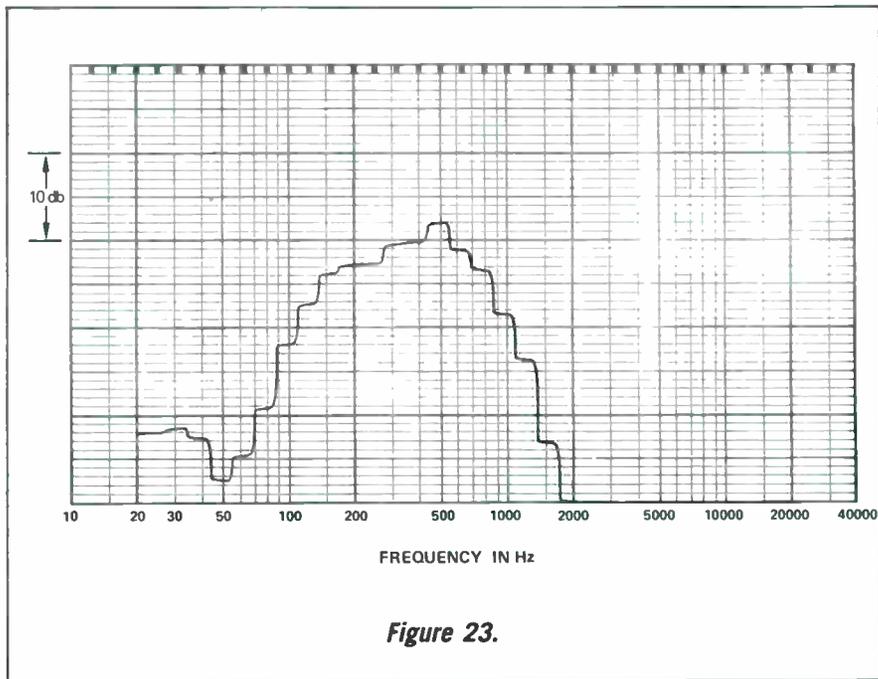
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To facilitate system evaluation and adjustment, the output of the IE-30A was interfaced to a Hewlett-Packard 7035B X-Y recorder via an Ivie IE-17A. This combination of equipment made it super-easy to run hard-copy frequency response curves with a resolution of .2 dB.

To get started, we placed the three microphones well within the coverage angle of the short-throw HR90 horn. First, we turned on the mid-bass system (125 to 800 Hz), taking care that any ambient room noise was at least 10 dB below the measured signal, so that our readings would not be affected by the noise. The resulting mid-bass-only curve is shown in Figure 23. Second, we turned off the mid-bass systems and turned up the level of the short-throw HR90 horn so that its midband output matched that of



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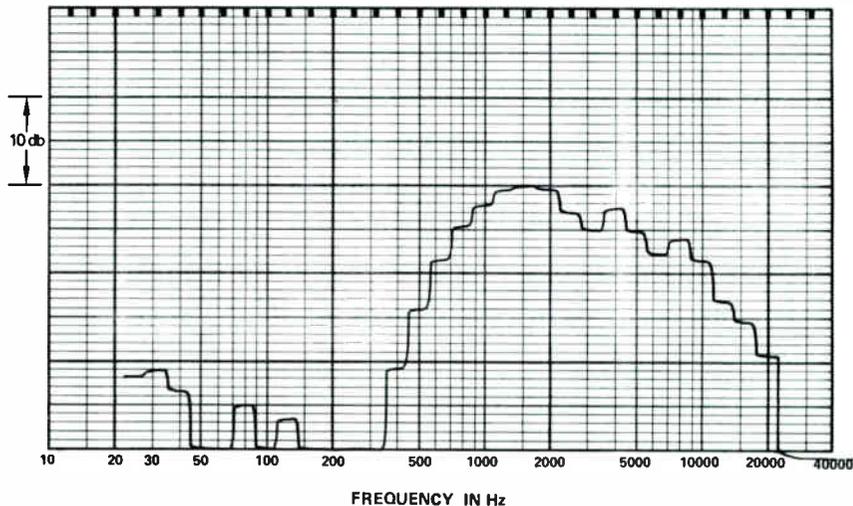


Figure 24.

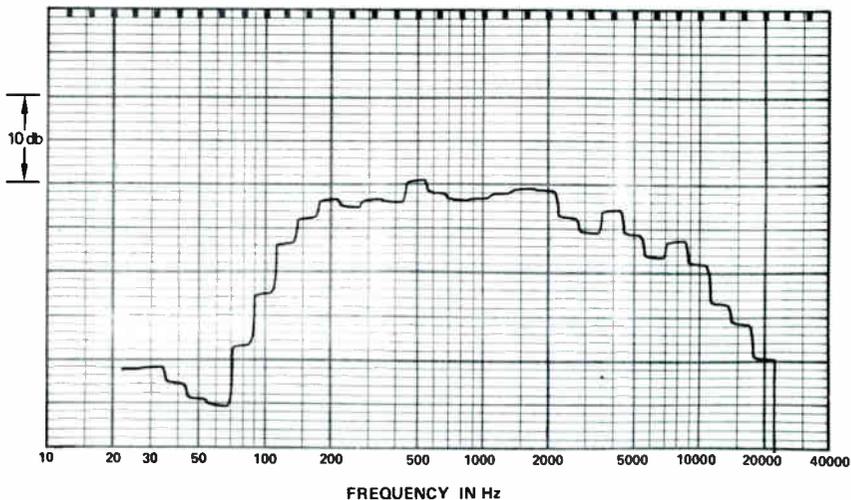


Figure 25.

