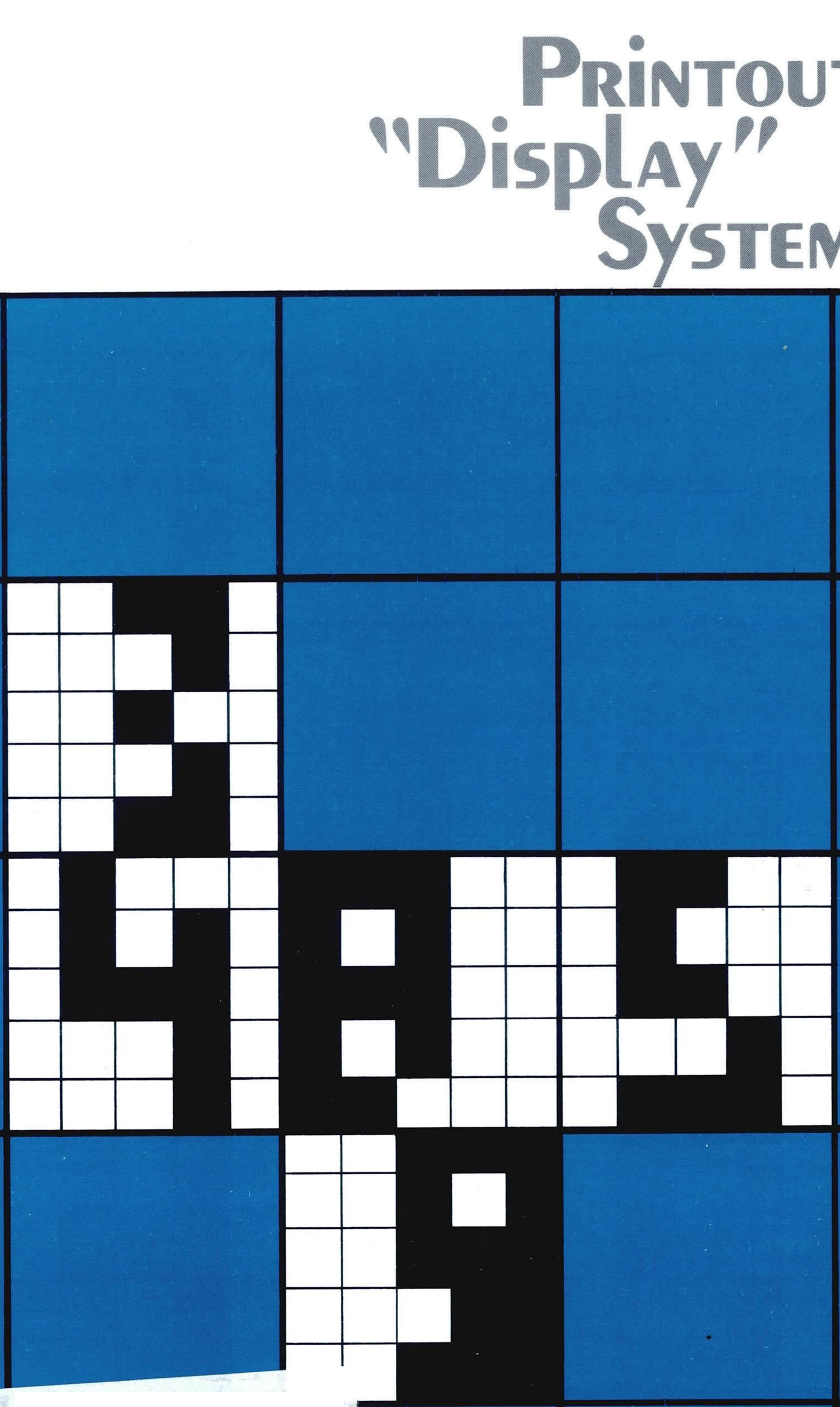
MODERN DATA

OCTOBER 1973

PRINTOUT "DISPLAY" SYSTEM

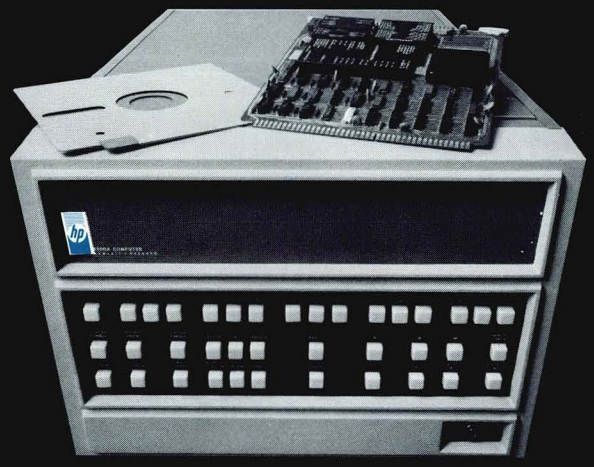


FLOPPY DISC
HP 2100
A-D CARD

DACONICS HAS INTEGRATED VERSATILITY WITH RELIABILITY. NOW.

We did it because you needed it. You wanted the proven strength of the 2100, mated-up with the specialized nature of your