

MARCH 1983

# SOUND & COMMUNICATIONS



World Radio History

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# EV PRO SOUND PRODUCTS

The competition in the professional sound field is pretty fierce. Ask anyone who has ever competed for a contract with EV Professional Sound Reinforcement products and they'll tell you that on a head-on, feature-for-feature, dollar-for-dollar basis, there's really no competition at all. Especially when EV's "Sound in Action" line is pitted against Altec and JBL. The truth is that many of their basic products are based on technologies that go back more than 50 years, to the first sound motion pictures. But designing sound products that are capable of filling a theater, concert hall, auditorium or stadium with high quality sound is a lot more demanding than reproducing the sound tracks of yesterday's talking pictures. In addition, the mechanical design and manufacturing processes of today and yesteryear are miles apart. (We ought to know, since EV's been making transducers since 1927).

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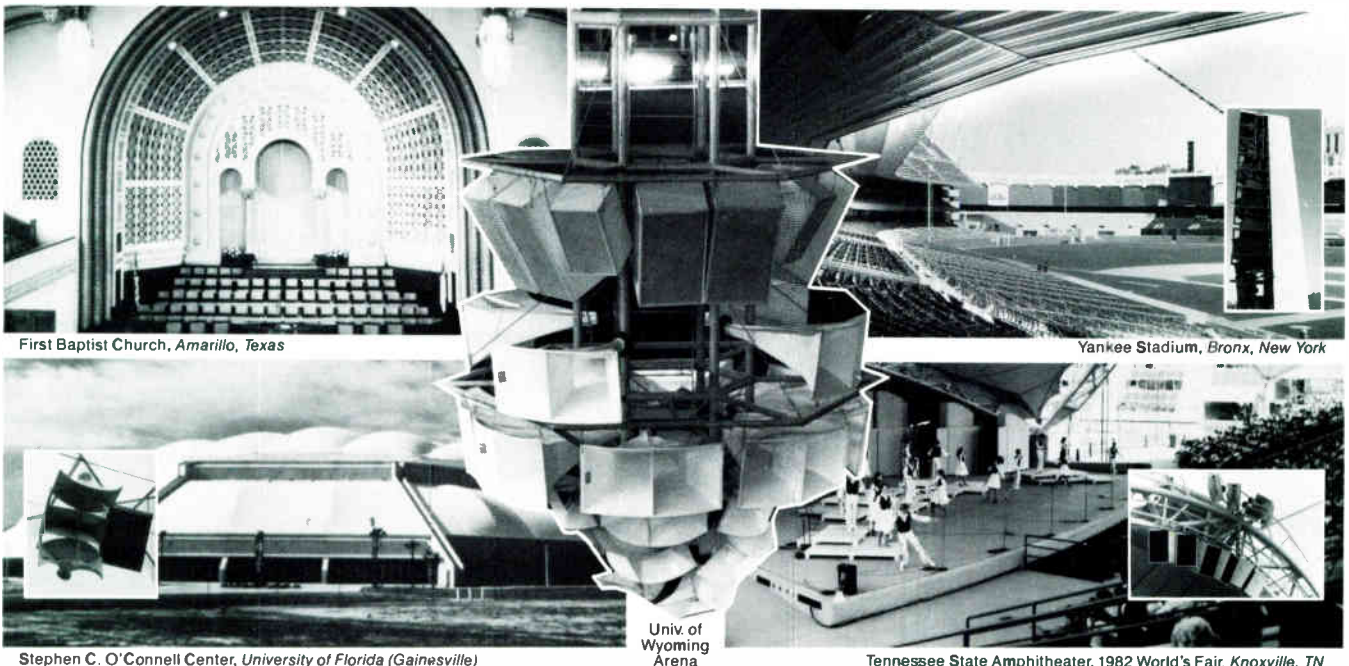
University of Akron, as well as countless numbers of churches, schools, theaters and clubs all over the country.

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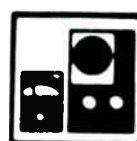
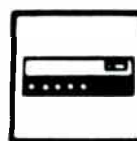
Sound & Communications (U.S. P.S. 943-140) is published by Sound Publishing Company, Inc., 156 E. 37th St., N.Y., N.Y. 10016. 212-685-3480.

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.



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Circulation audited by  
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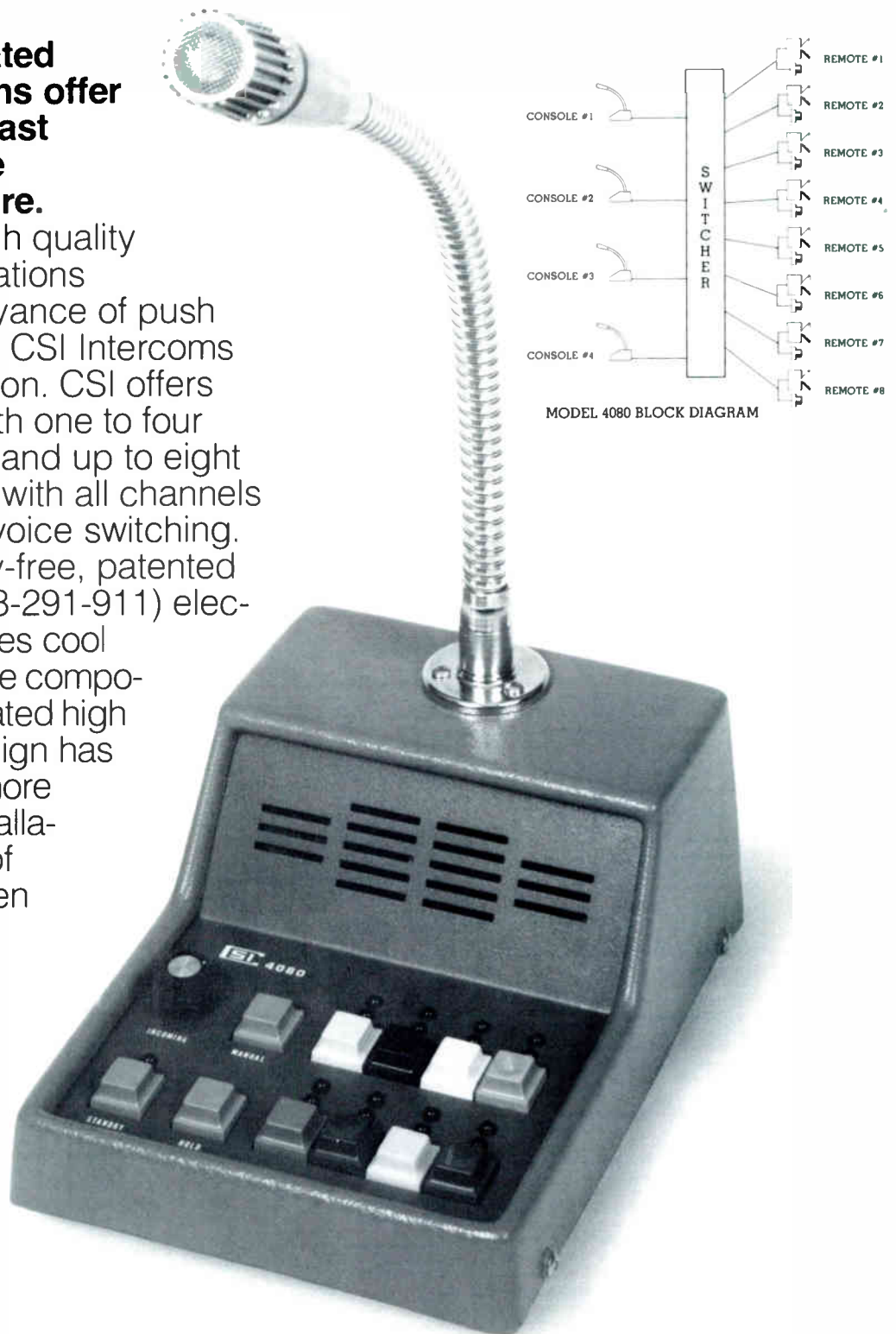


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# LATE LINES

One wonders about the upcoming (EDS) Electronic Distribution Show & Conference: what could possibly be NEW—DIFFERENT—EXCITING—COMMANDING ONE'S PRESENCE after 46 years of shows?

Well, let's ponder some possibilities:

For example: Newness lies in the first-time exhibitors: they've got product(s), domestic and offshore, priced for quick turnover. They're geared for impulse sales. Some product(s) are blister-packed; some are intended for that still emerging market, MRO. One needs a line on that!

Then there are telecommunications items that are worth discussing with both personnel. One needn't be an interconnect dealer, nor even a specialist in the marketplace for intercom—duplex and simplex—to appreciate the absolutely revolutionary things that are happening to the world of wired and wireless communications. How does one follow the developments of microcomputers, that seem to grow and multiply and divide with the speed of an amoeba, if not at EDS? They're being introduced into everything—with performance features that stun the mind. One needs a line on that!

In addition to exhibits of products, from antennas for TV and hand-held VHF radio gear to Zener diodes for voltage regulation, there are the conferences. One needs to look in on them!

The National Sound and Communications Association's Contractors Conference, running alongside of EDS, has prepared a program that should satisfy most contractors. They'll be discussing management and technical problems associated with sound and such associated systems as security and life safety. There's the promise here of good listening. One needs to bend an ear to learn how the other guy does it!

The EDS conferences are loaded with management topics. The newness here is the presenter. The old-timer has been superceded! There's a new breed of manager in the industry—the MBA (Master of Business Administration) who views the industry and his specialty therein on a CRT screen. Everything is committed to the computer memory; and the computer doesn't often make a mistake. One needs to cast an eye at these "programs" that can make one's business FLY!

The wonder about the upcoming Electronic Distribution Show & Conference is the constantly evolving change. Circuits are being created for new products; new products are introducing other technologies; the new technologies are calling for newer materials. All of this creativity is expanding the reach of products and systems into the far corners of the industrial and consumer markets for electronic and electro-acoustical apparatus. And with this apparatus comes the requirement for new ways of thinking, new merchandising techniques, new methods of preparing for emerging markets—preparations such as sales and technical training, and associated computer conveniences. Once upon a time EDS was a frolic. Today, it's a new frontier!

Once a year, at EDS, for the past 46 years, there's been an exchange of ideas, a learning process and an aura of camaraderie.

Everyone is expecting you to be there—

The 1983 Electronic Distribution Show & Conference,

May 3, 4, 5, Tuesday, Wednesday and Thursday.

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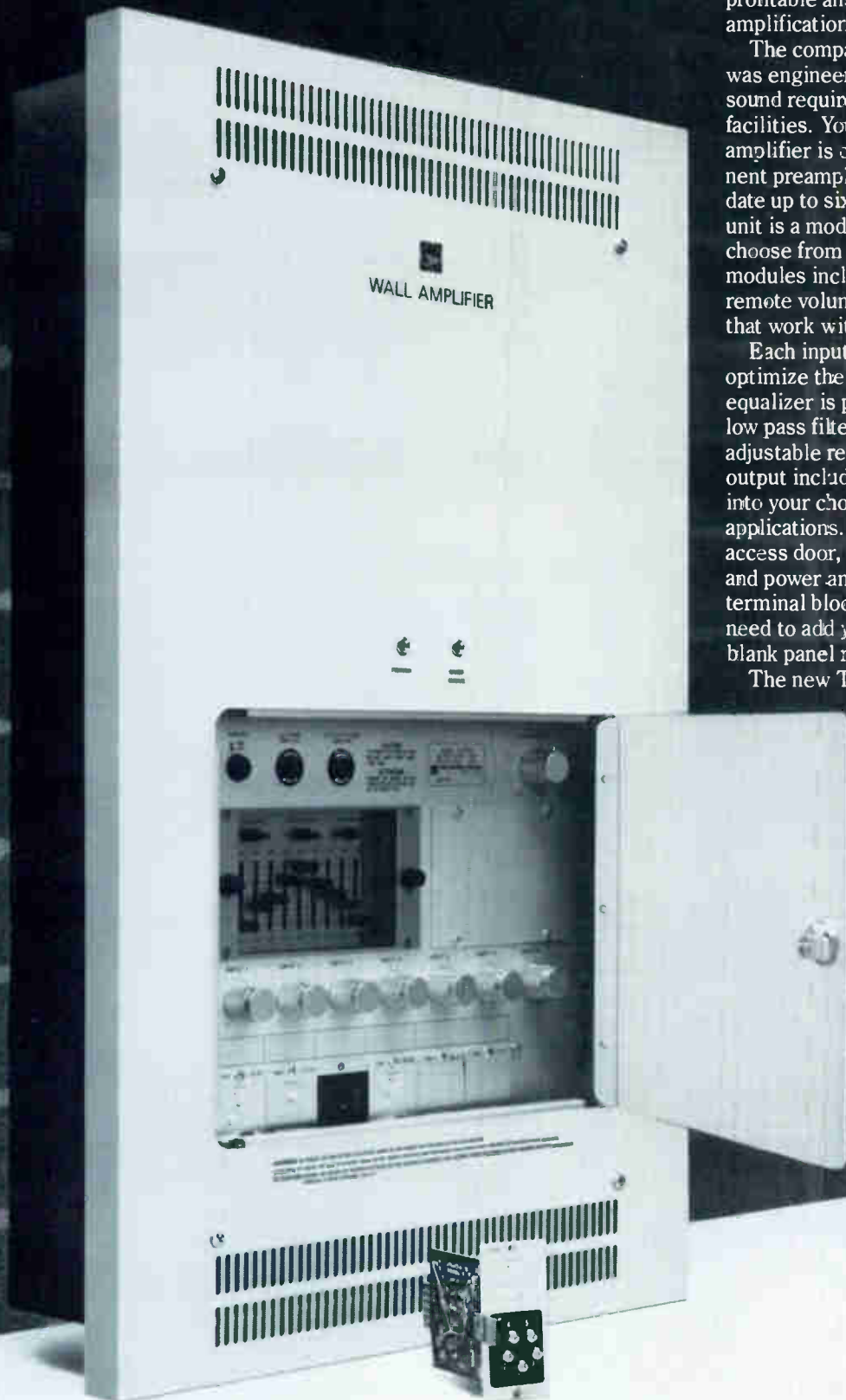
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# Computers Join the Design Team

by David H. Bryan

“Given a loudspeaker’s location, we can quickly calculate the direct and reverberant sound field coverage at all points on the floor plan, and also determine the intelligibility at these points.” John Eargle turns to his IBM Personal Computer and demonstrates his claim: it took about five minutes. Pointing to the floor plan display on the computer’s screen, he notes, “This ‘T’-shaped building doesn’t show as many points as would a larger, square room; the limitation is just the character size and the available space for them on the floor plan shown on the screen,

but the program can handle 100 to 200 points.” As he spoke, the field coverage levels in dBs vanished from the screen to be replaced by the words, EX, GD, OK, and QU at the many points on the floor plan. Ron Means translated, “They mean Excellent, Good, Okay—which is still intelligible—and Questionable, that’s doubtful intelligibility.”

The scene is a computer workroom at JBL’s headquarters in Northridge, near Los Angeles. John Eargle is the company’s senior director of product development and applications, while Ron Means is vice president of marketing and sales.

Both men hovered over the keyboard of the small computer sitting on the work table.

Eargle types on the keyboard and the computer draws a sketch of the cluster of horns he’d defined earlier. Ron Means watches and comments, “Notice, it shows the views a draftsman will need to draw up later on; it even shows a red dot locating the center of gravity of the cluster, and that’s to help the rigger.”

This particular computer was selected because it had good graphics, and because IBM is expected to make available a wide variety of business and engineering software

*The computer displaying a three-horn cluster.*



programs to small businesses—including sound contractors, dealers, and consultants. Ron Means explains, “We considered the graphics capability—the computer’s dot matrix printer will output anything you see on the screen excepting the colors; the printer just prints in black and white—the service, the new business and engineering programs they’ll have available, and the price. It’s \$6,000.”

He added, “Our program is written in IBM’s BASIC, but if a group of our customers want a program like this written for another machine, we may do it if there’s enough of them to make the cost split reasonably low.” JBL has spent half a man-year on the program development and will make it available for “well under \$1,000—maybe half that amount” about spring of ‘83.