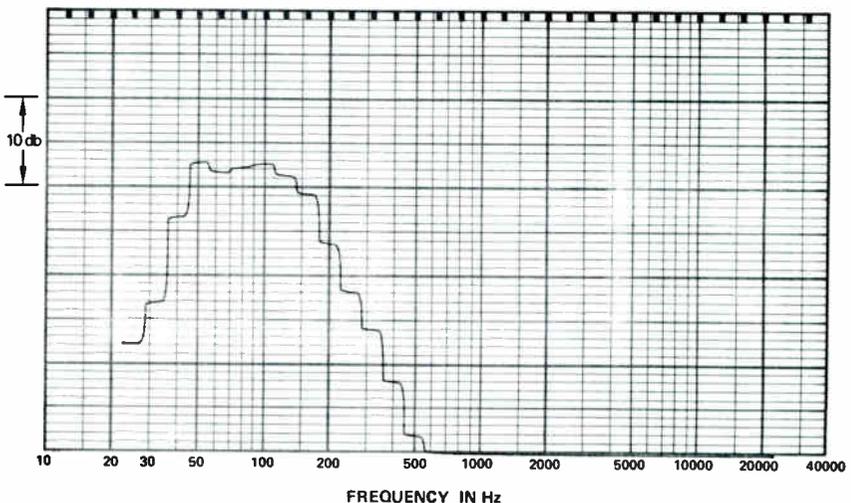


Figure 26.

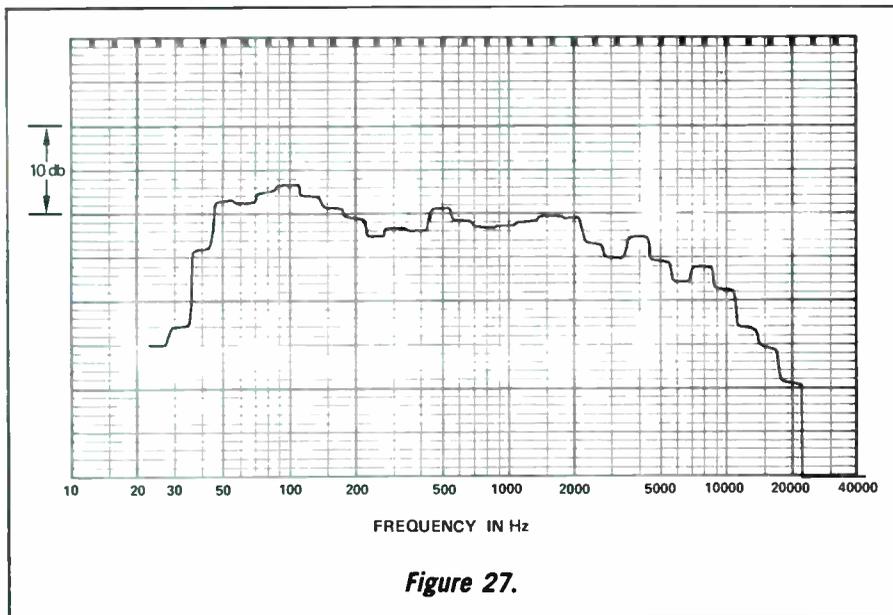


Figure 27.

the mid-bass systems. See Figure 24. Then, the mid-bass speakers were turned on again. The composite curve is shown in Figure 25.