needs. So we put together a proven floppy disc with a compatible DOS-M Package and a plug-in A-D card to make it all work in beautiful harmony.

We've heard of your needs —now we'd like to hear from you. Give us a collect call. We've refined the workhorse.



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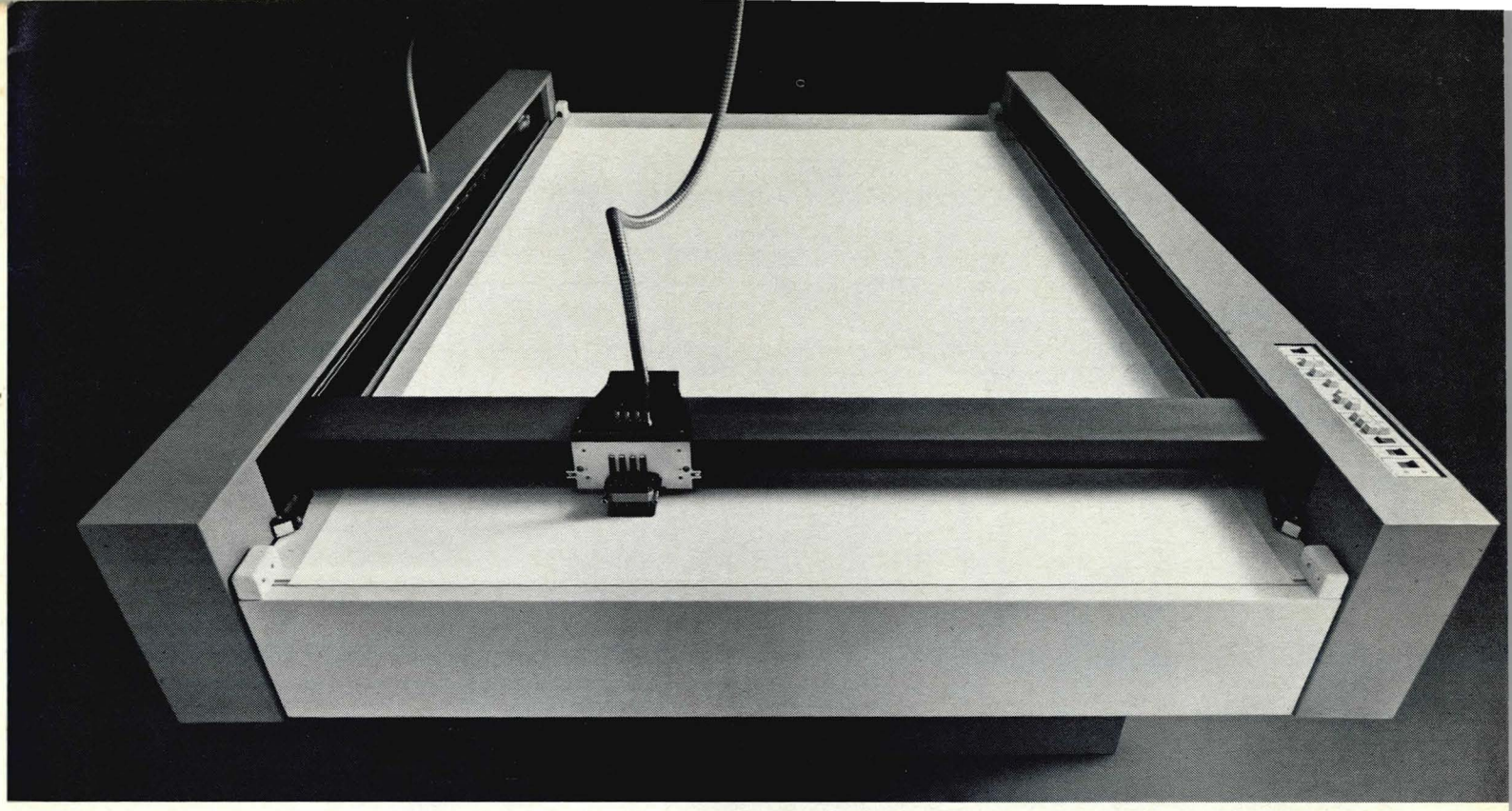