The selection of the computer was also governed by its large memory capacity. A programmer at JBL says, “We wanted a capacity large enough so the contractor or consultant who uses our program will be able to also use it for other purposes: accounting, taxes, payroll, inventory control, estimating jobs and pricing them, writing specifications and contracts, and other word processing activities.” In response to a question as to how long it would take an average contractor or dealer to learn to use the program, the programmer replies, “Well, if he already has a machine and knows how to ‘boot the disc,’ turn it on and things like that, and if he’s already a designer of sound systems, I’d guess he could be using the program after half a day of instruction. That’s been the experience here for several of our engineers.”

The program is easy to use. It’s “menu driven” in that the user is asked to choose one of several options presented on the screen. The operator can elect to work in feet or in meters, choose whether to begin a new design or continue to work on an old one (handy for updating old bids with alternate designs), type in data such as the average absorption coefficient and reverberation time—or just put in the room dimensions and the approximate absorption coefficients of the materials used and let the computer work out the reverberation time, or . . .



*A close-up of the screen, showing menu choices.*

To observers, it seems as though the computer is having a conversation with, or working with, the person operating it. But uninitiated observers will find it a bit strange: the user replies to the computer’s question with a few keystrokes, and occasionally there’s no action, but he’ll hear the whisper of the disc mechanism shifting its head positions—then suddenly a new menu appears on the screen, or a plan view of a church or a room appears and sound levels numbers in dBs are sequentially deposited in their

appropriate places on it. Eargle says, “It takes the machine about half a second to calculate a value for each point.”

JBL will supply the program users with a disc containing information about their products; this includes the footprint of their various horns. The computer mathematically slices the footprint at any desired angle; the angle changes as the horn is aimed more and more downward towards the floor, and this slicing is what preserves the normal appearance of the floor plan or



*Francie Wuilley of JBL at the console of the IBM Personal Computer. The main display screen is in the center, the magnetic disc unit is on the far left, on the bottom, and the dot-matrix printer is on the far right of the table.*





John Eargle at the computer, with Ron Means looking on.

seating arrangement.

Ron Means discussed the reasons for referencing everything to the floor plan—instead of to the horn's pattern. "We want to end up with a computer's print-out that can be easily read by laymen, not with something that makes sense only to sound engineers. Customers, for the most part, aren't able to understand what's happened to a three-dimensional horn pattern that's been drawn or warped onto a two dimensional drawing. Square floor plans come out looking trapezoidal—they look weird. Laymen aren't happy with such patterns; they aren't comfortably conventional nor normal looking. So, by letting the computer handle the horn's characteristics, the floor plan views remain flat and rectangular—if that's what they really are. It's quite a sales advantage!"

John Eargle remarked: "The program will handle *any* floor plan shape, but we have to describe it by a series of straight lines. A circular floor plan would be represented, as accurately as we'd like, by a polygon. Perhaps by a hexagon or, better, as an octagon." The operator "draws" the room by merely typing in the locations of the *corners* of the room, using x, y and z Cartesian coordinates. In return, the computer allows the operator to check his accuracy by showing representa-

tions of the room in both orthographic and isometric line drawings. Eargle says, "If anyone designs an *impossible* room, perhaps one with a missing corner, the sketch on the screen will make it immediately obvious and the operator can correct the error."

How about floors with ramps, raised balconies, and other odd shapes? "No problem," says Eargle. "And the final print-out of the acoustical data will always be shown on a top view of the floor plan—very easy for anyone to read and understand."

The program operates in several steps. The first is to show the coverage of a horn or of a cluster in the room without the effects of sound reflected from the walls or the ceiling. This result, the direct field sound levels, is printed out in dBs at as many points as there's room for on the floor plan. Next, the effect of reflected sound is shown as the ratio of direct to reverberant sound at each point on the floor plan.

Finally, these ratios are interpreted for intelligibility, and the computer prints out estimates for each point as Excellent, Good, Okay, and Questionable. From these outputs, the sound system designer can modify any input data and try again; he can change the reverberation time if such a change can be justified, re-aim the horns, repeat

the calculation with different horns, whatever.

Eargle makes a point: "What the sound system designer wants will depend a lot on the use of the room. Designing for intelligibility of speech is one thing; getting a design for organ music is another. The designer makes *all* the decisions; the program just calculates the results in terms of coverage and the effects of reverberant sound. It's only an aid to the designer."

Means injects, "It's also a very useful sales tool, and it can be used to save lots of drafting and rigging time."

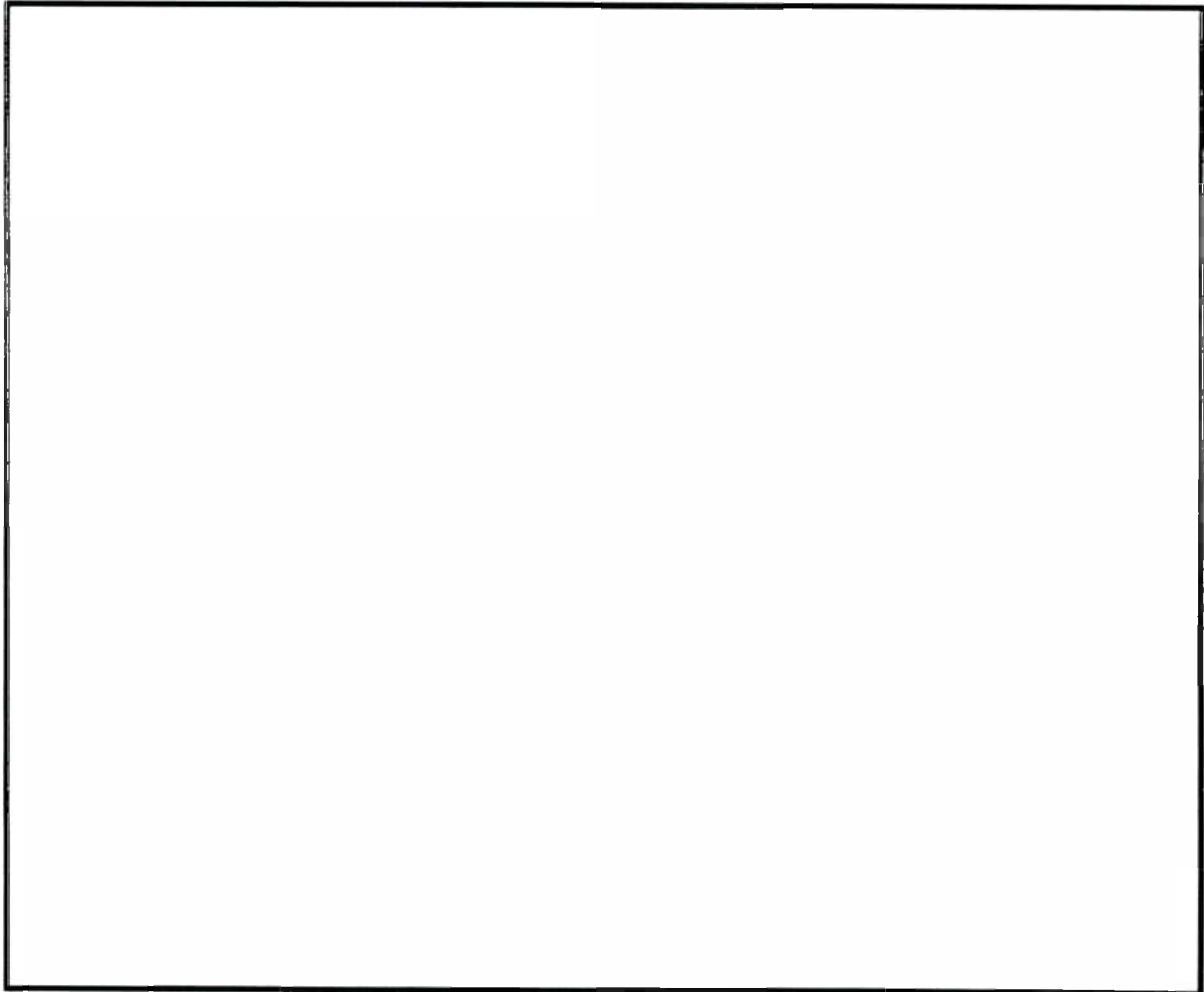
Eargle demonstrates the point by typing instructions on the keyboard. The computer starts drawing a three-dimensional, isometric sketch of the cluster of horns; the drawing shows the center axis of each horn in the cluster as dashed red lines, and locates the center of gravity of the cluster by a red dot. Means compares the colorful display on the screen to the black and white print-out: "A draftsman can very quickly trace this and smooth out the lines with his French curve. We think the savings in drafting time alone will pay for the whole system in a year; that's for an average contractor." Means has owned a sound contracting business and knows the various costs involved.

Asked if the computer could handle changes such as opening or closing the windows in a room, Eargle said, "Sure, and it can also plot the results of changing the reverberation time resulting from hanging up drapes or installing acoustical materials on the walls or ceiling." Pressed on exactly how long such a recalculation takes, he replies, "At least a minute and a half, but not longer than about twice that."

A point of great general interest to contractors and consultants is the fact that the program can be used with horns *not* manufactured by JBL. The users' manual will show how any other horn's specifications can be entered onto a disc for use by the program. Means explains this feature: "This flexibility of the program will be valuable to consultants who might want to compare various products for an application; it will



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also allow users to update their data discs with the specifications of our future horns. We've designed the program so it will be easy for users to add additional horn data—any horn data—to the disc files."

The simple fact that the computer solves mathematical problems so fast opens up new uses for it. Problems in sound system design that used to take a competent man several days to solve now can be worked out in minutes. Means comments on this point: "Before we started using this computerized approach, it just wasn't economic to try to solve the kind of problems sound engineers ran into—except at a very few points on the floor plan. In the past, a designer might make a few calculations, perhaps to check the critical distance, but he'd usually stop there. He'd utilize various rules of thumb to get an idea of how well the system worked in other areas of the seating plan. He might not have the time to check out his alternative approaches or other options to the job, especially for small budget situations. But today, using the computer to assist him, the designer can be quite thorough,

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even for low budget jobs. He can *do it right* the first time, because of the speed of the computer in doing the necessary calculations."

The IBM Personal Computer uses BASIC programming language; it's a high level, interpretive language, but it's different from other manufacturers' versions of BASIC. For this reason, JBL feels it *may* make other versions of their program available for the owners of Apple, TRS-80 by Radio Shack, and other makes of small computers.

An official of a medium-sized contracting firm was asked his reaction to this situation. He replied, "No problem! We're using a computer now and it's generally booked up solidly, so we will definitely get another one soon and perhaps we'll have three of them." He listed the applications: "One will be for the office; that one will be for accounting, word processing of letters and contracts—all kinds of paperwork. The next one will be for use of the estimators in getting quotes and prices out faster; it will also be used by engineering to lay out wiring and loading charts. The third computer will be for inventory control."

He noted, "I strongly suspect that one of these two new computers will have to be an IBM Personal Computer, not only because JBL has applied it to our business, but because IBM may have a lot of new programs we can benefit from using." Apparently, the industry is swinging over to the use of small computers in a big way.

Means suggests a new way to sell sound systems: using the computer print-out to show prospective customers the performance of various, alternative sound systems. He remarks, "Generally, a church goes through two or three preliminary systems before they get one that's satisfactory to them in terms of proper coverage and speech intelligibility. That's really a shame; it wastes the church's money and it tends to lower the professional standing of the whole industry. We hope that the proper use of the computer program by competent designers will almost eliminate most of these problems."

He suggests that these computer print-outs can be used as part of a sales presentation to prospective customers, to show them the performance attainable with several dif-

ferent configurations of horns and other equipment, the difficulties caused by reverberation, the coverages of overhead clusters versus column speakers, and the effects on intelligibility of noisy air conditioning and heating systems. He says, "I think such performance-oriented sales approaches will be greatly appreciated by customers, and will also tend to destroy the credibility of salesmen who don't utilize these new tools of sound system design." He adds, "There's really not much reason, today, for churches to endure the expense of going through several different sound systems just to get what they need."

The people at JBL are quite proud of their company's contribution to the *science* of sound system design, and they feel strongly that that's exactly what it is today.

Means and Eargle discuss the characteristics of long lasting vowel sounds and the shorter, almost instantaneous, consonant sounds, and how the intelligibility of speech is determined by the computer. Eargle remarks: "We didn't have to take any undesirable shortcuts or mathematical approximations in how the computer makes its calculations or interpretations. It handles so much data and runs so fast, shortcuts weren't needed." That fact will probably be very comforting to sound system designers. The calculations in the program are largely based on the works of H. Haas and of V.M.A. Peutz.

How will the new JBL computer program be announced? Probably as the company prepares to present a series of three-day seminars to be held in the spring of '83 in New York, Chicago, Dallas and Los Angeles. The first day's seminar will be devoted to introducing a host of new products and their specification sheets, approximately 100 products in all. One is very interesting: it's a new digital type of automatic microphone mixer with amazing performance. The next two days will be given over to introducing the attendees to the computer program. Eargle says, "We'll ask the people to bring in sound system design problems that they've already solved, then we'll run those same problems through the computer for a comparison right before their eyes. It should be quite instructive for all." □

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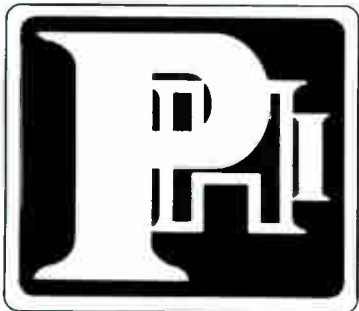


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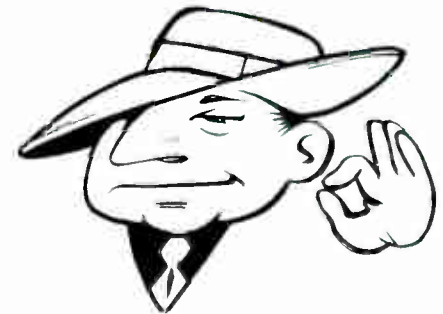
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# The Future of SCA

by Kenneth St. John

**H**istorically, the use of the SCA channel has been closely tied to the broadcast nature of its associated main channel programming. In the early days of FM broadcasting, many broadcasters additionally used their programming to provide a background music service to subscribing customers. Special receivers were supplied which silenced during commercials.

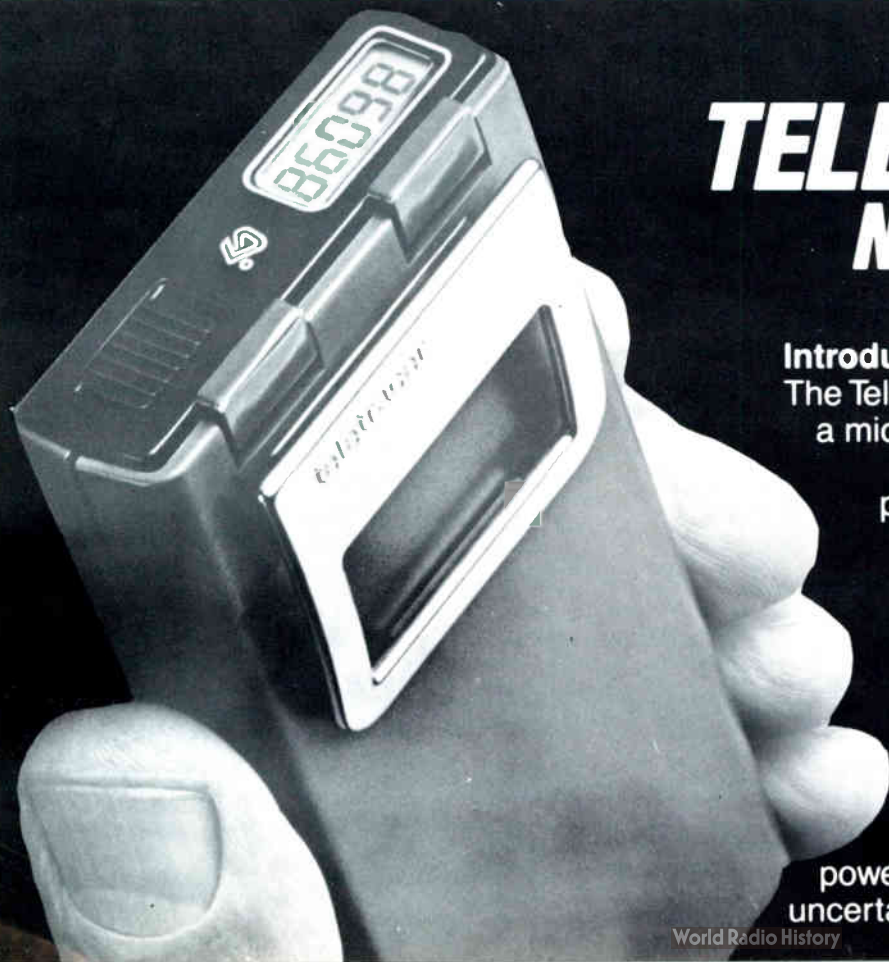
To the FCC, this clearly was an abrogation of the intended broadcast nature of the FM band. Conversely, however, in the primal beginnings of FM broadcasting the

financial contribution of the background music operation was significant. The licensee was hard-pressed to compete for advertising with the long established AM presence.