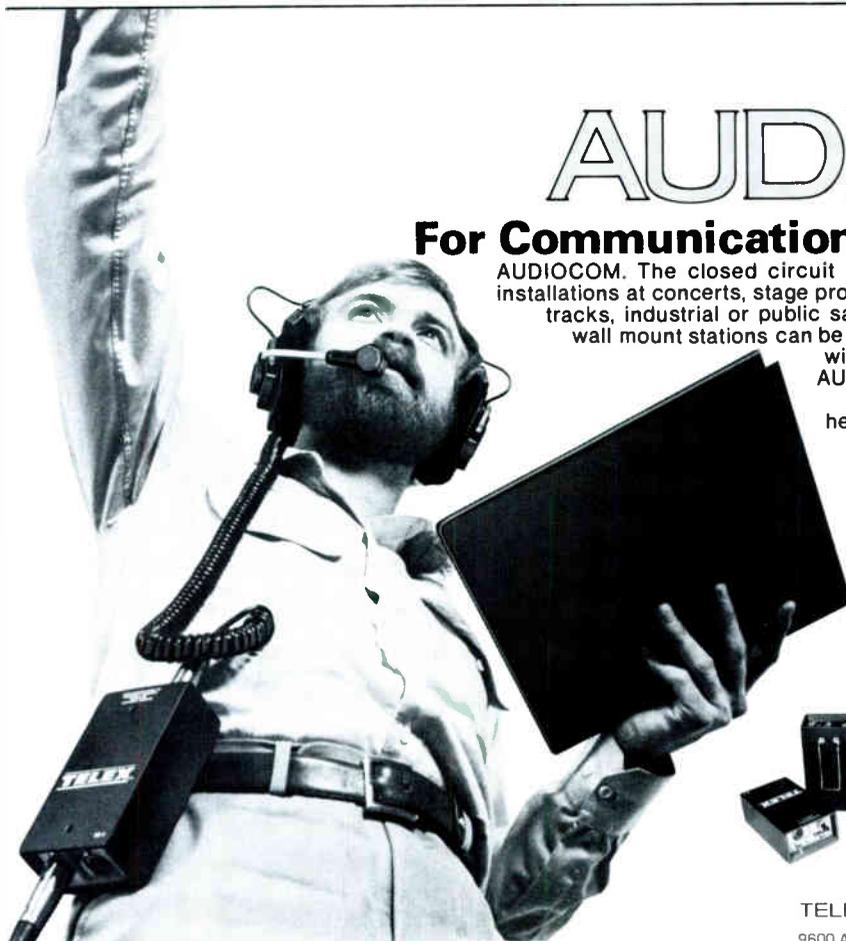
The XEQ-2 crossover has a polarity-reversal switch as well as an unusual control which can delay its low-frequency output by up to about 2 milliseconds at crossover. We made certain that the settings of these controls were consistent with

the smoothest response in the crossover region. Finally, the sub-woofers were added to the system. Figure 26 shows the response of sub-woofers alone. Figure 27 shows the combined frequency response of all three system sections.

#### Equalization

Note that the overall system response is quite smooth, typical in

smoothness of responses found in high-quality fixed installations after the "house curve" has been equalized with a multi-band, one-third-octave equalizer. This rather unusual result is typical of the experience of E-V personnel when using similar components. We suspect that these results are related, particularly in the case of the high-frequency horns, to using basic transducers whose free-field response is unusually uniform, both on and off the transducer axis. For the high-frequency horns, this performance characteristic is directly related to the concept of constant directivity. It is also directly related to the horn equalization modules available for the XEQ-2 crossover. These modules actually make the XEQ-2 a "crossover/equalizer." With the HR90 module installed (model EQA), the on-axis, free-field frequency response of the horn/driver combination is essentially flat. Thus, instead of equalizing for the efficiency rolloff above about 3,000 Hz which is a property of all commercial compression drivers, out-board one-third-octave or octave



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equalizers can be used to "fine tune" the system.

With the XEQ-2's built-in high-frequency contouring, how close is the resulting room response to that desired? Figure 28 shows the room response without equalization (other than that provided by the XEQ-2) compared to the "Boner preference curve."\*\* Note that the Music Box curve closely follows the Boner preference curve to 10,000 Hz. However, there is some experience and evidence—beyond the scope of this article—which indicates that clusters made up of constant directivity horns "sound best" when the 3-dB-per-octave rolloff of the Boner preference curve is somewhat less. Thus, we opted to boost the

\*C.P. and Charles R. Boner, "Minimizing Feedback in Sound Systems and Room-Ring Modes with Passive Networks," *J. Acoust. Soc. Am.*, 37 (January 1965), 134.

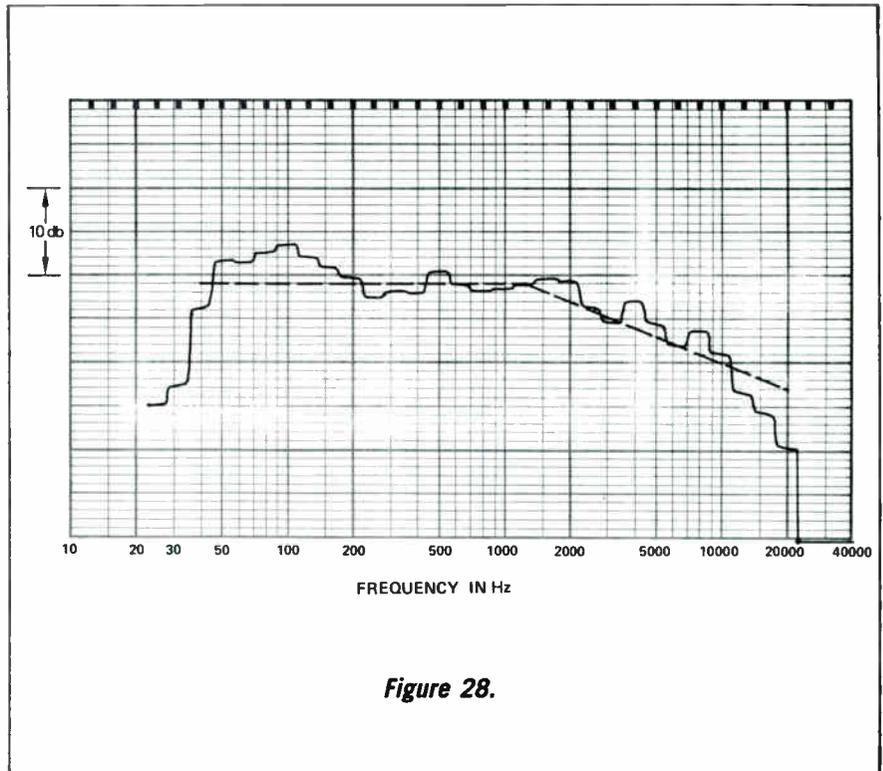


Figure 28.