The four-fingered fast-drawing kid is coming to town.

We call it the 748. It's big. And it's fast.

Its 4 inking pens move at speeds over 40 inches a second. That's faster than ink flows, so we had to figure out a pressure inking system that lets the ink catch up to the pens.

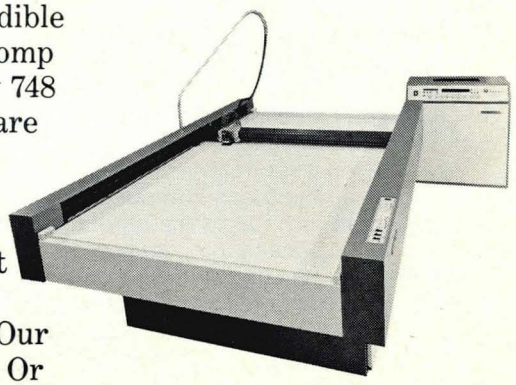
If you make integrated circuits or maps. Or if you have precision drafting needs, this is the new tool.

The 748's plotting area is 48″x82″. It can scribe coated materials and cut strippable film. At peak speeds!

The quality of its line is not impaired by its incredible speed. And like all CalComp flatbed plotters, the new 748 offers easy-to-use software for most computers.

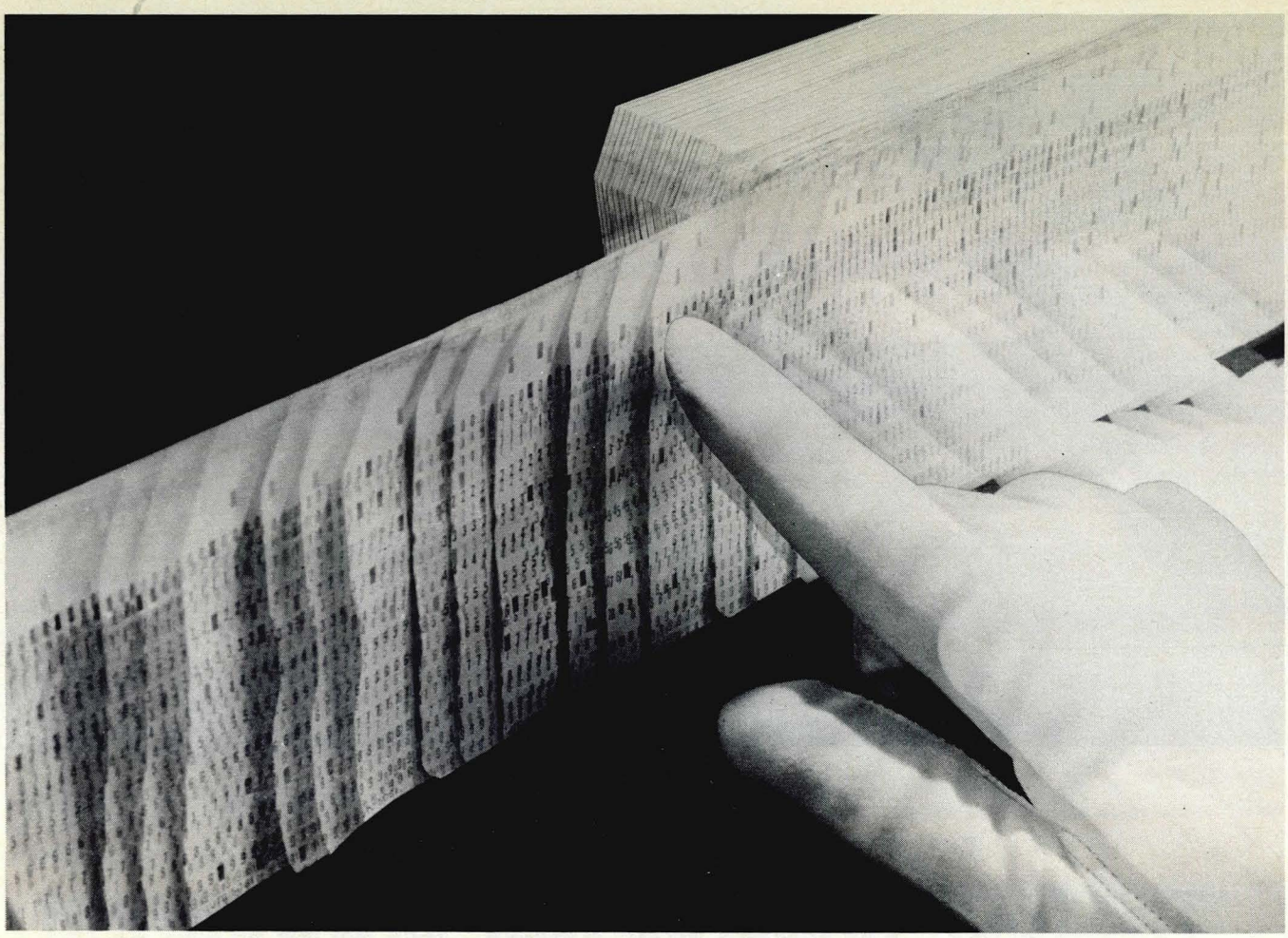
We service it in 29 countries. But the way we've made it, you won't be calling us very often.