This, then, was the dilemma facing the FCC in 1955, when it created the Subsidiary Communications Authorization, now commonly referred to as the SCA. In order to allow the FM station to continue its selective music operations in troubled financial waters, the SCA was created for the provision of background music. Although the Commission originally held that back-

ground music was of a non-broadcast nature, later court decisions caused a redefinition of both background music and the SCA use provisions, begetting the current rules limiting transmissions to those of a broadcast nature.

Unfortunately, such restrictions—coupled with current technological advancements—have severely hampered the exploration of the vast resources of the SCA. By the Commission's own rules, "... wherever the use is to activate or control non-broadcast equipment or to transmit point-to-point personal contact



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information, the service is not permitted..." (on the SCA). These limitations are seen to possibly be a casual influence on the meager showing of only 27% estimated operational SCAs out of approximately 3600 possibly available for use in 1981.

Furthermore, the increasing technological advancements in the areas of personal communications, private communication networks, public safety services, etc., find no outlet under the present rules regarding SCA broadcast terminology.

It would seem, however, that all is not so gloomy as far as the future of SCA is concerned. In what many have been heralding as the next great evolutionary phase regarding development of the SCA market, the FCC now has pending before it legislation which could revolutionize the industry. Sweeping changes, if approved, would seem to remove almost all of the limiting factors held to account for the rather small participation by both broadcasters and businessmen alike. Most importantly, the rules requiring SCA programming to be of a broadcast nature would be abolished completely. Furthermore, available

broadcasting time would be increased, owing to the removal of restrictions requiring operation to be permitted only simultaneously with the presence of the main channel programming. On the technical side, rules limiting the type of modulation to FM would likewise be eliminated.

Continuing to ease the technical limitations and, therefore, the parallel technical opposition to adding an SCA carrier, the present proposal would attempt to punch holes in most arguments against the addition. The expounding of the "loss-of-modulation syndrome" has been used frequently to defend against the addition of SCA by some. The argument finds its basis in the fact that adding the carrier will cause a loss of a precious 10% total main channel modulation. In actuality, however, the operation of an SCA at maximum levels will cause a reduction in the main channel modulation of only about 1 dB, hardly worth considering. Under the new rules the regulations may permit modulation levels of as high as 110%.

This increase in energy allowance should not only cover any pseudo loss arguments in the minds of a

few, but would obviously permit more expansion of the available upper spectrum to permit a second SCA channel at 95 kHz. One only need use a little imagination to visualize the market impact of such a move.

Because of the sweeping nature of the proposed rule changes and their market implications, the future of SCA has become impressively optimistic for new ventures. It is estimated that by removing the time-use restriction currently in force, the potential subcarrier service-hours per day would add up to 19,500, or nearly 30% of the total main channel operating hours of *all* commercial FM stations per day. This figure could rise to as much as 60% with the addition of the second carrier. The SCA market just might become the next great frontier gold rush.

Obviously, for this to occur the limitation on the types of communications permitted would have to be broadened to new horizons, as is the case with the new rule proposals. Some new services which we may see being offered include those now normally found in the RCC operations: paging systems and mobile

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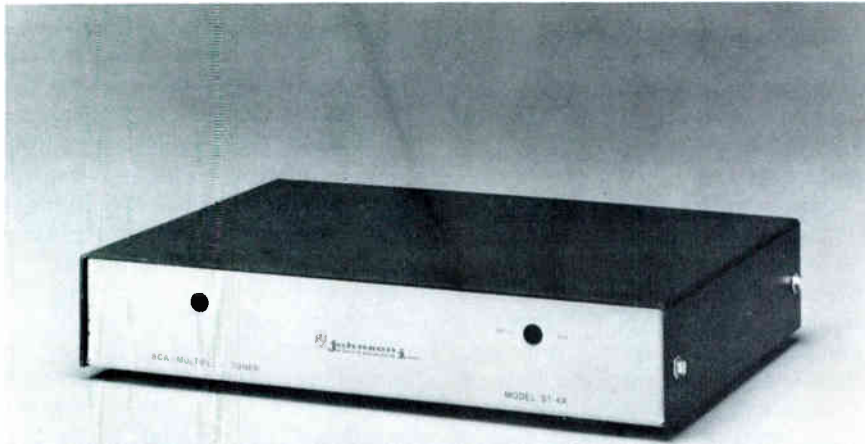
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Johnson's ST-4A SCA receiver.

communications, for example. Any communications network that would benefit from excellent local distribution would find widespread application for the SCA. Services such as newspaper deliveries, electronic mail, emergency vehicles and pub-

lic utility control could equally enjoy new avenues of exploration. The list goes on and on, limited only by one's imagination and, of course, the new rules.

Hopefully, with the increase in available SCA channels will come

relief for some specialized current operations whose low level of available revenue does not compare with the importance of their service. Perhaps now the new spectrum will allow room for further development of everyone's personal interests and for the common interest, as well.

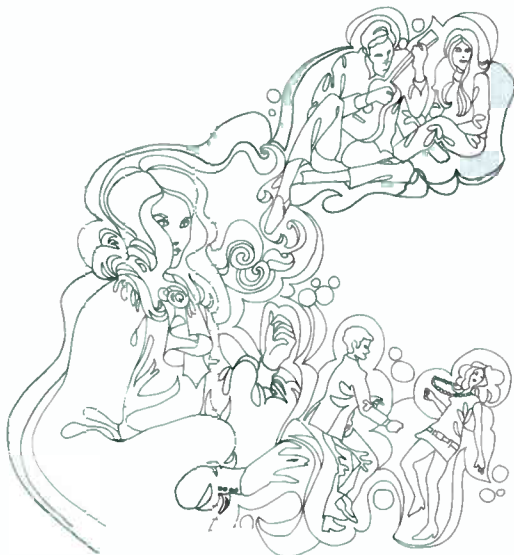
Broadcasters, too, hold their licenses as trustees of the public interest. The FCC, therefore, has a fiduciary interest in providing regulations which necessarily serve the best interests of the American listener. It is with this in mind that one applauds the actions of the Commissioners in their current aggressiveness towards the expansion and revitalization of the SCA. Here's to a bright and exciting new future!

*Mr. St. John is Vice President, Engineering, Johnson Electronics, Inc., Casselberry, Florida*

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The following are pertinent excerpts from the FCC's BC Docket No. 82-536, Notice of Proposed Rule Making in the matter of amendment of Parts 2 and 73 of the Commission's Rules concerning use of the Subsidiary Communications Authorizations:

#### Current Supply of FM SCAs

8. As of December 31, 1980, there were 3,573 FM stations potentially available for SCA use. However, 705 of these stations broadcast only monaural signals, making no use of multiplexing techniques. Another 1,926 stations broadcast in stereo, but were not using the available subchannel for SCA services. Thus, only 942 FM stations, or less than 27%, use their SCA capacity. This translates into a potential SCA availability at 2,631 stations throughout the United States. In an attempt to view the extent to which FM stations' SCA capabilities are used, we estimated the number of unused hours during which SCAs could be providing a service. We found that, for all FM stations, the amount of non-use comes to approximately 104,000 hours per day.

11. *Uses Currently Not Permitted*—As a general statement, wherever the use is to activate or control non-broadcast equipment, or to transmit point-to-point personal contact information, the service is not permitted to be provided via SCAs under the Commission's current rules. Over the years, the Commission has received requests for SCA uses which are prohibited by our rules. Examples of those uses include: paging services; distribution of inventory, price and delivery information by businesses; transmission of laboratory test results to doctors and clinics; electronic mail delivery; facsimile services to offices; page transmission to local printing plants; police communication to all substations; distribution of information from a newspaper's circulation department to distributing stations, and from distributing stations to carrier pick-up points; distribution from county governments to local public works garages and vehicles; bus dispatching for local and regional transportation; coordination of forest-fire fighting efforts over large

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#### New RM-150 (15 watts) and RM-350 (35 watts) FM/AM Receivers

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#### TP-50, TP-100, TP-200 FM/AM Tuners

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geographic areas; and municipal traffic light and sign control. Given the wide variety of possible uses from industry to industry and by different government organizations, the potential within these presently prohibited categories would seem to cover a very wide span.

### Proposals to Improve SCA Spectrum Use

12. Several findings are apparent from the above discussion. First, vast numbers of potential SCAs are unused and probably wasted. Second, many potential users of SCAs are currently barred by the Commission rules from employing what may be their most efficient means of providing service to the public. In light of these findings, the Commission deems it appropriate to revisit this area and consider possible changes in our rules. In addition to considering rule changes that would both increase the demand and supply of SCAs, this *Notice* includes proposals that would remove burdensome procedural requirements for broadcasters who use their SCAs. We believe that the proposals set forth below would allow the sub-

stantial unused SCA capacity to be put to uses that would serve the public interest.

13. *Non-Technical Rule Proposals*—We intend to explore elimination of two non-technical limitations contained in our rules. The first non-technical proposal would abolish the current requirement that SCAs be used only for transmitting material of a "broadcast nature." The second non-technical proposal would effectively increase the supply of SCAs by allowing their operation at times when the main channel is off the air.

14. The removal of the rules that limit SCAs to broadcast like uses offers a particularly promising means to more efficiently use both presently available SCA capacity and any additional resources that would be newly available from changes in operating hours or changes in technical rules as discussed below. As already noted, over 70 percent of the FM stations with SCA potential do not have SCAs at all. In terms of unused SCA service-hours, this means that about 84,500 such hours are

available to licensees but have not been used by them. It is worth noting that this unused and, therefore, currently lost SCA use amounts to substantially more hours than the total regular program hours of all commercial FM stations combined. In fact it is 126 percent of this total. A substantial portion of this unused SCA capability may be idle because licensees do not have sufficient incentive to use it under our current restrictions. The Commission's proposal to remove this rule impediment would abolish this possible source of waste.

19. *Technical Rule Proposals*—In addition to the non-technical proposals presented above, we are considering a number of technical rule changes which would expand the capacity for multiple SCA services and enhance the flexibility with which SCAs could be used. Permitting an increased number of SCA subcarriers would increase the number of uses that could be accommodated by existing FM stations. Thus, licensees may be in a position to reasonably accommodate the demand for new and/or existing SCA services.

20. Specifically we wish to explore changes in three technical areas:


(a) increasing the upper limit restricting the instantaneous sidebands of SCA subcarriers in the FM baseband from the present maximum of 75 kHz to a maximum of 99 kHz;

(b) increasing the maximum modulation deviation for FM broadcast stations; and

(c) removing the requirement that only frequency modulated SCA subcarriers be transmitted.


21. The Commission has an outstanding proposal to permit SCA subcarriers at 95 kHz, with instantaneous sidebands permissible to 99 kHz. Data submitted in response to this proposal indicate that satisfactory SCA operation may be expected at 95 kHz. The importance of this proposal lies in its potential to increase the number of SCA subcarriers a licensee may transmit. Stations now transmitting a 67 kHz SCA (at the maximum injection level of 10%) would be able to transmit a second (with 10% injection) at 95 kHz.

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36. Under the proposed rules, licensees could commence subcarrier operations immediately upon installation of type-accepted SCA transmitting equipment and any necessary type-approved SCA modulation monitoring equipment. Since we are proposing no other technical standards than those to provide suppression of intrachannel crosstalk and out-of-band emissions, the type acceptance application need only show that the equipment is capable of meeting those requirements. The present rules also require stations transmitting SCA subcarrier communications to install a modulation monitor for SCA operations. Any necessary adjustments in the monitor rules to accommodate the extended aural baseband subcarrier operation as proposed herein will be made in conformance with the outcome of the outstanding rule making in Docket 81-698 addressing the need to retain our modulation monitor type approval and use requirements.

**Estimate of Current Unused SCA Baseband**

These estimates of unused SCA capacity assume only the current technical rules, and do not incorporate any changes in these rules as proposed in the Notice. We further assume that a monaural FM has an SCA capability to handle three full services while a station broadcasting stereo can handle only one. These station estimates are based on the following data:

	Stations		Currently in Monaural
	Total	Currently in Stereo	
No. of FM stations available for SCA use .....	3,573	2,798	775
No. of FM stations using SCAs .....	<u>942</u>	<u>872</u>	<u>70</u>
No. of Unused SCAs .....	<u>2,631</u>	<u>1,926</u>	<u>705</u>
Average daily operating hours per FM station .....	20.2 hours		
Average daily non-operating hours per FM station .....	3.8 hours		

The total number of FM stations includes all commercial FM stations on the air as of 12/31/80 (3282) plus all public broadcasting FM stations of 3 kW or larger (291). This base period was chosen in order to obtain approximate period comparability with the sources used for estimating the number of operating SCAs.

(Continued)

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# BENJAMIN

Potential SCA service-hours available	Total	Stereo	Monaural
1. FM stations capable of SCA use . . . . .	3,573	2,798	775
2. Services per SCA . . . . .	—	1	3
3. Total potential SCA services (1x2) . . . . .	5,123	2,798	2,325
4. Service-hours per 24 hour day (3x24 hours) . . . . .	122,952	67,152	55,800
<b>SCA service-hours in use</b>			
5. FM stations using SCAs . . . . .	942		
6. Average operating hours per station . . . . .	20.2		
7. SCA service-hours in use (5x6) . . . . .	19,028		
8. Potential unused service-hours (4-7) . . . . .	103,924		

These potential unused service hours can be further separated into two non-technical categories: non-use due to the time limitation rule tied to main channel operation, and SCA services available but unused.

### Time limit rule portion

9. Total potential SCA services (3) . . . . .	5,123
10. Average daily non-operating hours per service . . . . .	3.8
11. Time limit rule portion (9x10) . . . . .	19,467
12. Available but unused portion (8-11) . . . . .	84,457

### Actual Commercial FM program service-hours

13. No. of commercial FM stations in operation . . . . .	3,282
14. Average daily operating hours per commercial FM station . . . . .	20.4
15. Total commercial FM station program hours (13x14) . . . . .	66,953
16. Ratio of available but unused SCA portion to commercial FM station program hours (12-15) . . . . .	126%
17. Ratio of SCA time limit rule portion to commercial FM station program hours (11-15) . . . . .	29%

### Summary of Current SCA Uses

Uses	SCAs	
	Number	Percentage
Subscription background music . . . . .	432	46
Radio reading service for the blind . . . . .	110	12
Facsimile, audible teletype or telemetry chirps	57	6
Talk, including instructional programs . . . . .	34	4
Physician's radio network . . . . .	28	3
Farm news . . . . .	23	2
Other SCA users not covered by the above . . . . .	258	27
Total SCA uses . . . . .	942	100%

# Profile: Background Music Man

**M**edicine's loss was background music's gain...because Lee Tate found chemistry a bore and switched his college major at USC to business management.

Lee Tate, president of Tape-Athon Corporation, Inglewood, CA, evolved into the background music business by being told to "take on this job" by bosses and associates.

It all began when Lee Tate was in high school and sought work after school and into the evenings, commencing as a "go-for" at a low power radio broadcasting station. Watching the operations of the station manager, the program manager, the time sales manager, he sopped up the radio business like a sponge.



Music programming appealed to him; he saw and heard reactions to all types of music. He found that music moved people, its efficacies reflected in positives: recognition, earnings, success.