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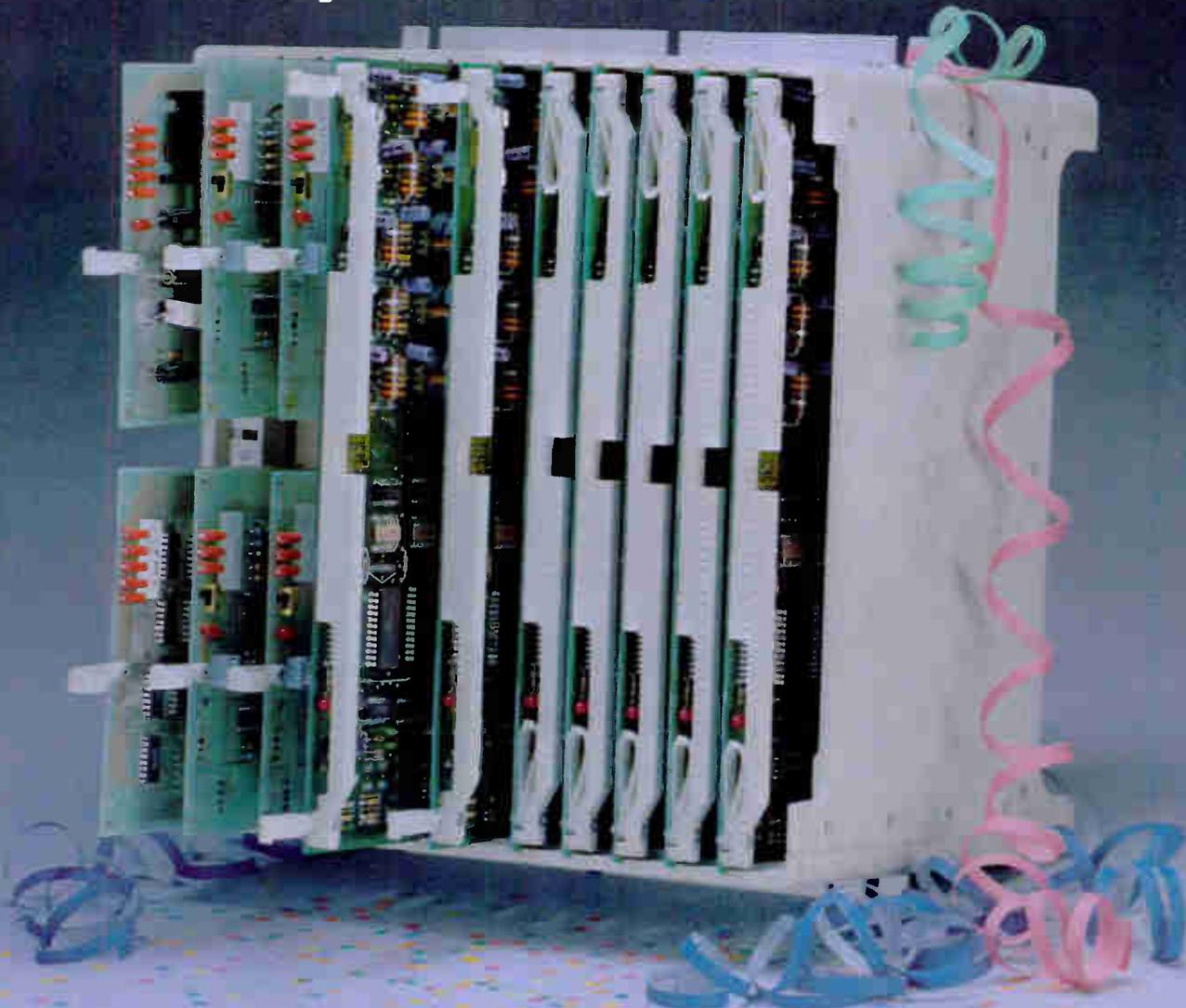
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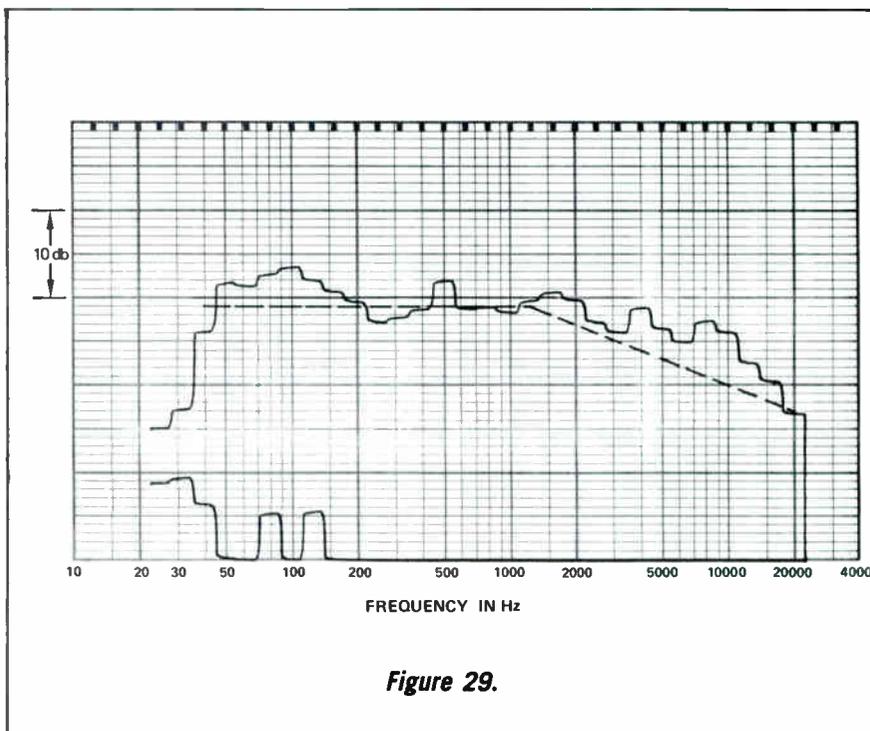
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response in the highest octaves. The resulting curve is shown in Figure 29 and was achieved with a modest boost of the octave-band equalizer in the 8,000- and 16,000-Hz bands. Although the curve is a bit "hotter" than the Boner preference curve, it sounded very good on the typical close-talking vocal mikes used at the Music Box (E-V PL80 dynamic, PL77B condenser, etc.).