Do call us to see it. Our number is (714) 821-2011. Or write California Computer Products, Inc., MD-10-73, 2411 West La Palma Avenue, Anaheim, California 92801.



CALCOMP

CIRCLE NO. 37 ON INQUIRY CARD



Crinkled, Crumpled, Damp or Worn; Our Vacuum Finger Speeds Cards Through.

Our card reader keeps data flowing. By means of fiber optics. And the vacuum-pick finger that you'll find only on an EAI card reader.

The vacuum in the finger plucks the bottom card from the stack precisely. Decisively. No matter what condition the card is in—even if it's so damp and swollen that it couldn't possibly go through the restrictive throat found in other machines.

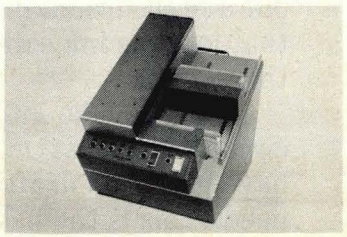
Now, even if your cards are badly bent or worn, only one card at a time feeds into our friction transport system—which, in turn, takes the card at a constant speed past our fiber-optics reading station.

There, our synchronous logic data-sensing and verification method ensures correct reading of card information that's misregistered by as much as half a column.

So while you get new freedom from the jam-ups caused by cards that stick together, cards that catch in the throat, cards that buckle and tear, you also get greater accuracy in data transfer. Our fiber-optics light-distribution system channels the light of a single bulb uniformly to all parts of the card. This system also makes possible self-diagnosing circuitry that immensely simplifies the maintenance of your reader.

Though our finger picks cards with great precision, don't think you have to trade away speed for accuracy. We offer 300-cards-a-minute data readers—in single-unit or OEM quantities—at prices competitive with those of machines that give you far less throughput of data.

If three hundred cards a minute won't satisfy your CPU, then we have a reader that flicks through 600 a minute and an optical reader that can tell a pencil mark from a smudge without batting an eyelash. There's a vacuum finger on each of these machines.



Let us tell you about them. Just write or phone today.