His break in the radio business came in the late 1950s when Ed Jacobson, then owner of station KGLA, hired him as program director and announcer. This was his first showcase job "on the air," taxing his abilities to structure musical programs, create the pacing that kept listeners tuned in, and announce—with flair. He proved to himself and Jacobson that he was a most competent practitioner in the music and



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**HANDBOOK ON ESTIMATING** is the combined knowledge of four men who've accrued almost 100 years of experience in the sound system business, estimating jobs price-tagged from a few hundred dollars to over a hundred thousand dollars. You won't find a circuit diagram, nor a discussion of acoustics, time delays, or installation techniques—this is strictly a volume devoted to the plain arithmetics concerning time, materials, men, overhead, insurance and taxes, that are a vital part of the estimate that brings in the dollars, and **MAKES A PROFIT!** Each element of these items—and more—are given their proper treatment, and are shown in their relation to one another, broken down into pennies (an hour's time for a technician is broken into its 60-minute segments, and the price for that minute is scored and tallied with the rest of the estimate). Equipment suppliers are invited to seek quantity purchase price discounts.

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**INSTALLING & SERVICING ELECTRONIC PROTECTIVE SYSTEMS**, by Harvey Swearer, is wholly concerned with alarm systems for industry/commerce/retailers and homes. The author has included every method employed in alarm systems—electromechanical alarms, photoelectric alarms, ultrasonic detection systems, sensors and detectors, microwave systems, proximity systems and audio and visual alarms. Of particular interest for sound system people who are moving into this "circuit" is the chapter dealing with specialized systems — Holobeam Personnel Access, pulse alarm detection and sensing type vehicle alarms. Added features include the full Federal Crime Insurance Regulations from the Dept. of Housing & Urban Development, a glossary of terms; a list of manufacturers. Profusely illustrated.

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**COMMUNICATIONS STANDARD DICTIONARY** by Martin H. Weik, D.Sc. clearly defines terms used by designers, developers, manufacturers, vendors, users, managers, administrators, operators and maintainers of communication systems and components. All entries are arranged in alphabetical order and every significant word in a multiple-word entry is also featured in the main listing. There are illustrations, cross-references and easy-to-spot italicized terms.

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**SOUND SYSTEM ENGINEERING**, by Carolyn & Don Davis, is the masterwork of the professional/engineered sound system field. Starting with basic system configurations, individual chapters discuss Audio Environment, Interfacing the Electrical & Acoustic Systems, Equalizing the Sound System, and Instrumentation. This volume explains fully the steps in designing, testing, installing and maintaining a sound system, along with photos and graphs that enhance the text. Don Davis has included test questions (with the answers) about the mathematical science in acoustics, to hone your skills. Hard Cover .....\$22.00

**LEASING PRINCIPLES & METHODS** by Jack Leonard Green, 320 pages/hard cover, grew out of a series of articles that first ran in **SOUND & COMMUNICATIONS** on money management. The author expanded the six articles into a full explanation of leasing—its advantages over outright purchase—and fleshed out the work with 32 pages of documents and financial instruments, covering every financial exigency. Interconnect phone dealers and duplex intercom distributors will find this volume of exceptional use in crafting lease arrangements for telecommunications systems. ....\$49.95

**MODERN COMMUNICATIONS SWITCHING SYSTEMS/2nd Edition** by Marvin Hobbs is a step-by-step treatment of telecommunication switching techniques by the telco, into crossbar and microcomputer switching techniques for the customer-owned system. The elements of Stored-Program Control are detailed, as well as Time-Division Switching Systems. There is a complete presentation of PBX systems. This work will find a ready audience among the interconnect dealers whose installation and servicing crews are "crossing-over" daily with the telco.

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**VIDEO SECURITY SYSTEMS**, by Keith Bose, is a work of increasing importance now that security systems are becoming more sophisticated and an integral part of the communications system for industry, commerce, institution, school, and the leisure/housing markets. The technical aspects of the CCTV camera and its peripherals are presented in word and picture—from installation tips to maintenance practices. Two chapters are of especial interest: Cameras, Monitors and Video Recorders covers the range of tubes, signals, night viewing cameras. Signal Processing, Special Effects and Color deals with amplification, equalization; then special effects, screen splitting and character displays. Hard Cover .....\$16.95

**CONCEPTS IN ARCHITECTURAL ACOUSTICS** by M. David Egan is the "textbook" used by Bob Davis/Altec Lansing in his technical seminars on sound distribution systems. Mr. Egan created this work for the professional seeking answers to: How to Ensure Speech Privacy. How to Provide Effective Isolation. How to Choose the Best Room Surface/Shape. Packed with illustrations, tables and step-by-step computations for help in understanding the behavior of sound in the environment.

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announcing field.

In the 1960s, Lee Tate got caught up in an idea—how about syndicating the programs he was broadcasting, by taping them and selling them to other broadcast stations, who were not operating with a “disc jock”? The “service” caught on.

He joined with Alto Fonic Programming Company, Palo Alto, CA, an early entry in supplying background music services to central station operators. Tate spread his programming expertise to the FM station operator, selling them background music programs for their SCA channel. “It was at Alto Fonic,” Tate remembers, “that we developed an on-premise background music player licensed by Ampex. At the same time we developed the Prolog Broadcast Automation System, which was later sold to Continental Electronics.”

But, Alto Fonic was not geared to manufacture hardware, for the emphasis was on music. A search for a contract fabricator of background music machines led Tate to Tape-Athon, specializing in the design and production of hardware...and the music, later...for broadcast stations, with reel-to-reel recorders. “Even though we soon became competitors,” Tate said, “we worked together to meet the needs of the BGM and broadcast consumer.”

Tate was moving ever deeper into his studies of music programming, music recording techniques, and the “packaging” of music for locations with varying needs—ethnic, factory, shopping center, therapeutic. At the same time, he was looking at the “delivery system” when the Anthony Brothers called him in as a consultant. They had developed new equipment for the cable industry, and had a pressing need for software—music and other programming features: weather reports, stock reports, and the feature material that is common to Channel 6 in most of the hotels and motels around the United States.

He forsook Alto Fonic Programming to devote his full attention to cable programming and the background music business—especially to develop and produce a method of encoding and decoding his programs to prevent pirates and free-loaders from utilizing his product. In 1971, he had his device(s) and with

it created CaVox, a patented, stereo cable scrambling system, sold to local CATV operators throughout the United States.

Tate noted: “Because we were producing entertainment programs as well as background music for the CaVox project, I created a separate division at Tape-Athon in 1972 (CaVox Stereo Productions), syndicating music to radio stations (200) throughout the nation, in addition to the American Forces Radio and Television Service, Far East Broadcasting Company, etc.”

In 1976, George Anthony, chairman of the board of Tape-Athon, sold out to Lee Tate, who took over a running business—but one that wasn’t running up to its full potential. Lee inherited a small sales organization, headed by the late

Wally Rubin, with whom he made a “bargain.” Wally would take over the full range of sales and promotion and contracts with operators, while he revamped the interior organization—his programming, his thinking on product development, and upgraded the keeping of sales and inventory records. It was a handsome bargain: Tape-Athon began to rise like yeast in a hot oven. Wally Rubin lived a little past one year of the “bargain,” when he expired from a heart attack. Enter Blair Hunicut—a sales manager without any of the bad habits acquired from the industry: he was brand new to it. Hence, his new approach generated a faster rising sales curve.

Lee Tate looks upon the music business as a constantly evolving one, simply because of public taste,



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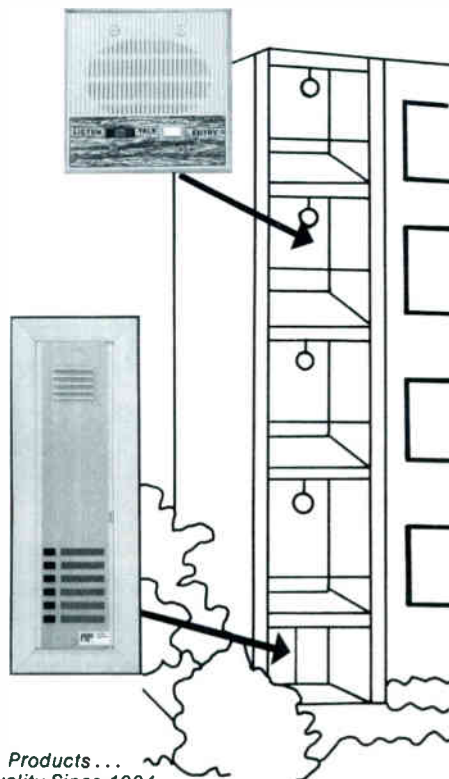
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in constant search for new music, new sonic effects, new arrangements, and because of new location demands, witness: foreground music for the boutique, new therapeutic music for an increasingly aging population. And then there are the economic pressures calling for new music presentations incorporating storecasting.

Tate has moved out into the user area—that is, visiting locations with the background music operator—listening, learning, surveying how his product is used and whether the musical programs are delivering the intended promise. He's discovered, to his dismay, that too many operators have not honed their selling techniques to match the sophistication of his product. He relates an incident that arose during his visit to a hosiery knitting plant in North Carolina. The operator had changed the program—standard tunes—several times, without achieving the rate of worker production he had said his music could deliver. And it was a mystery to the operator, as well as to his client, why the music had no impact.

Tate walked through the plant, listening to the music, and listening to the "mumbling" by the workers about the "constant annoyance—that other man's music." A quick ranging eye over the plant worker population flashed the answer: the majority of the workers were black; the music was "white." Tate went to his car, picked up a program of "ethnic" music, and suggested that the new tape be substituted for what was then being "publicast." The response was almost electric.

So Tate has been telling his sales organization, and his dealer customers, to be aware of music tastes, tastes that are dictated by marketplace ethos. Music programming has to be aware of who is listening, where and when. Demographic studies are most important to the selling of background music.

Foreground music, Tate declares, is nothing more than music that is meant to be listened to, as contrasted with background music that is meant to be an inducer of an ambiance...for a restaurant, a manufacturing plant, a professional office, etc. Today's listeners' tastes have been fashioned by what he/she has been listening to at home, on a reasonably good stereo system. He



insists that the background/foreground music market is witnessing today a fast rising sales curve...which will ascend even faster as we move into the middle and last quarter of the 1980s, because of the thrust of three fast-moving markets: (A) the leisure business—national and international—has hyped Tape-Athon's business a mere 15%, with the potential for doubling that figure each succeeding year through this decade. (B) chain stores, cruise ships and resorts have become a thriving market for background music, and understandably so. The chain store is using music in combination with storecasting, to their immense profit; cruise ships are playing to a population which can no longer drive and camp for little money. (C) senior citizen housing and hotel/motel accommodations are demanding newer music.

Additionally, Tate sees newer applications for background/foreground music: For instance, along with music-on-hold for telephone answering services, there is a message section which can fade out and fade in announcements...the applications are limitless.

What lies ahead for the background music industry, in Lee Tate's view, is not just new programming, but improved methods of delivery. Fiber optics will play a role in delivering the "product," because of their pure transmission. Laser techniques in recording will have an immeasurable impact. Satellite delivery of the "product" may preclude the return of tapes for replacement, saving time and money and possible damage to the tape. The widening use of the SCA channel by FM stations, in conjunction with a satellite, will be most appealing for its profit potential. Coding and decoding for satellite transmission is already worked out.

Tape-Athon is not doing the actual research and development on these newer transmission methods. Rather, they are working with partners. And to Lee Tate, this is being a reborn music programmer, working with newer materials, hardware and software.

For the young kid who evolved from a "go-for" in a radio broadcast station to the top dog in the background music business, it appears to have been a grand sing-along! □

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# CELLULAR RADIO

**T**hat spanking-new telecommunications service—Cellular Radio—has cleared another hurdle on its way to universal service in the United States.

The Justice Department dropped its action before the U.S. Court of Appeals for the District of Columbia, which had challenged the licensing plan by the Federal Communications Commission.

The FCC last year devised a licensing and governing plan to introduce cellular radio mobile telephones into the nation's 30 leading

cities.

The Justice Department took issue with that licensing procedure, stating that the new service gave an unfair head start to telcos, by giving one of two licenses for each of the 30 cities to the phone company already serving the city. In most cases, the license went to an AT&T or an affiliate. The other license was put up for competitive bidding.

A Justice Department spokesman observed that while the department believed the FCC's decision to be anti-competitive, "various factors

have convinced the department that, under present conditions, the likely success of the appeal was small."

The FCC licensing program for cellular radio service had suggested that both telephone and non-telephone company applicants negotiate partnerships to avoid lengthy licensing hearing. The telephone industry quickly negotiated such partnerships for the 30 cities, giving AT&T majority control in 23 cities, and the GTE Corporation control in the remaining seven.

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Historically, cellular radio has been intermittently on the front or back burners of the FCC for almost two years. The Commission told the Court that based upon the evidence elicited during rulemaking, there was a very substantial, urgent demand even for the poor quality service that existing mobile radio phone could provide, and that the present demand greatly exceeded capacity. Thus, said the FCC, its separate allocation policy would not only lead to faster availability of cellular service, but would facilitate a highly competitive market structure. The FCC was convinced that a split-spectrum ruling was the only way to ensure a competitive market, while providing a rapid response to the demand for increased land mobile radio services.

And, declared the FCC to the Court, this regulatory agency "is not strictly bound by anti-trust laws" in reaching public interest decisions. On the matter of considering "a multiplicity of factors" involved, Congress "has left that to the expert judgment of the agency."

The FCC produced evidence that showed a backlog of 25,000 cus-

tomers for AT&T's conventional mobile services. Complaints from would-be subscribers were that to procure other services created a waiting period of up to 15 years. The FCC suggested that Justice was "shortsighted to suggest the Commission could not adopt its preferred policy until it obtained additional evidence of serious congestion in most major markets."

In a separate action, the Federal Communications Commission has asked AT&T to provide details on its plans to transfer nearly 2000 radio licenses, which are affected by the company's proposed spinoff of its 22 operating companies, into seven regional companies, as dictated by the Consent Decree of 1982, under the aegis of U.S. District Court Judge Harold Greene.

Industry observers now look for an "exercise" that could impact significantly upon the outcome of the divestiture process. Legal lights point out that the 1934 law that created the FCC gives that agency review and veto power in matters affecting the establishment, transfer or termination of transmission facilities and licenses. And up until AT&T

was handed an FCC letter, calling for explanation of their transfer plans, all government activities vis-a-vis AT&T and its monopolistic operations were handled in the courts.

FCC Commissioner Henry M. Rivera commented: "We've been on the sidelines for a long time in this thing. The letter represents the first time that the Commission itself is exercising authority" in determining the outcome of the divestiture, by AT&T, of its 22 BOCs.

The FCC's primary goal in reviewing the license transfer plans is to determine whether any of the transactions will undermine emergency and defense communications systems.

Cellular radio service could become an achieved fact in a very short time, now that the courts and the government agencies—Justice and the FCC—have resolved their differences. The transmission techniques are in place. The transceiver is at hand—including domestic, and soon some Japanese, products to answer the pent-up demand for mobile radio telephone service, in 30 of the major cities of the nation.

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# CONTRACTORS CONFERENCE

"Contractors are not alone out there. That's one very important message we hope to deliver at the Contractors Conference in May," NSCA president Bud McKinney reports. "With technology racing at us from so many directions, we need a place to catch-up. We'll spend several days doing just that, with experts from many fields and high tech/new tech product display from many companies."

To be held May 3, 4 and 5 in the Las Vegas Convention Center—across from the Electronic Distribution Show, this Contractor's only Conference has three main attractions:

60+ hours of workshops—technical and management topics...all "how-to..." and all for contractors only.

23 hours of high tech/new tech displays in a conference-type atmosphere...all directed at contractors.

18 hours of promotion and advertising ideas and clever techniques for the installation and/or testing of systems...all for contractors only.

"We'll have many, many concurrent activities," says conference chairman Harold Lander, NSCA vice president. "Our program will start at 8:30 in the morning with a continental breakfast and continue non-stop until 10:00 at night on Tuesday and Wednesday. On Thursday we'll close that last seminar at 6:00 PM."

For those contractors who want to learn about the multi-faceted world of opportunities available, this conference and expo should provide the answers; security, engineered sound, life-safety, interconnect, paging and other disciplines including MATV, CCTV and satellite signals, all converge on the electronic systems contractor. No matter what the engineering, no matter how simple or complex the components, no matter how sophisticated the design...it has to be installed.

"Electronic systems contractors will be installing things next year

that barely had names a few years ago," says workshop chairman Emory Straus of White Instruments. "Their most difficult problem is staying current with new technology. This conference, and the hundreds of hours of work by the people designing the workshops, should help them get current. Future conferences will keep them that way."