**Setting Levels for the Mid- and Long-Throw Horns**

To set the mid-throw HR60 level, the three microphones were moved to be in the HR60's coverage pattern. A frequency-response curve was made with microphones in position but with the mid-throw horn off. The level above crossover (800 Hz) was somewhat lower than the level resulting when the microphones were within the beamwidth of the



*Figure 29.*

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short-throw horn. This is not surprising, since the measuring microphones are now out of the direct field of the short-throw horn, and measured sound levels are essentially those of the room's reverberant field, established by the room's reflective surfaces. The level of the mid-throw horn was increased until the frequency response curve began to look like the one developed for the short-throw horn. Figure 30 shows the mid-throw room curves with the mid-throw horn both on and off. Note that no equalization settings were changed.

The final step was to incorporate the long-throw HR40 horn. This was done in the same fashion as for the mid-throw horn. Figure 31 compares the response with the microphones in the beamwidth of the long-throw horn, but with the horn off, with the response when the level of the long-throw horn is appropriately adjusted. As an experiment, the long-throw horn was turned on and off while spoken vocal material was played through the system. Without the long-throw horn, speech level was plenty high, but the non-vowel speech components had a "muddy" quality. Switching on the long-throw horn brought the sound dramatically into focus, and gave clarity and intelligibility strikingly similar to that observed in the pattern of the short-throw horn.

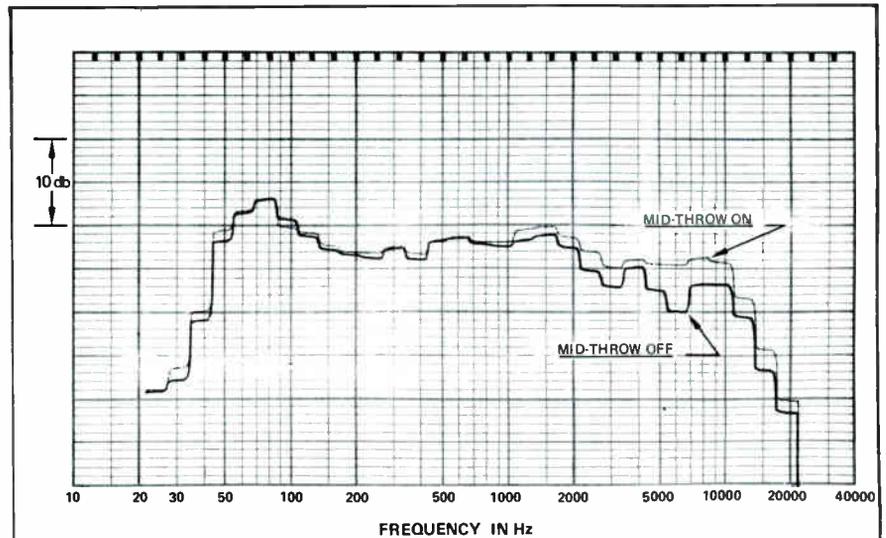
**Overall Coverage and Response Uniformity**

Figure 32 shows an overlay of three frequency response measurements made with all system components operating but with the trio of measuring microphones in the three different locations: within the short-throw coverage pattern, within the mid-throw coverage pattern, and within the long-throw coverage pattern. Coverage is uniform within  $\pm 2$  dB over most of the frequency range.