"From a sales representative's point of view," said Chuck Rancilio (Rancilio Associates, St. Louis), "a well informed, well trained contractor provides better installations, with fewer problems. It's that simple. That's why my company and a network of reps from around the country are working hard to support this conference. The better the contractor, the more we sell with fewer problems."

Air travel discounts are available to those attending the conference. By calling the toll-free number 800-433-1790 at American Airlines and telling the agent your code number is S-5689, you'll receive the best fare available or a minimum discount of 25% for the round trip. If American does not have service between your city and Las Vegas, you'll be booked on the appropriate air line with the best fare available.

Hotel room discounts are available at key hotels near the Convention Center. Rooming forms are sent when registrations are received at the NSCA office.

Free registration for two people from contractor members or any sponsor company is a benefit of belonging to the association. Non-members pay one hundred dollars per company registration fee for the first two people registered. The third person and more will pay \$15.00 each until April 1st and \$20.00 on site.

For more information about the Contractors only Conference and Expo, contact National Sound and Communications Association; 5105 Tollview Drive—#201 Rolling Meadows, IL 60008 (312) 577-8350.



# UPCOMING

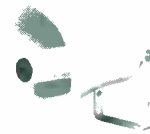
- March 2-3: American Loudspeaker Manufacturers Association, Spring Meeting**, Hyatt Regency O'Hare, Rosemont, Ill. (ALMA, 3413 N. Kennicott, Arlington Hts., Ill. 60004. 312 577-7200)
- March 14-17: Electronic Industries Association, Spring Conference**, Shoreham Hotel, Washington, D.C. (EIA, 2001 Eye St., N.W., Washington, D.C. 20006. 202 457-4900)
- April 19-21: Mini/Micro-Northeast**, New York Coliseum, NYC. (Electronic Conventions, Inc., 8110 Airport Blvd., Los Angeles, Cal. 90045. 213 772-2965)
- April 19-21: Electronics/ECIF Show**, Barbican Centre, London. (Electronics Components Industry Federation, 34-36 High St., Saffron Walden, Essex CB10 1EP England. 0799 22612)
- May 3-5: Electronic Distribution Show & Conference**, Las Vegas Hilton, Las Vegas, Nev. (Electronic Industry Show Corp., 222 S. Riverside Plaza, Chicago, Ill. 60606. 1 312 648-1140) **Contractors Conference Expo**, in tandem with EDS '83. (National Sound and Communications Assoc., 5105 Tollview Dr. #201, Rolling Meadows, Ill. 60008. 312 577-8350)
- May 10-12: Northcon/83 High-Technology Electronics Exhibition and Covention**, Portland Coliseum, Portland, Ore. (Electronic Conventions, Inc. Address above)
- May 31-June 2: EIA Telecommunications Group Seminar, Trends and Directions**, Dunfey's Hyannis Hotel, Hyannis, Mass. (EIA. Address above)
- June 2-5: Society of Telecommunications Consultants Spring Meeting**, Industry Hills Conference Center, City of Industry, Cal. (Society of Telecommunications Consultant, One Rockefeller Plaza, New York, N.Y. 10020. 212 582-3909)
- June 14-16: Ohmcon/83 High-Technology Electronics Exhibition and Convention**, Cobo Hall, Detroit. (Electronic Conventions, Inc. Address above)
- August 21-24: International Background Music Association Convention**, Hyatt Hotel, Lake Tahoe, Nev. (IBMA, 4949 W. Belmont, Chicago, Ill. 60641. 312 685-7850)
- August 23-24: Indycon '83 Microcomputer/Electronic Components Show**, Indiana Convention Center, Indianapolis, (Indycon '83, 8326 Trace Circle, Indianapolis, Ind. 46260. 317 875-7711)
- September 13-15: Midcon/83 High-Technology Electronics Exhibition and Convention**, O'Hare Exposition Center and Hyatt Regency O'Hare, Rosemont, Ill. (Electronic Conventions, Inc. Address above)
- September 26-28: Maecon/83 High-Technology Electronics Exhibition and Convention**, Kansas City Convention Center, Mo. (Electronics Conventions, Inc. Address above)
- November 8-11: Wescon/83**, Moscone Center, San Francisco. (Electronics Conventions, Inc. Address above)

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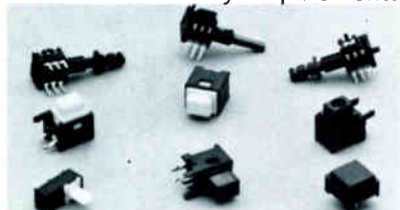


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□ For more information write 365 on the inquiry card. Or write: Switchcraft Inc., 5555 N. Elston Ave., Chicago, Ill. 60630.

## PROTECTION SYSTEM

Model PS-1 is a power line conditioning unit designed primarily for sound reinforcement systems,



although its combination of features makes it useful in laboratory, instrumentation and industrial environments. The transient suppressor provides protection from high voltage spikes on the power line from such sources as lightning strikes to nearby utility poles and inductive (i.e., motors & transformers) switching. The radio frequency interference (RFI) filter reduces noise from radio transmitters such as CB and from light dimmers, invariably found in night clubs, which are usually the cause of the ever-present sound system "buzz." Three neon lamps indicate relative phasing of the line, neutral and ground connec-

tions, thereby detecting improper wiring and/or grounding of the outlet in use. The latching relay prevents re-application of AC power to loads until the power on switch is manually depressed. This feature allows the user to properly sequence power-up and thereby avoid amp/speaker damage or destruction. Additional features include a built-in circuit breaker, EIA standard 19" rack mounting, six grounded outlets and an 8-foot power cord.

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## DMM

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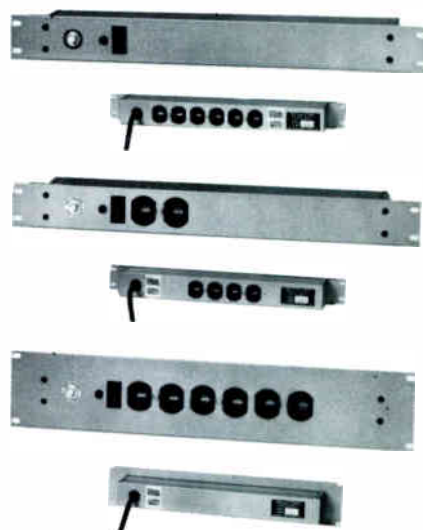


There are three autoranged resistance ranges with 0.5% accuracy; audible continuity testing; and a diode check range that displays the forward voltage drop and audibly signals a properly conducting diode. The package includes full overload protection, shock and water resistance. It is dustproof and comes with a separately accessible battery compartment, to maintain sealing integrity.

□ For more information write 367 on the inquiry card. Or write: Weston Instruments, 614 Frelinghuysen Ave., Newark, N.J. 07114.

## OUTLET STRIPS

A series of multiple outlet strips, called Sockets Plus, offers units mountable in standard 19-inch cabinet racks. A choice is offered with the 6 outlets all on the front plate, all on the back, or divided 2 front, 4 back. Front panels are 1⅞" or 3½" high. All are protected against overloads by a built-in 15-amp circuit breaker, located on the front plate



for easy reset. An on/off switch and indicator light are also located in the front plate. The units feature U-ground outlets with electrically-wired ground; phosphor bronze, dual-wiping contacts; either 6 or 12-ft. double-insulated #14/3 "SJT" line cord on back of the unit; heavy-duty 22-gauge metal construction; and baked-on silver hammertone paint over zinc phosphate undercoating, resulting in a hard, corrosion resistant surface. All components are U.L. listed, and exceed NEC requirements. The strips are rated at 1875 watts, 125V, 15 amps. The strips are also available in conventional 4, 6 and 8-outlet sizes; 2, 4, and 6-ft. industrial strips; and in residential and commercial model groups. They provide a safe and convenient way to control power when and where it is needed.

□ For more information write 368 on the inquiry card. Or write: Perma Power Electronics, Inc., 5615 W. Howard Ave., Chicago, Ill. 60648.



## POWER MEGAPHONES

A series of compact, dependable power megaphones for tour guides, public speakers, construction supervisors and others who must project important messages clearly over large distances, indoors or outdoors,



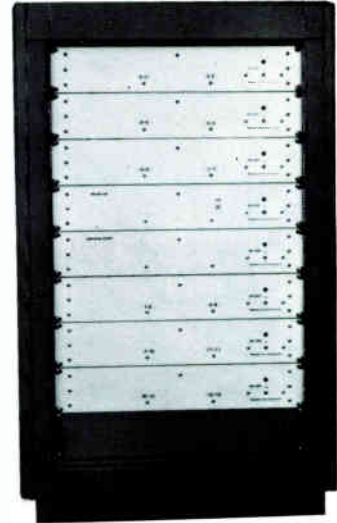
offers a choice of 5, 12 or 16 watts of power. The hand-held public address systems feature solid-state amplifier circuitry, efficient horns and balanced design for prolonged use without fatigue. Both the 12 and 16-watt megaphones also have a built-in, attention-getting electronic siren. All three impact- and crack-proof megaphones incorporate high-intelligibility and dynamic microphones. Each microphone trigger and volume control is located conveniently for instant, one-hand operation. Other conveniences include use of standard batteries for power and shoulder straps for times of extended use. The PM-16S megaphone, the most powerful in the series, provides 16 watts to project sound 850 yards. The hand-held microphone, with 4' coiled cord and volume control, features built-in noise canceling. Two small legs provide stability that allows placing the megaphone on a surface, or it can hang from its attached shoulder strap. This megaphone has a high-power emergency siren and is finished in a two-tone design of tan and cream. The PM-12S is a 12-watt megaphone in blue and white, with built-in electronic siren. Its clear audio power can be heard up to 720 yards away. The red PM-5 offers 5 watts that project sound for approximately 250 yards.

□ For more information write 369 on the inquiry card. Or write: Bogen, P.O. Box 500, Paramus, N.J. 07652.

## SIGNAL PROCESSING

The SR-500 multichannel signal processing system selects any desired services from a standard cable drop and reprocesses them into a combined 12-channel output. Offering low cost-per-channel in a prepackaged system, the system is suitable for hotels, motels, hospitals, schools and similar applications. Its "cherry-picking" capability provides optimal service to systems limited to 12 channels and eliminates the potential for equipment theft, since no converters or descramblers are required in individual rooms. Commercial quality descramblers, using crystal control for increased frequency stability, are available for use with the SR-500, to provide descrambled pictures to any desired output channel. Reliable performance, efficiency in power consumption and economy are ensured by the system's broadband AGC preamplifier and single high-level output amplifier. The heterodyne processors incorporate SAW I.F. filtering and accept any standard CATV channel. The system input level from the cable drop may be between  $\pm 0$  and  $+ 20$  dBmV. Maximum output level is  $+ 45$  dBmV per channel at the single output port,

and individual channel gain trim is  $\pm 5$  dB minimum. The system is supplied completely wired and packaged in an open-frame equipment rack. Each component is  $3\frac{1}{2}$ " high and, because two signal processors occupy a single rack chassis, the total system uses less than 30" of vertical rack space. It is also available in a louvered cabinet with front and rear doors.



□ For more information write 370 on the inquiry card. Or write: Catel/Tomco Communications, Inc., 4800 Patrick Henry Dr., Santa Clara, Cal. 95054.

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A desk version of the Entraguard remote entry panel is now available for office buildings and residences. The handsome instrument allows the concierge or guard to utilize 3-digit dialing to reach each of the occupants of the building, using the Entraguard system installed in the building. In the temporary absence of the concierge or guard, the door beyond the lobby can be locked, and the visitor can use the desk unit to dial the tenant's code and communicate with the tenant, who may then allow entry by using his normal



telephone to release the locked door. Designated the REP-561 Desk, the instrument connects to a 5"x9"x1" chassis box which is mounted out of

view, and from which connection is made to the main unit. The Entraguard 5610 series also has units for hands-free applications and remote keyboards utilizing the Entrakey feature for opening garage gates or gaining access to recreation rooms or other areas not available to the public.

□ For more information write 371 on the inquiry card. Or write: Marlee Electronics Corp., 3965 Landmark St., Culver City, Cal. 90230.

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The RT-156, is a hand-held radio small and light enough to fit in a breast pocket. It delivers a two-watt VHF output and contains temperature-sensed Ni-Cad batteries which can be recharged in as little as ninety minutes with an optional high rate, drop in charger. The unit features remote push-to-talk capability with a remote speaker and microphone jack. Options include a speaker/microphone, headset, and a Voice Operated Transmit (VOX) attachment. The optional leather holster protects the radio from inclement weather with an adjustable translucent shield. The two-channel, 144-174 MHz hand-held transceiver comes ready to work with one set of crystals installed, a flexible antenna, rechargeable Ni-Cad batteries and the wall charger.



□ For more information write 372 on the inquiry card. Or write: Ritron, Inc., 148 W. Carmel Dr., Carmel, IN 46032.

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□ For more information write 373 on the inquiry card. Or write: David Clark Co., Inc., 370 Franklin St., Worcester, Mass. 01604.

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# ALARM SYSTEM COMPONENTS

by John Sanger

**A**larm systems are not complex—at least, in theory. However, the application and installation of equipment can be difficult. Actually, for those who install sound and communication or telephone interconnect systems, the physical installation should not be a major problem. Becoming familiar with alarm system components and

features, and learning a few basic application techniques, will further simplify the installation process.

## Basic Components

All alarm systems, whether burglary, hold-up, fire or medical, consist of three basic components: detector, processor and annunciator. These components may be individ-

ual units or two or more may be combined in a single package.

The detector, or detection device, does just what its name implies: it detects something. For example, you can detect a door being opened with a magnetic contact switch. As the door opens, the magnet moves away from the switch, causing the

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switch contacts to open (or close, depending on the type of contact used). Likewise, a smoke detector or heat detector reacts to certain stimuli and either opens or closes a switch. Most detection devices rely on a switch of some type; a few provide a voltage output when they have detected something.

The second basic component is the processor—commonly known as a control panel. It accepts a signal from a detector and processes it. That is, if the panel is armed (on), it will interpret the signal as valid and go into an alarm condition; if the panel is disarmed (off), the signal will be ignored.

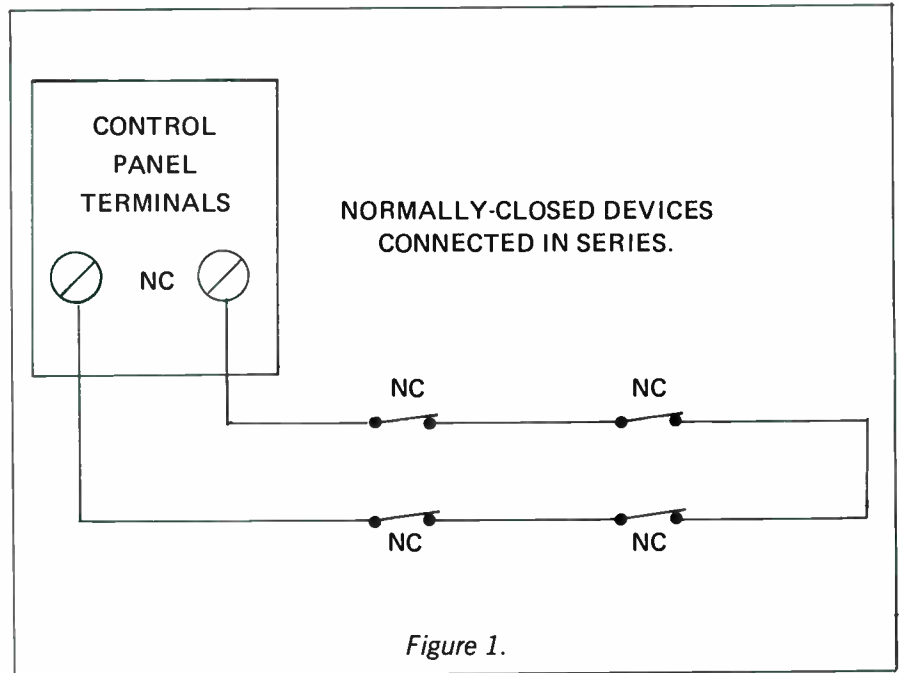
Assuming that the detector's signal is valid and is processed through the control panel, the final basic component, the annunciator, is activated. The annunciator, too, does what its name implies: it announces the alarm. It can be audible, visible or both. It can be a bell, siren, horn or strobe light. It can be a pre-recorded voice or digitally coded message transmitted via regular telephone lines or a signal sent directly to a central station, police or fire department.

There is a variety of equipment available. Before we discuss the various types of detectors, control panels and annunciation devices, let's take a brief look at the types of circuits used to connect the detection devices to the panels.

### Protective Circuits/Loops

Most burglar alarm circuits employ normally-closed (usually abbreviated NC) devices, connected in series. Breaking the circuit will cause the panel to go into an alarm condition. Normally-closed loops have the added advantage that if the wire is cut at any point, it will cause an alarm. Figure 1 shows a typical normally-closed circuit.

Most fire alarms and some burglar alarms use normally-open (NO) devices, connected in parallel. Shorting or closing the circuit will cause an alarm. The primary disadvantage to this type of loop is that if the loop is broken or cut, all devices



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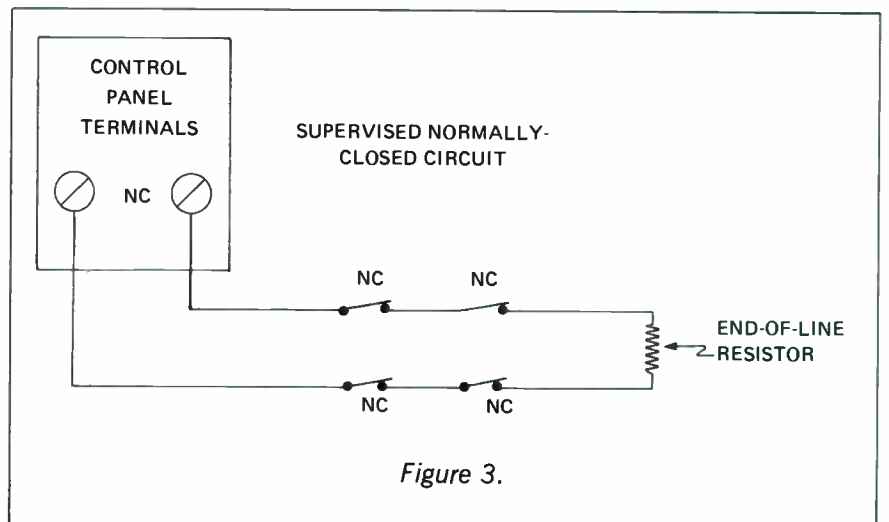
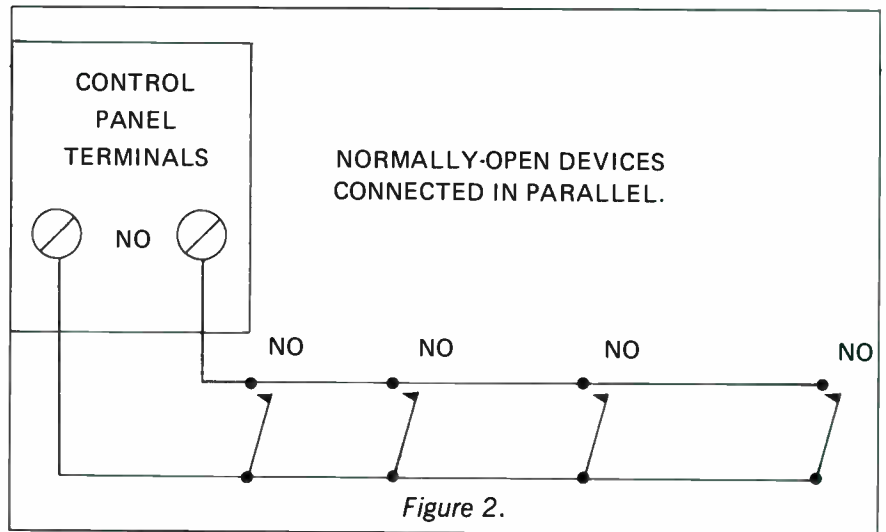
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beyond the break will be inoperative. A normally-open loop is shown in Figure 2.

To make the circuit more secure, some panels require the use of end-of-line resistors—which makes a supervised loop. In effect, the control panel is measuring the resistance of the entire loop. As long as the resistance is within certain tolerances, there is no alarm. However, cutting or shorting the loop will cause an alarm condition. Both normally-open and normally-closed circuits may be supervised, depending on the panel's specifications. Figure 3 shows a supervised closed circuit loop.

#### Detection Devices

The most common detection device in a burglar alarm system is a magnetic contact switch. They are available in a variety of sizes, shapes and colors—as well as normally-open, normally-closed and single-

pole-double-throw (SPDT) configurations. They may be classified, generally, according to the type of switch: reed or mechanical. Reed switches are glass enclosed and are suitable for corrosive or exposed environments; also, they are more fragile than mechanical switches. Most of the modern switches, of either type, are very good if installed properly.

Recessed switches are popular, especially in residential installations. They enhance the appearance of the installation, because they are completely hidden. Moreover, they are less susceptible to tampering, because they are not easily accessible.

Long drill bits facilitate drilling up through the door frame and header plate into the attic. While bits in lengths of up to 72 inches are available, a 1/4 or 3/8 x 30-inch bit is usually sufficient.

Installation of magnetic contact

switches on the surface of metal doors may require the use of a wide-gap magnet and switch. These types of switches are readily available and install in the same manner as regular magnetic contact switches.



Some magnetic contact switches, like this surface mount model, have wire leads already attached to simplify installation.  
Photo courtesy of Sentrol, Inc.

Glass breakage can be detected in several ways. First, foil tape is one of the best protective devices available. There is nothing mechanical that can fail; either it is in one piece, and the circuit is intact, or it is not.

Initially, applying foil tape to windows can be a frustrating experience. There is no substitute for patience and practice.

Foil tape is inexpensive, when compared to other types of glass protection devices, and provides an extra measure of protection in the form of *prevention*. Since the tape is visible on the glass, it could act as a deterrent to someone considering breaking the glass to gain entry.

Other glass breakage detectors, that are attached to the glass, are available. Some respond to the frequency of breaking glass, others to vibration. Care should be exercised if vibration detectors are used on glass. Thunder, high winds or other vibration causing phenomena may cause false alarms.

Audio discriminators, or sound detection devices, also can be used to detect breaking glass. They are usually placed near the windows and will trigger an alarm when certain types, frequencies and volumes of sounds are received.

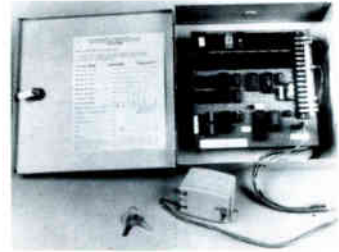
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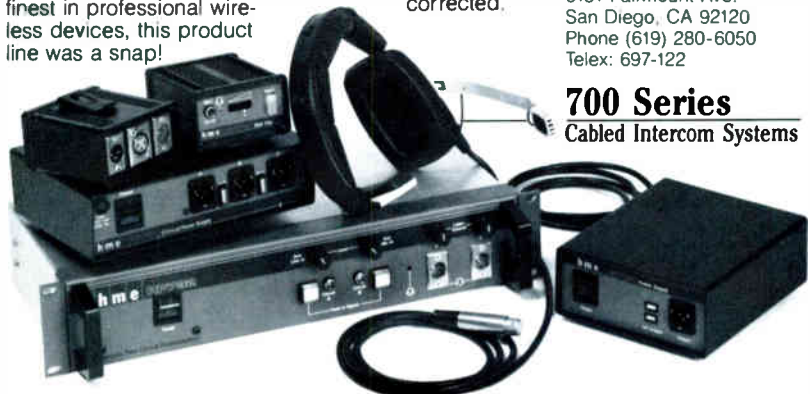
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motion detectors and passive infrared devices give the system designer or installer a variety of protection options.



*A remote keypad controls the alarm system. Entering the correct code will arm or disarm the system. Photo courtesy of Nel-Tech Development, Inc.*

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While photoelectric beams are not truly protecting space, because their area of coverage is so confined, they are very versatile. Hallways, aisles and unobstructed walls can be protected by the beam—with some units having a range of 1,000 feet. The older photoelectric units, similar to those that open supermarket doors for customers, were relatively simple to defeat. The newer units, however, utilize a pulsed infrared light. Even if the intruder possessed an infrared light source, it would have to be pulse modulated in exactly the same way as the photoelectric device—which is highly unlikely.

Both ultrasonic and microwave motion detectors respond to moving objects, yet each is slightly different. Ultrasonic units usually have a range of 25 to 30 feet and will not penetrate any solid material. They may be falsely triggered by strong air currents from a ventilating system or certain high frequency noises.

Microwave devices have larger protection patterns and may protect an area up to 150 feet long and 50 feet wide. The microwave energy will penetrate, to some degree, all non-

metallic objects. Care must be exercised so that the energy does not penetrate a wall or window and detect movement *outside* the area to be protected. While not as susceptible to air currents and high frequency sounds, fluorescent lights that are nearby may affect their operation.

It may seem as if passive infrared detectors are detecting movement. Actually, they are responding to thermal change—that is, body heat. Passive infrared (PIR) devices “look” at several sections of a room and use the temperature of these sections as reference points. Any change in temperature that is above or below a preset level will trigger an alarm. PIRs are available in a wide variety of protection patterns and ranges—some with long, narrow zones, others with shorter, wider zones.

Many other types of detection devices are available for general and specialized applications. The ones included here are those that are the most common.

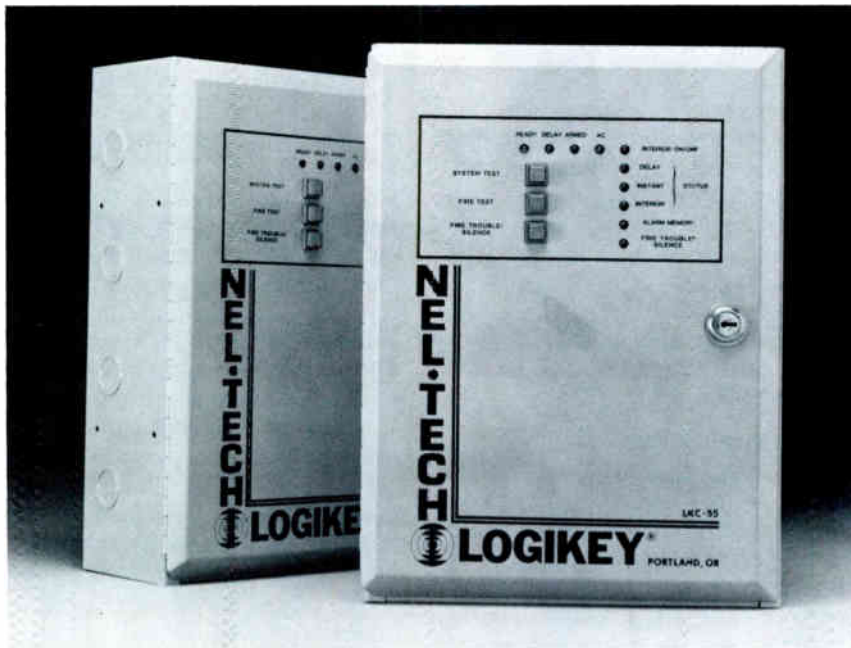
#### Control Panels

Control panels are available with a myriad of features and functions. The following list offers some for consideration:

- adjustable entry and exit delay circuits
- delay/instant selector
- automatic alarm cut-off, re-arm and reset
- zone identification
- power requirements
- standby power supply
- auxiliary power output
- voltage output and/or dry contact closure on alarm
- low battery reporting
- entry warning reminder
- remote control capability
- accepts NC and NO devices
- separate fire alarm circuit (input)
- separate fire alarm output
- 24-hour panic alarm circuit
- fail-safe arming

Prices for control panels range from less than \$50 to several hundred dollars, depending on the features included in the panel.

Each system designed will have different requirements; control panels should be selected that meet those requirements. There is a hazard in using too many types of controls, though, because the installer may not have the opportu-



As can be seen from the indicators on the face of this panel, a variety of functions are performed by modern control panels.  
Photo courtesy of Nel-Tech Development, Inc.

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nity to become thoroughly familiar with their installation requirements. Selecting three or four that will satisfy ninety percent of your usual jobs will provide you with a good selection and allow the installer to gain hook-up experience. Those systems requiring special features will necessitate using control panels other than your basic group.

#### **Annunciation Devices**

Once the detector has sent a signal to the control panel, and panel has identified it as a valid signal, some type of annunciation is necessary. The primary purpose of an alarm system is to make noise—to notify someone of a problem.

Some municipalities have noise abatement ordinances that restrict the use of certain types of noise-making devices. If sirens are prohibited, bells may have to be used. Moreover, some ordinances limit the time that an alarm can sound—so a cut-off device, built into the control,

or an add-on device, may be necessary.

In addition to making noise, other signalling devices may be needed. A strobe light provides visual annunciation, and helps pinpoint the location of the alarm. Strobes are especially useful in high density areas when the audible alarm may be echoed by other structures.

Notifying the local authorities of the alarm can be accomplished in several ways. Direct lines from the customer's premises to your office, or to the local police department, is one method, though some departments do not accept direct connection. Also, direct (leased) lines must be provided by the telephone company and can be expensive.

Sending an alarm over the customer's regular telephone line is another alternative. Automatic telephone dialers, tape and digital, can be used. The tape dialer will dial pre-recorded telephone numbers

and play a prerecorded message. The primary disadvantage to a tape dialer is that it cannot tell if the receiving party's line is busy or if it is not answered. It will go through its dialing and message playing sequence whether or not anyone on the receiving end answers the call.

Digital dialers add reliability to the message transmission. Once triggered, they seize the phone line and send a coded message to a remote receiver. Before the digital dialer, often called a communicator, will send its message, the receiver must acknowledge that it is present and ready to accept the message. After the message has been sent, the receiver acknowledges that it has received the message and the digital communicator is sent a signal to shut down until another alarm condition exists.

Several remote monitoring stations offer their services to alarm dealers. Their entire operation is geared to monitoring digital communicators for alarm companies—or other companies that install alarm systems. Their rates are reasonable and their services are varied. The chief advantage of using a remote monitoring station is that it allows the alarm installing company to compete with large central station alarm companies without a significant investment in equipment and personnel. And by providing monitoring services for customers, the installation company generates a regular monthly income from its monitored customers.

#### **Outlook**

Audio, telephone interconnect and related installation companies already have the necessary technical expertise to enter the alarm market. Familiarity with alarm equipment and a few unique installation procedures are all that is needed.

The practical side of alarm system installation—that is, what happens on the job site—must be learned. And, most of that learning comes from on-the-job experience. The technical ability already possessed, combined with the basics of alarm system operation and installation, will pave the way for a smoother and more profitable installation. □

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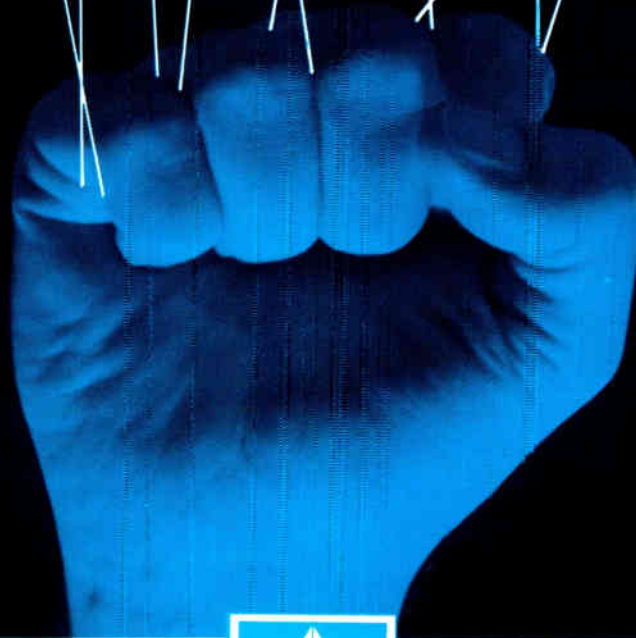
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**R**apidly advancing technology and regulatory freedom have both contributed to the rapid increase in the importance of data communications. New long-haul terrestrial and satellite carriers, improved modems and line control systems, and increasing traffic volume have all provided more and more opportunities for datacomm to be applied to solve problems. Indeed, far more is published today about data communications than about voice telephone, and a far greater percentage of datacomm expenditures are spent on management than is the case for voice telephony.