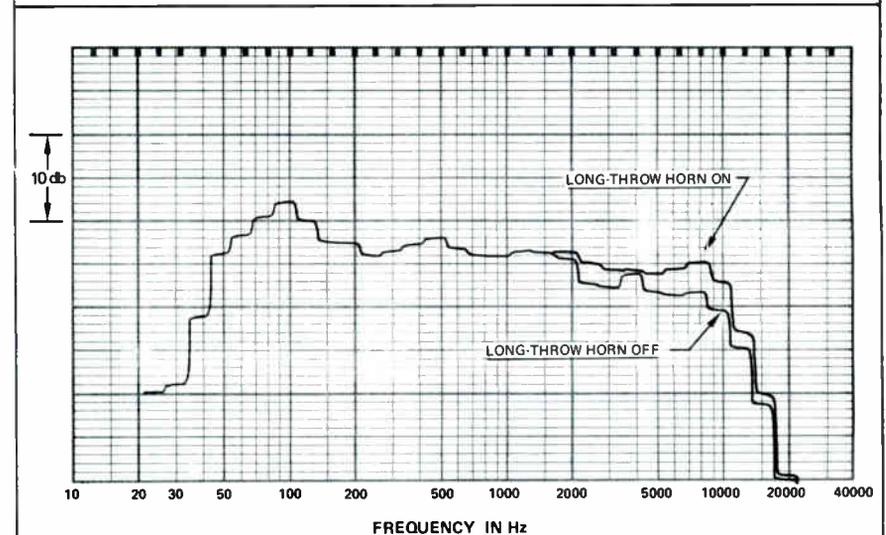
**Sound Pressure Levels**

With wide range speech and music program, unweighted average levels of about 118 dB were obtained before the onset of significant amplifier clipping. This sound pressure level was judged sufficient for all Music Box activities, even good enough for rock-and-roll!

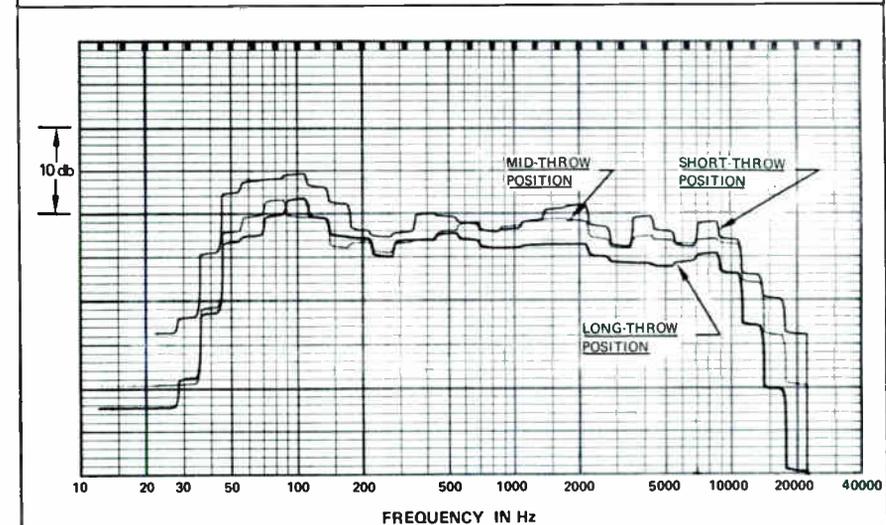
*to be continued*



**Figure 30.**



**Figure 31.**



**Figure 32.**

# SOUND LEVEL METERS

## Part 3

by Daniel Queen

### Application of Sound Level Meters to Noise Measurement

The requirements for measurement of environmental noise vary depending on the meter used.

The approach taken depends greatly on local ordinances or national legislation passed with regard to the type of noise. Thus, for community noise, there are ordinances largely designed around recommendations of the U.S. Environmental Protection Agency, and for industrial noise there are regulations

based on the rules developed by the U.S. Occupational Safety and Health Administration.

Most of these measurement methods are based on A-weighted readings using slow response. The notable exception to this is in measurements of aircraft noise according to Federal Aviation Administration directives. Here the "D" or "E" weightings appear to be more appropriate but actual measurements are usually based on octave band readings.

Measurement of environmental noise occurring indoors, such as the background noise in an auditorium, only starts with A-weighted measurements for survey purposes. They must include readings with at least the resolution of octave bands for them to be useful for the design of sound systems and the improvement of auditorium acoustics.

The ranges of sound level called for in the different areas of measurement also differ. For outdoor noise in communities, the range of levels is

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approximately 55 to 95 dB; for aircraft noise it should go as high as 125 dB; and for occupational noise the instrument should be capable of handling impulses in excess of 150 dB. However, for measuring compliance with industrial noise regulations, there is seldom need to measure levels *lower* than 75 dB.

On the other hand, the measurement of indoor room noise using octave bands requires an instrument capable of *octave band levels* as low as 10 dB and as high as 80 dB.

Remember that measuring microphone size is the principal determining factor for its output for a given sound level and that the internal noise generated by the microphone is inverse to the microphone size. It is evident that for the lower level requirements the largest possible microphone may be necessary, whereas for the higher level requirements smaller microphones are possible.