But one aspect of datacom has been frequently overlooked by many users. The simple link between users' computer terminals and the nearest computer or other communications node is often ignored,

or allowed to go uncontrolled until problems become serious enough to warrant senior management attention. So much has been done to improve the intercomputer and long-haul segments of datacomm that the simple short-haul portion has been left behind.

Telephone systems, in contrast, generally have carefully planned and documented cable distribution. Cable terminations are usually neat and well marked. Telephone companies can generally find in their records the actual pair assignments for any given line or extension all the way from the central office to the set itself. Pair requirements are well planned in advance, and uniform standards are applied. Today's newer computerized PBXs use fewer multi-line sets than older installations generally needed, and new "skinny-wire" key systems have further sim-

plified telephone wiring. Data systems often would do well to emulate telephone practices.

The problem is one that grows with the size of an installation. A small company with a few terminals and one computer can usually connect everything together with a few short runs of cable. But as a company grows, the distances between terminals increase, and a given terminal may need access to more than one computer system.

The telephone industry went through similar growing pains in the 19th century, when switchboards were introduced to allow flexible interconnection of local telephones, and long distance links were later added. In local datacomm distribution, though, the long haul is often developed well before the local portion is designed.



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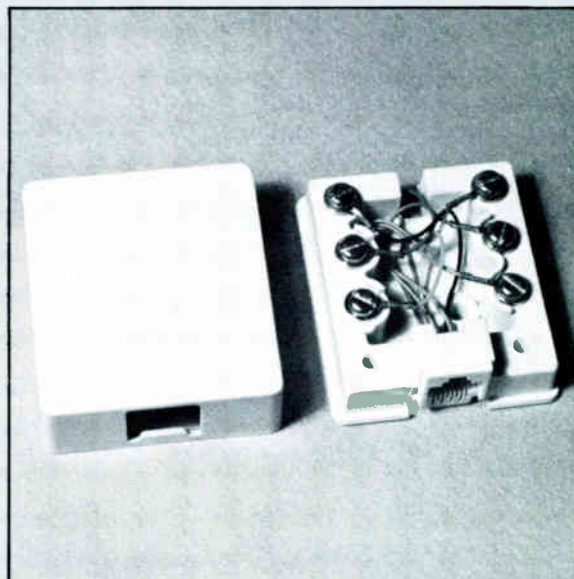
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### Transmission Techniques Differ for Various Types of System

On a long-distance common carrier line, datacomm is generally handled by modems costing as much as several thousand dollars each. A coast-to-coast private line can cost roughly \$18,000 per year to rent, so it makes sense to pay half that amount for modems capable of reliably getting 9600 bits per second across that line. But to connect a few hundred local computer terminals to a computer within 300 yards of them all, modems are hardly economical.

At the hardware level, a number of approaches can be used to cover short distances reliably. The most common include the EIA standard RS-232, the 20-milliamp current loop, and the use of modems over telephones lines. Other approaches are still less common.

The RS-232 standard adopted some years ago by the Electronic Industries Association is the starting point for many datacomm systems. While rather detailed, it centers around a 25-pin connector (type DB-25), and uses three leads for most transmission purposes: receive, transmit, and common. The data is carried in a bipolar voltage mode, that is, a positive or negative voltage on the appropriate lead represents a binary 1 or 0. The absence of voltage is an error condition. Almost all modems use the RS-232 standard to interface to computers or terminals, and many make use of the various defined functions such as "clear to send" and "data set ready."

While fine for very short-haul use, RS-232's electrical properties prevent its use at high speeds over more than a few hundred feet. It cannot be carried for significant distances over conventional telephone cable, and good RS-232 compatible cable is relatively expensive. A newer standard, RS-423, is similar to RS-232 but with a longer range. Equipment may be made compatible for both, but the older standard is still more common.

The 20-milliamp current loop protocol was the outgrowth of the original teleprinters made by Teletype Corp. that were the workhorse computer terminals of the 1960s. They were electromechanical, and the selector magnets that decoded the signal ran off of a 20-mA loop.

Hence many computers were provided with 20-mA loop interfaces, and later terminals were able to emulate their mechanical predecessors, even though they had no moving parts. A 20-mA current loop terminal uses two wire pairs, "keyboard" and "printer." Range is far greater than with RS-232; a 9600-bps terminal can operate at full speed through a few thousand conductor-feet of telephone cable with a current loop interface. The major disadvantage of current loop, other than its inability to interface directly to most modems, is the lack of special functions sometimes needed for multiplexed lines or high-speed printers. The computer is not aware if the terminal is ready or not to receive transmissions.

Circuitry to convert between the RS-232 and current loop protocols is not expensive, and where possible, 20-mA converters can be used to extend the range over which a computer can be connected to a terminal. Standard telephone wiring practices can also be used, so long as the keyboard and printer lines are not confused (no one uniform standard exists, so each installation must adopt one).

The ubiquity of telephone lines makes data communication via

modems a viable option in many places where average terminal connection time is low, or where speed is not important. The cost of modems increases with speed, but where dedicated telephone pairs are available, "short-haul" modems can carry high speeds at low cost. This makes dedicated data wiring unnecessary and is most useful for low-density installations such as campuses. Dial-up modems, while generally good only at low speeds (up to 1200 bits per second), have the advantage that a large number of low-use terminals can contend for access to a relatively small number of computer terminal ports. Where dedicated lines are used, each generally needs its own port.

Where telephone wires are available but dedicated pairs for data use are not, data can be directly carried over the same wire pairs used for voice. This is done with hardware that transmits data in the supersonic frequency range with simple modems. Some telephone company-owned systems may not permit this, but the approach is harmless to interconnect PBXs. The problem is cost; in most cases, additional wire pairs are cheaper.

New PBX systems often have

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some digital transmission ability. While most manufacturers are still more content to talk about than to deliver combined voice-data systems, a few have come out. The Northern Telecom SL-1 allows data to be multiplexed over its proprietary SL-1 telephone set. Rolm's CBX products have a data transmission option that permits computers and terminals to be directly connected, via a Data Terminal Interface unit, to its digital switching matrix. Datapoint's new ISX is also designed to be a voice/data PBX. IBM's European PBX, the 3750, also has data switching ability, as do several other systems. But again, most of these can be relatively costly compared to dedicated data transmission systems.

Coaxial cable installed for cable TV use can carry data over spare bandwidth, and some cable TV companies are selling two-way data transmission bandwidth on a common carrier basis. Internal cable can be used similarly, and this may become more practical for many companies as coaxial distribution systems become more common and the necessary modems become cheaper. The same applies to fiber optics, whose bandwidth is even greater than that of coaxial cable.

In places where any data wire would be an obstruction, a new technique allows simple wireless terminal connections via infra-red light. A terminal need only be within the same room, in line-of-sight or reflected-light range of an I.R. interface unit, and light waves will carry the data.

#### Switching Techniques Are Often Inefficient or Ineffective

The low-cost terminal to computer switching that many systems need is far less common than it should be. The most common approaches are primitive: a given user may have more than one dedicated access line to his terminal, with a separate one for each computer, or a manual patch box (cord switchboard) is used.

If data lines are inexpensive, such as telephone lines and 20-mA loop drivers, multiple lines to each terminal site are not really as inefficient as they may sound; telephone distribution cable currently costs less than 2¢ per pair-foot. The major cost is in providing ports on the computers to interface to each

potential user, since no contention for ports is possible. Patch boards solve the contention problem but require operator intervention, which telephone users generally haven't needed for about 50 years. RS-232 patch boards require special multi-conductor plugs, and any sort of patch board can become a "rat's nest" as it grows.

Several types of automatic switching are available today. A "data PBX" approach is much cheaper, per line, than a voice PBX, because the transmission requirements are relatively simple and few complex features are needed. Some allow the terminal to type an identifier for the computer desired, and the connection is then established if a port is available. Some even allow a modem to be put "in front of" the switch, and users can address the modem via the switching unit and type the phone number they wish to then be connected to. An electronic dialer will complete the call.

Packet-switched data systems can perform a similar function. If all desired computers are part of a packet network, a single port on a

packet node can be used to address any system, either local or remote. The flexibility of commercially available packet communications systems is still increasing rapidly, and the cost will likely fall as the technique becomes more common.

When adequate switching is available, it becomes possible to design a datacomm network that resembles a voice system in most physical respects: a central frame area, likely in or near the computer center, satellite closets connected to the central room via multi-pair cable, and jack-ended runs in each user location. Maintenance of such a system can even be consolidated with telephones, especially if interconnect, and some facilities can be shared. Many data managers are unfamiliar with telephones and practices that have been followed by the telephone industry for years, and this is a field where communications management can make a major contribution to data processing. □

*This article initially appeared in Trends in Communications Management, a monthly newsletter published by TELEMATION.*

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# Dialing Profit Automatically

by Thomas M. DeRosa

**O**ne segment of the telephone business remains virtually untapped by the interconnect companies. This sector of business can be entered with relative ease and very little investment, yet is producing substantial initial rewards and subsequent sales of complete telephone systems.

The potential market in this sector is still in its infancy, but demand for the service and the product, which are tailored to this industry, is growing at a rate which exceeds that for systems in the early days of interconnect.

The industry I am speaking of is the Reseller and Common Carrier (OCC) business—AT&T's competitors in the long-distance market.

The leaders in the Reseller/OCC market are Southern Pacific (SPRINT) and MCI. Together they control the majority of the OCC/Reseller market.

Companies such as SPRINT or MCI offer discounts ranging from 20 percent to 50 percent below comparable AT&T long-distance rates. This results in enormous savings to any business which makes a large number of long-distance calls.

The product is an automatic dialer

designed specifically to access the Reseller/OCC's network by automatically bypassing AT&T's lines. The result is a considerable savings for the end user on all long-distance calls.

At the present time, the use of these alternative long-distance services is hampered by two major disadvantages. The user must dial a total of 23 digits—seven digits to reach the OCC office and then a six-digit personal access code, followed by the ten-digit long-distance number. Secondly, the user must necessarily know the otherwise confidential OCC personal access code in order to make a call over the network. This, of course, raises the problem of subsequent telephone abuse. Employees who know this code can make telephone calls from their homes, and the charge will appear on the business' telephone bill as if the call originated from the business' offices.

BFI Communications Systems, Inc. has developed the Automatic Carrier Entry Signalling System (ACCESS 2000), a trunk-side autodialer capable of providing automatic access to OCC networks when attached to a key system or PBX. The autodialer is a single-number autodialer designed only to dial the access and the authorization numbers required to access the OCC/Reseller lines.

The module is a single-line device designed to interface between ter-

restrial equipment (KSU, PBX) and central office trunks (loop or ground start). The ACCESS 2000 is field programmable to provide the user with various interface options, dialing patterns, timing options, and custom calling features. The unit is a self-contained microprocessor-controlled standard ringer (5" x 5") for wall-mounting configuration.

The dialer is designed in such a way as to make the process of seeking out and connecting to an OCC's long-distance line virtually invisible; that is, to make the process not different for the user than dialing a simple long-distance call over AT&T's normal long-distance lines. Essentially, the microprocessor controlled device, which is programmed on site, monitors the initial digits being dialed by the user for the purpose of determining whether the call in question can be routed to the lower priced lines of an OCC. If such is determined to be the case, the unit then proceeds to speed dial "invisibly" the alternative carrier's local number and thereafter the appropriate "confidential" access code, while the caller is continuing to complete his own dialing. The end result is that the call is made over a non-AT&T line in a manner which, from the caller's viewpoint, is both "invisible" and undistinguishable from a normal long-distance call over AT&T lines.

One company that has recognized the potential of this business is Com

---

Mr. DeRosa is Director, Marketing Services, for BFI Communications Systems, Inc., Utica, NY.



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Installing the single-line autodialer.

Systems, Inc., located in Van Nuys, California. This sizable interconnect company has been successful in marketing the ACCESS-2000 autodialer as an enhancement to the telephone equipment they install.

Joseph E. Sharkey, vice president—applications-engineering, for Com Systems, states, "We are providing an additional feature to our existing and future customers that our competitors have overlooked."

Sharkey went on to say, "After an

analysis of the customer's long-distance usage, we are in a position to recommend the services of a local OCC/Reseller in conjunction with the sale of an autodialer in an effort to further reduce our customer's telephone expenses."

BFI has recommended to many interconnect companies that they follow the lead of Com Systems and enter into a business agreement with a local OCC/Reseller and assume the responsibility for all installation and programming of the units.

The agreement could be structured in one of two fashions. First, the OCC/Reseller actively markets the autodialer when selling their long-distance service and then provides the installation information to the interconnect. Secondly, the OCC/Reseller provides the interconnect company with the list of subscribers and the burden of sales lies with the sales staff of the interconnect company.

Either way, installation of the autodialer will not only provide the interconnect with additional revenues but could lead to additional sales of telephone systems.

The ACCESS-2000 automatic dialer offers a variety of benefits to business in both efficiency and cost savings.

The dialer's efficiency results in the elimination of having to dial the 13 extra digits required to access the OCC line. This saves a great deal of time—an average of 16 seconds per call—and also reduces errors, with fewer wrong numbers, because of having to dial fewer digits.

If the business has rotary dial telephones, there is no need to convert existing equipment in order to save money via an OCC. The BFI autodialer will work with whatever equipment is in use.

The dialer does not require any end-user training, and is simple to install. Only one unit is required per installation, not one per phone as with station-side dialers, and the unit is capable of redirecting the long-distance number via Ma Bell when the call cannot be completed and reducing the frustration of having to redial.

In addition to offering end-user dialing convenience, it provides security against employee abuse. The employees need not know the personal access code, which pro-

hibits them from making calls from their home and having the charge appear on the business' telephone bill.

The cost saving feature of the autodialer has resulted in unprecedented end-user acceptance. Business' are assured of having 100 percent of their calls automatically placed over the least expensive network available.

Employees will be forced to save 20 percent to 50 percent on each long-distance call without any inconvenience.

The telecommunications industry is continually changing and so is the role of the interconnects; because of this, interconnect companies should be prepared to offer the complete spectrum of services and advice to their customers. No longer is it sufficient to remain abreast only of the state-of-the-art PBX or key system; it is essential to provide all related telecommunications services to your customers.

As Sharkey put it, "My customers have become more dependent on Com Systems for everything relating to the telephone; if we don't provide this service, someone else will, and that results in lost revenues."

Even when the unit is sold alone and not as a system enhancement, the benefits to the end-user justify its use.

Up to now, if a business had rotary telephone equipment, they were prohibited access to the OCC/Reseller's lines. The BFI ACCESS 2000 converts pulse to tone, allowing access to a cost saving network with rotary equipment.

Installation and programming have been simplified so that any individual, with common knowledge of telephone equipment, can quickly and easily install the units.

The OCC/Reseller market is growing at an inconceivable rate each year. This new segment of the industry has spanned the need for technically innovative equipment designed to provide efficient access to this cost saving network.

The autodialer has filled this void by providing transparent operation and forced OCC/Reseller routing and dialing efficiency.

The aggressive interconnect company looking to expand into this growing market should carefully evaluate this opportunity; for those who do, the rewards are there. □

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# NEW PRODUCTS

## AUTODIALER

The SoftTouch 23 is an automatic tonedialer with three 16-digit special memories, each with one-button hot line convenience, 20 regular memory positions of 8 digits each, stackable to 160 digits, and a wait-for-dial-tone circuit. Each model is controlled by a microprocessor which utilizes a 3-micron fabrication process, creating a repertory dialer with tone generation, internal memory, and control logic on one monolithic chip. The silicon chip, .145-inch square, contains ROM, RAM, CPU, 832 bits of memory storage, a tone generator, and buffers for direct access to 16K of external memory. The automatic dialer fits into a 3-ounce mouthpiece, can be installed by the user, and runs on line power. Its two 16-digit memories, at the press of a single key, dial a local access number, listen for the computer dial tone, and then continue dialing an authorization code. These bonus memories can be combined for hot line dialing of a telephone number series that totals up to 32 digits.