Since the disadvantage of a large microphone is that it becomes more directional, that is, its random incidence response becomes different from its on-axis response as frequency increases, the applications have to be examined for the diffuseness of the sound field that one would expect. Diffuseness is a measure of the uniformity of the sound field with regard to the directions in which the sound waves travel. Thus, a room with high diffusion would have sound waves coming at every point from every direction in a random fashion.

Under these conditions, a measurement would not change using a directional microphone as one rotates it about its diaphragm. Thus, the more diffuse the sound field, the larger the microphone may be that is used to measure it. This characteristic fortunately complements the lowest acceptable noise level requirements for the various applications. Thus, in the industrial environment, where the highest noise levels are encountered, the largest amount of directional sound is also encountered from individual machines, parts of machines, etc. At the other extreme, in the rela-

tively quiet environment of an auditorium, the principal source of noise is ventilation equipment, which tends to spread diffusely through the hall. The third application, that of community noise, tends to be somewhat less directional than the industrial application, due to the distance and possible random location of noise sources, but is far less diffuse than the indoor application due to the relative lack of reflecting surfaces.

For the general cases, it would appear that in the high noise of the industrial environment, a quarter-inch mike would be satisfactory. In the medium situation outdoors, a half-inch microphone would be the choice—reserving the one-inch microphone for indoor noise.

Nevertheless, even within this scheme, there are exceptions which

should be noted. For example, in smaller rooms indoors, where absorption is unevenly distributed (for example, when absorption material appears only on the ceiling), highly directional effects can occur. Since it is difficult to avoid a one-inch microphone for low-level noise measurements indoors, great care must be taken to rotate the mike into various positions to be sure that correct readings are being obtained.

A substantial source of error, particularly at higher frequencies, comes with the choice of field response for the microphone used. It is nearly impossible to obtain an accurate reading of noise above 5 kHz in a non-diffuse field using a one-inch microphone. Thus it would appear necessary to utilize different size microphones for measurement

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of different ranges.

Fortunately, another characteristic of most precision condenser microphones is that the noise level in octave bands tends to decrease with frequency. Thus, a smaller microphone can sometimes be used in the higher octave bands to obtain an adequate reading of the noise.

#### The Effect of "Other" Noise

The accuracy of a measurement of sound pressure in the presence of noise which is not intended to be measured (such as background noise when measuring a sound system) is shown in Table 3. As long as the undesired noise is 10 dB less than the sound being measured, no correction is necessary. If the noise is within 4 dB of the desired signal, then the measurement cannot be relied upon. Measurements where the difference is between 4 and 10 dB can be corrected by the factor shown, provided that the interfering noise is largely random and contains no discrete tones.

Measurement of noise for occupational safety purposes, as well as for community noise, requires the taking of multiple measurements over a period of time and the application of a formula to average them. To aid in this task and presumably to increase its accuracy, integrating Sound Level Meters may be used (Fig. 12).

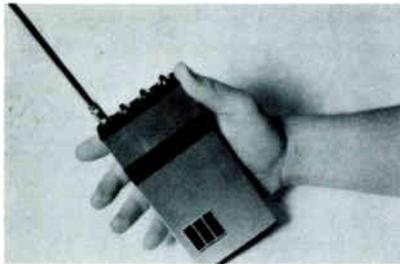


Figure 12. An integrating and computing handheld SLM.

The usefulness of the Integrating Sound Meters may be seen from Table 4, showing the methods for calculation of the various sound level designators used for community and industrial noise.

However, one precaution is necessary with regard to industrial noise. Unlike the practice anywhere else in the world, the Occupational Safety & Health Administration rules for the calculation of a noise hazard depends on a 5-dB "doubling rule." This means that the hazard, according to the regulation, doubles for every 5-dB increase in A-weighted

**Table 3**  
Corrections for Ambient Sound Pressure Levels

Difference (in Decibels) Between Sound Pressure Level Measured with Sound Source Operating and Ambient Sound Pressure Level Alone	Correction (in Decibels) To Be Subtracted From Sound Pressure Level Measured with Sound Source Operating To Obtain Sound Pressure Level Due to Sound Source Alone
4	2.2
5	1.7
6	1.3
7	1.0
8	0.8
9	0.6
10	0.4
11	0.3
12	0.3
13	0.2
14	0.2
15	0.1

**NOTE:** For the survey and field methods, corrections of less than 0.5 dB are seldom necessary. For the laboratory method, a measurement shall not be considered valid if the correction exceeds 0.5 dB.

$L_A$  = A-weighted Sound Level

$L_D$  = D-weighted Sound Level

$L_{PN} \approx L_D + 7$ : Perceived Noise Level (for aircraft flyovers)

$L_{NC} \approx L_A - 5.7$ : Noise Criterion Curve

$SIL \approx L_A - 9.8$ : Speech Interference Level

$L_{xx}$  = Level exceeded xx% of time (A-weighted unless otherwise specified)

$TNI = 4(L_{10} - L_{90}) + L_{90} - 30$ : Traffic noise index

$L_{eq} = 10 \log \left( \frac{1}{N} \sum_{i=0}^N 10^{(L_i - 94)/10} \right)$ : Equivalent Noise Level for  $N$  samples equally spaced in time with background sound level (if any) more than 10 decibels below lowest sample.  $L_i$  is A-weighted unless otherwise specified.