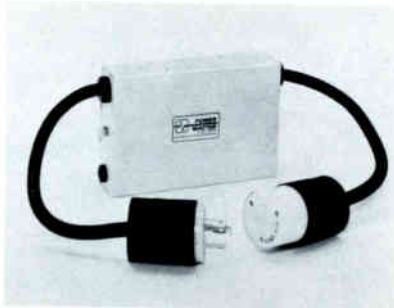


The third special memory is reserved for automatic redial of the last number manually dialed. Twenty 8-digit memory positions, each accessed by a two-button press, may be combined or stacked to store ten 10-digit long distance telephone numbers. In addition, the unit features fast- or slow-speed

dialing, a ½-second pause command, a keyboard mute and hold function, and manual dialing of all 12 keys. The housing is high-impact ABS plastic; the case is in soft grey, the grille in midnight blue. The entire dialer, with its 12-button keyboard, memory system, tone generator, and high fidelity microphone, fits into a custom mouthpiece that can be screwed onto a standard handset, replacing the existing mouthpiece and microphone.

□ For more information write 374 on the inquiry card. Or write: Buscom Systems, Inc., 4700 Patrick Henry Dr., Santa Clara, Cal. 95050.

## LINE MONITOR



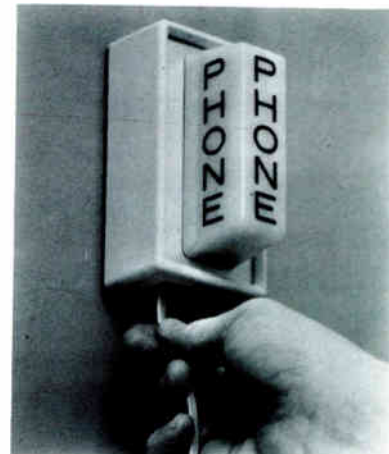
Line monitor power conditioners, rated at 20 amps, 125 volts, will protect sensitive electronic equipment from power surges, spikes, and noise interference. The two available units consist of the LM5200, which is a multiple outlet strip model with four receptacles, on/off switch with built-in pilot light, six-foot power supply cord and circuit breaker to protect against power overloads. The LM5300 is a 20-amp unit with a twist-lock receptacle, providing clean power to equipment that has a twist-lock 20-amp plug. Both units feature heavy-duty steel construction with a baked on beige finish.

□ For more information write 375 on the inquiry card. Or write: SGL Waber Electric, 300 Harvard Ave., Westville, N.J. 08093.

## PHONE SIGNAL

A self-contained strobe light signalling device for telephone systems mounts easily on a wall surface and

emits a high-intensity flashing light when a telephone rings, making it ideal for effective visual signalling where distance from a telephone or high ambient noise make it difficult to hear a phone ringing signal. It is also a good telephone signal source where ringing is not desired, such as in hospitals and other quiet areas. A solid-state relay incorporated in the circuit design is activated by the standard 90V, 20-Hz telephone ringing voltage, allowing line voltage to be applied to power the strobe. Because the highly sensitive relay has a low ringer equivalence, these new strobe devices can be used in multiple telephone station hookups off the same circuit, without concern for line overloading. The device is designed with a wide tolerance for variations in the ringer input voltage—150V max. to 40V min., with 90V typical. Light output is 70K peak candle power. The strobe is housed in an extremely rugged plastic enclosure measuring approx. 4¾"H x 2½"W x 1¼"D, and is provided with a line cord for AC power and a standard modular jack at the base of the unit for simple connection to existing telephone lines. All relay circuitry and strobe components are sealed in silicon.



The strobe components are housed in a sturdy, vandal-resistant Lexan lens marked with the word "Phone." Optional lens cover wording or symbols are available on special order.

□ For more information write 376 on the inquiry card. Or write: Wheelock Signals, Inc., 273 Branchport Ave., Long Branch, N.J. 07740.

## ELECTRONIC PHONE

The Crestcom II is a full-feature, two-line plug-in telephone system for business, institutions and residences. It offers two-line selection, an electronic bell, a built-in call transfer signal, 3-party conferencing, optional call privacy/exclusion,

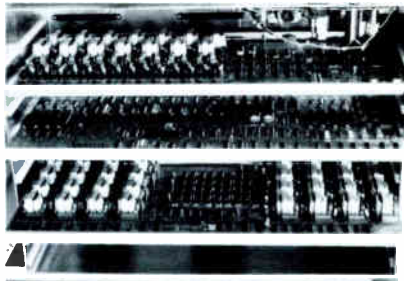


multiple phone locations, remote extensions and emergency power failure service. The system is compatible with the supplier's two-line phones. Simple plug-in installation requires only two telephone lines and an electrical receptacle.

□ For more information write 377 on the inquiry card. Or write: Crest Industries, Inc., 6922 North Meridian, Puyallup, WA 98371.

## CONCENTRATOR

The Model 35 Electronic Concentrator offers the flexibility and convenience of direct inward dialing (DID) trunks and provides line identification in the form of outpulsing 2, 3, or 4 digits. The device allows telephone answering service bureaus to economically enlarge their client base outside their local telco central office exchange, as well as expand service to secretarial lines, in addition to call-forwarding.



The device also enables remote paging services to operate in areas not served by electronic central offices. The unit consolidates and identifies up to 768 incoming loop-start lines onto as many as 16 DID trunks. Caller identification is made with standard rotary dial outpulses of two to four digits in immediate-start or wink-start formats. Calls are systematically forwarded after one

or three rings, eliminating the need for operators to count them before answering. The concentrator's standard DID interface offers a broad range of benefits. For example, it allows service bureaus equipped to handle call forwarding to also accommodate dedicated secretarial lines, by converting them to DID trunks at the premises or remotely. Secretarial lines offer the convenience of automatic call-transfer to customers and greater system control to answering bureaus. For mobile telephone services, the unit permits improved mobile telephone service (IMTS) in areas covered by non-ESS central offices. Up to now, the cost of conversion by the telephone operating company has been prohibitive. Similarly, one-way paging service is also facilitated. Available in two EPROM-based software packages, the Model 35 provides automatic trunk or line selection and computer controlled interface for such applications as mobile and cellular radio. It features dual processor cards to insure smooth operation in the event of failure, and dual alarm indicators. Standard configuration includes one line card for 32 (expandable to 256) incoming loop start lines, accommodating 16 trunks. Line upgrade is facilitated through two optional master and slave concentrators, accommodating up to 8 line cards and 768 lines each.

□ For more information write 378 on the inquiry card. Or write: Candela Electronics, 550 Del Rey Ave., Sunnyvale, Cal. 94088-3461.

## SYNTHESIZED MESSAGES

A choice of 15 voice-synthesized user messages and system prompts, with user entry of variable data, may now be employed in conjunction with the Omega IV Super Key phone system. The system will now be able to relieve a busy secretary from screening calls, by actually answering calls and delivering basic messages to the caller for her. Examples of these messages include: "I'm Out; I'll Return at (time);" "I'm Out; Please Call (phone number);" "I'm in a Meeting; I'll Return at (time);" "Station (system automatically enters extension number); Please Call Back at (time)." It will also aid the executive in more efficient utilization of the system through vari-

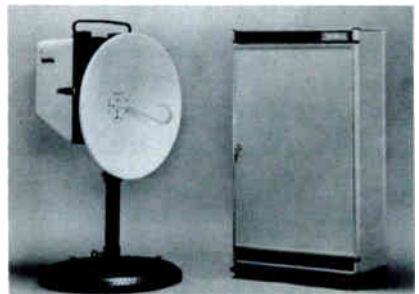
ous prompts, directing him to take a certain action before a feature can be accessed. Upon hearing the words: "All Trunks Busy," "Wrong Number, Call Again," "Station Busy," "Restricted," "Enter Code," or "Enter Feature," the user knows why a call may not be going through, and is helped to determine what steps he must take to correct the situation.



□ For more information write 379 on the inquiry card. Or write: Iwatsu America Inc., 120 Commerce Rd., Carlstadt, N.J. 07072.

## MICROWAVE SYSTEM

The MiniLink microwave system, for voice and data transmission through up to 96 PCM channels at 6.3 Mbps, is a compact, self-contained system for private users who want to avoid the rising cost of leased data lines and off-premise extensions and be assured of communications flexibility and reliability. Designed for short hop (up to 14 miles) transmission, the complete duplex radio also is designed for video transmission and FDM usage of up to 120 channels.



The system, which includes an 18-GHz radio and T-carrier interface, usually is installed on the top of buildings. The system has been FCC type-approved.

□ For more information write 380 on the inquiry card. Or write: Anaconda-Ericsson Information Systems, 7465 Lampson Ave., Garden Grove, CA 92642.



## The Receiver



### MODEL MS-72R — 7 WATT FM PAGING RECEIVER

Features sensitive reception of FM Broadcast for background music and selectable microphone or auxiliary paging sources, with precedence, all in a compact 3 $\frac{3}{8}$ " x 8 $\frac{1}{2}$ " x 9" size cabinet.

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- Aux. input sens. is 100 MV at 50K ohms.

Front panel has lighted 5 $\frac{1}{2}$ " slide rule dial. Controls include tuning, page level, music level, tone, AFC/MUTE and Power ON/OFF.

All connections on rear panel are screw type except the Aux. input is phono type. Also on rear, a page source selector switch and power circuit breaker are provided.

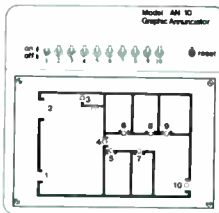
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## TIP & RING

**SYKES DATATRONICS, INC.**, Rochester, NY has introduced two new telephone management products—Telemiser™, for low cost management for organizations with less than 150 phone extensions; and Call Assistant™, an employee directory look-up system. The basic Telemiser system provides, on demand, four standard reports: a Chronological Detail Report, a Station Detail Report, an Account Code Report and a Summary Report which can assign cost according to date, time of day, call duration, trunk, or calling station by department and account code.

**OKI ELECTRONICS OF AMERICA AND STANDARD TELEPHONE COMPANY, S. HACKENSACK, NJ, HAVE JOINED IN AN EXCLUSIVE MARKETING AND DISTRIBUTION AGREEMENT**, for a "long term," giving Standard Telephone the exclusive distribution rights to OKI's advanced Spectrum 700 and 4000 Digital Switching Systems in most of the northeast United States. The agreement between the two companies guarantees long-term support for Spectrum customers, in Standard Telephone's trading areas in New York, New Jersey, Pennsylvania, Connecticut, Massachusetts, Rhode Island, New Hampshire, Maine, Vermont, Maryland, Virginia, New York City, Delaware, West Virginia and Washington, D.C.

**ANDERSON JACOBSON, SAN JOSE, CA, HAS STRENGTHENED ITS MANAGEMENT TEAM FOR INTEGRATED OFFICE SYSTEMS** by appointing Richard Barton as vice president/division manager and Robert Hooper/as vice president/marketing with responsibility for marketing, product planning and sales for the division. Anderson Jacobson has recently secured \$8.8 million in funding from a research and development limited partnership for the design and development of the IOX-1000 and a new IOX-250 digital telephone system product line. The two systems cover a sizeable market

in a wide range of system configuration, from 80 ports up to 1000 ports, a company spokesman said.

**NORTHERN TELECOM INC., NASHVILLE, TN, ANNOUNCED THE AVAILABILITY OF THE "VANTAGE 48" BUSINESS COMMUNICATIONS SYSTEMS FOR SMALL AND MEDIUM-SIZE BUSINESSES.** The Vantage 48 is the second in the Vantage line of business communications systems, along with the Vantage 12. Vantage 48 will accommodate 48 telephone sets and 16 telephone lines. Like the Vantage 12, the new system is built around microprocessor technology. Vantage 12 handles up to 12 telephone sets and up to 6 telephone lines.

**AMERICAN SATELLITE COMPANY AND MITEL CORPORATION HAVE AN AGREEMENT IN PRINCIPLE UNDER WHICH A NEW U.S. SPECIALIZED CARRIER WILL BE FORMED.** The new carrier, which will combine ASC's satellite transmission capabilities with the Mitel SX-2000 Integrated Communications System, will provide switched long-distance voice, data, video conferencing and value-added services via satellite to business users. At the same time, ASC announced having reached an operating agreement with the Trans-Canada Telephone System, providing trans-border satellite communications services into Canada. Under the agreement, TransCanada and American Satellite will make available voice, data, facsimile and video teleconferencing to business users in both countries.

**TELECOM PLUS INTERNATIONAL, INC., LONG ISLAND CITY, NY, HAS ENTERED INTO AN AGREEMENT IN PRINCIPLE TO PURCHASE THE ASSETS OF FLORIDA TELECOM, INC., AND ITS SUBSIDIARY, FLORIDA INTERCONNECT CO., AND THE ASSETS OF SOUTHWEST UTILITIES, INC., NEW ORLEANS, LA.** Southwest Utilities has branch offices for sales and service in Baton Rouge, Lafayette and Morgan City, LA, and in Gulfport, MS. The company has about 50,000 telephones currently under service contracts and serves a client base of more than 1000 customers.

Florida Telcom has sales and service branch offices in Tampa, Jacksonville, Cocoa, Ft. Lauderdale,



Riviera Beach, Ocala and Orlando. The company's client base is more than 2600 accounts; it is the oldest private telephone company in that state, employs 175 people, and had revenues in 1981 exceeding \$8 million.

**CHARLES MARSHALL HAS BEEN NAMED CHAIRMAN AND CHIEF EXECUTIVE OF AMERICAN BELL.** American Bell will be divided into two divisions. The Consumer Products Division, dealing with telephone equipment and services for homes and small businesses, will be headed by Randall L. Tobias, named president. Archie J. McGill was named president of the Advanced Information Systems Division, which will provide products for businesses.

**THE FEDERAL COMMUNICATIONS COMMISSION HAS BEEN BESEIGED WITH HUNDREDS OF APPLICATIONS FOR PERMISSION TO OFFER A BRAND NEW PORTABLE PHONE SERVICE—CELLULAR RADIO.** FCC officials expect to process over 400 applications submitted since November 1982. Last June, nearly 200 applications were filed, offering cellular radio in the nation's top 30 cities. FCC officials attributed the sharp increase in applications to the growing belief that this new service will be highly profitable, with thousands of businessmen and consumers demanding portable telephone service. Meanwhile, Reagan Administration Justice Department Anti-Trust chief William Baxter has termed the granting of cellular mobile radio phone licenses an "ambiguity," making it difficult to enforce anti-trust laws. According to Justice comments filed on the AT&T-GTE independent phone companies applications to operate jointly cellular systems in the top 30 markets, the FCC's "seemingly contradictory invitations to make competitive applications, on the one hand, and to arrive at agreements avoiding comparative hearings on the other," pose anti-trust law and public interest uncertainties that must be cleared up.

**ACCORDING TO NATA, THE INTERCONNECT INDUSTRY THIS YEAR AND NEXT YEAR WILL CONTINUE TO INCREASE ITS SALES AND MARKET SHARE** of business communications equipment but its "spectacularly high growth rates of the 1970s declined in the past year and are expected to stabilize through the mid-1980s." In its annual statistical review of the non-carrier PBX and key system and telephone set fields, NATA projected that total interconnect industry revenues in 1983 will exceed \$2.2 billion, compared with almost \$1.7 billion forecast for 1982, and almost \$1.4 billion reported in 1981. This represents an estimated 22 percent gain between 1981 and 1982 and a 33 percent gain between 1982 and 1983. The statistical report noted, "A weak economy in 1982 and an uncertain outlook for 1983, combined with an unclear picture of exactly how the divestiture of AT&T will take place, has produced the most confused market conditions since the Carterfone decision in 1968."

**AT&T'S SHUTTING OFF OF COMMISSION PAYMENTS TO HOTELS & MOTELS HAS BEEN FOLLOWED BY LARGE INDEPENDENT TELCOS DENYING THE LODGING INDUSTRY COMMISSION AS OF JANUARY 1/83.** The termination of commissions brings to an end a decades-long policy whereby hotels and motels drew a 15 percent payment off normal-but-expensive operator-assisted calls by their guests. Operational expenses, call-billing disputes and customer non-payments, however, are said to have often left hostelries in the red on their telephone operations. Resale of service was ushered in by a 1981 FCC ruling, after which AT&T immediately said it would end commission payments Sept. 1/81, but extended that deadline to Jan. 1/82, and finally to Jan. 1/83, following heavy pressure from the American Hotel & Motel Association.

Thus, the market for call accounting and resale products within the lodging industry appears to be wide open, now that hotels and motels are handling their own telephone service.



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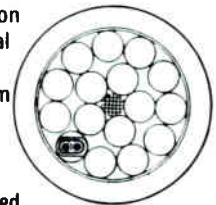
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