$L_{NP} = L_{eq} + (L_{10} - L_{90})$ : Noise Pollution Level

$L_d = L_{eq}$  for 0700 to 2200 hours

$L_n = L_{eq}$  for 2200 to 0700 hours

$L_{dn} = 10 \log \left( \frac{1}{24} \{ 15(10^{L_d/10}) + 9(10^{(L_n+10)/10}) \} \right)$ : Day-Night Sound Level

$CNEL \approx L_{dn}$ : Community Noise Equivalent Level

$NEF \approx L_{dn} - 35$ : Noise Exposure Forecast

$CNR \approx L_{dn} + 35$ : Composite Noise Rating

**Table 4.**

sound level (approximately three times the sound energy), but requires only two times the amount of exposure time for a doubling of noise hazard. Therefore, a simple time integral cannot be used to calculate the noise exposure per the OSHA Standard. It is necessary to utilize a computed solution using the five halves power.

Since a digital computation is necessary, the integrating meter needs to sample the slow response reading of the meter—also called for in the OSHA Standard. However, to obtain this slow response, some integration has already taken place. Thus, the very short impulses are integrated to provide the slow response.

This means that impulsive sounds are included in the measurement by simple integration—that is, a 3-dB doubling rule—whereas continuous sounds are included per the 5-dB doubling rule. This contradiction has not as yet been resolved, either with respect to the legislation or by the meter manufacturers or writers of standards. On the other hand, the Occupational Safety & Health Administration has approved the use of dosimeters which meet the requirements of American National Standard S1.25-1978. OSHA appears therefore, to be accepting the anomaly and the errors which it produces.

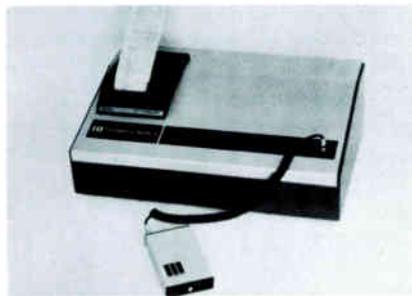


Figure 13. A Dosimeter with its readout.

Figures 12 and 13 courtesy of Metrosonics, Inc.

It is possible, therefore, that the design of integrating Sound Level Meters and of dosimeters will change in the near future or, that the regulations may change. It would be wise to obtain meters containing plug-in programming for the integration equations used (Fig. 13).

*to be continued*

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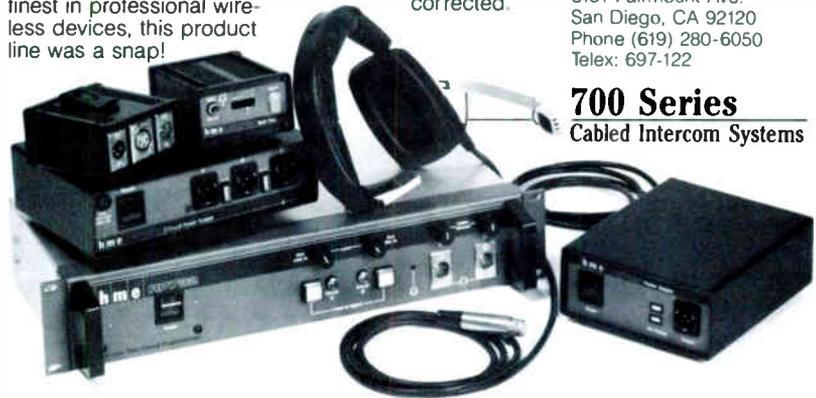
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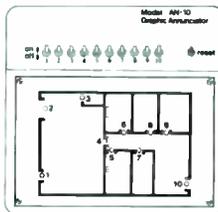
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## He's too busy to appreciate the clarity, sensitivity and design of this Shure microphone, but you will. The SM59.

Installing the Shure SM59 Cardioid Dynamic Microphone is one step toward a clean, natural sound for all of those who speak for a living. Its wide-range, ultra-flat frequency response prevents unwanted boominess or uncomfortable shrillness that complicates room acoustics and hampers intelligibility. And Shure's patented internal mechano-pneumatic shock mount virtually eliminates table rumble and hand-held noises.

To focus on the sound of the speaker, the SM59 features a classic cardioid polar pattern that remains symmetrical over a wide frequency range. This pattern also helps reduce feedback and other extraneous noises.

An internal humbucking coil minimizes hum problems associated with closed-circuit TV and lighting equipment, while a sophisticated internal windscreen

substantially reduces pop.

A champagne finish and distinctive appearance make this microphone a natural for permanent installation.

All of this makes the Shure SM59 the perfect choice for legislative chambers, court houses, large meeting rooms, pulpits and other public address applications.

In fact, wherever people are busy talking, they'll sound better through the SM59.

For more information on the complete line of Shure microphones, call or write Shure Brothers Inc., 222 Hartrey Ave., Evanston, IL 60204, (312) 866-2553.

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