EAI

Electronic Associates, Inc.
185 Monmouth Parkway
West Long Branch, New Jersey 07764
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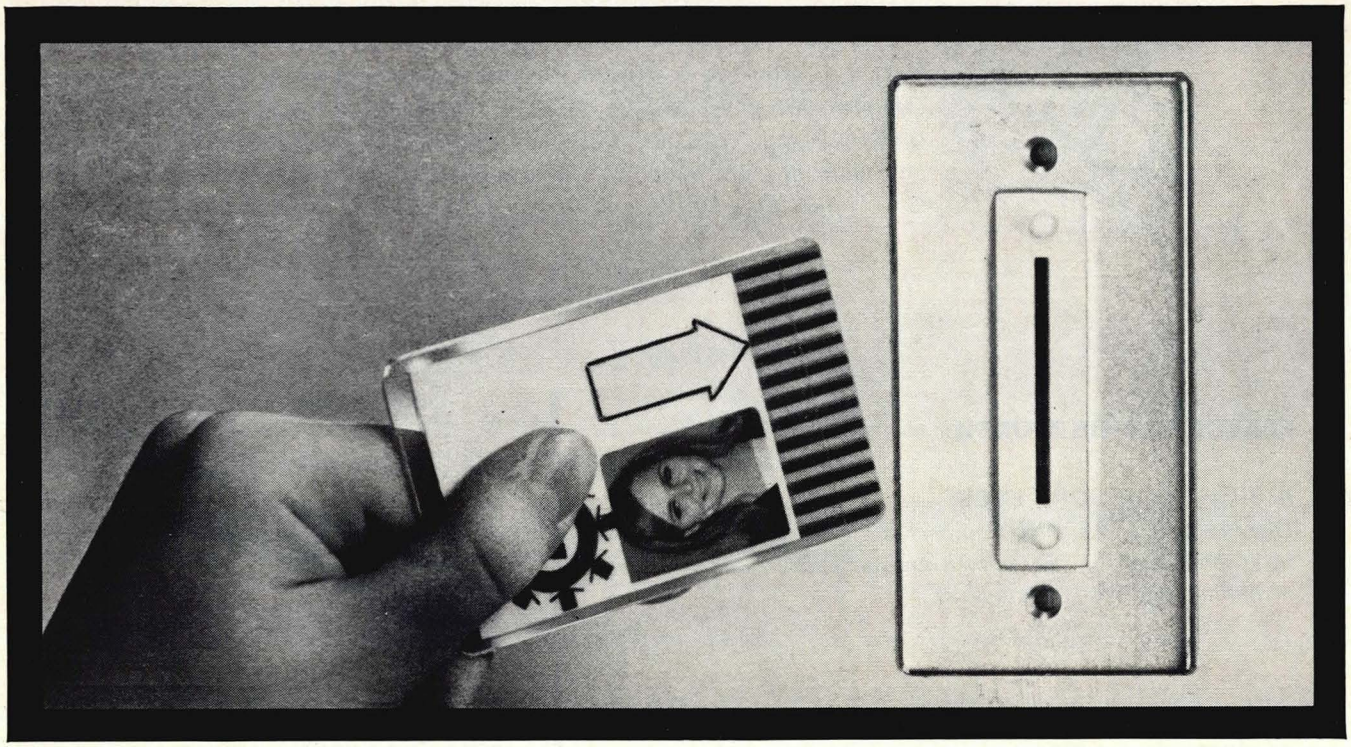
CIRCLE NO. 3 ON INQUIRY CARD

MODERN DATA

OCTOBER 1973 ■ VOLUME 6 ■ NUMBER 10

One small electronic photo I.D. card offers total security.



We've taken the three best security techniques and combined them to produce the GBC IDENTI-LOGIC® System. One, small card serves as an electronic key for access control, photo ID, and data collection.

When the card is inserted into the special slot, it can open a door or drawer; switch on computers and machines; and keep a record of personnel in an area or building. Plus the system automatically records the card number, the date, time and the slot into which the card was inserted.

Over 1.5 million coding variations are possible. You can add or rule out cards instantly. Applications include computer rooms, hospital storage rooms, residences, retail stores, warehouses, elevators, industrial plants, and almost any kind of organization. For all the details about GBC IDENTI-LOGIC, write to General Binding Corporation, Northbrook, Illinois 60062.

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CIRCLE NO. 4 ON INQUIRY CARD

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THIS ISSUE
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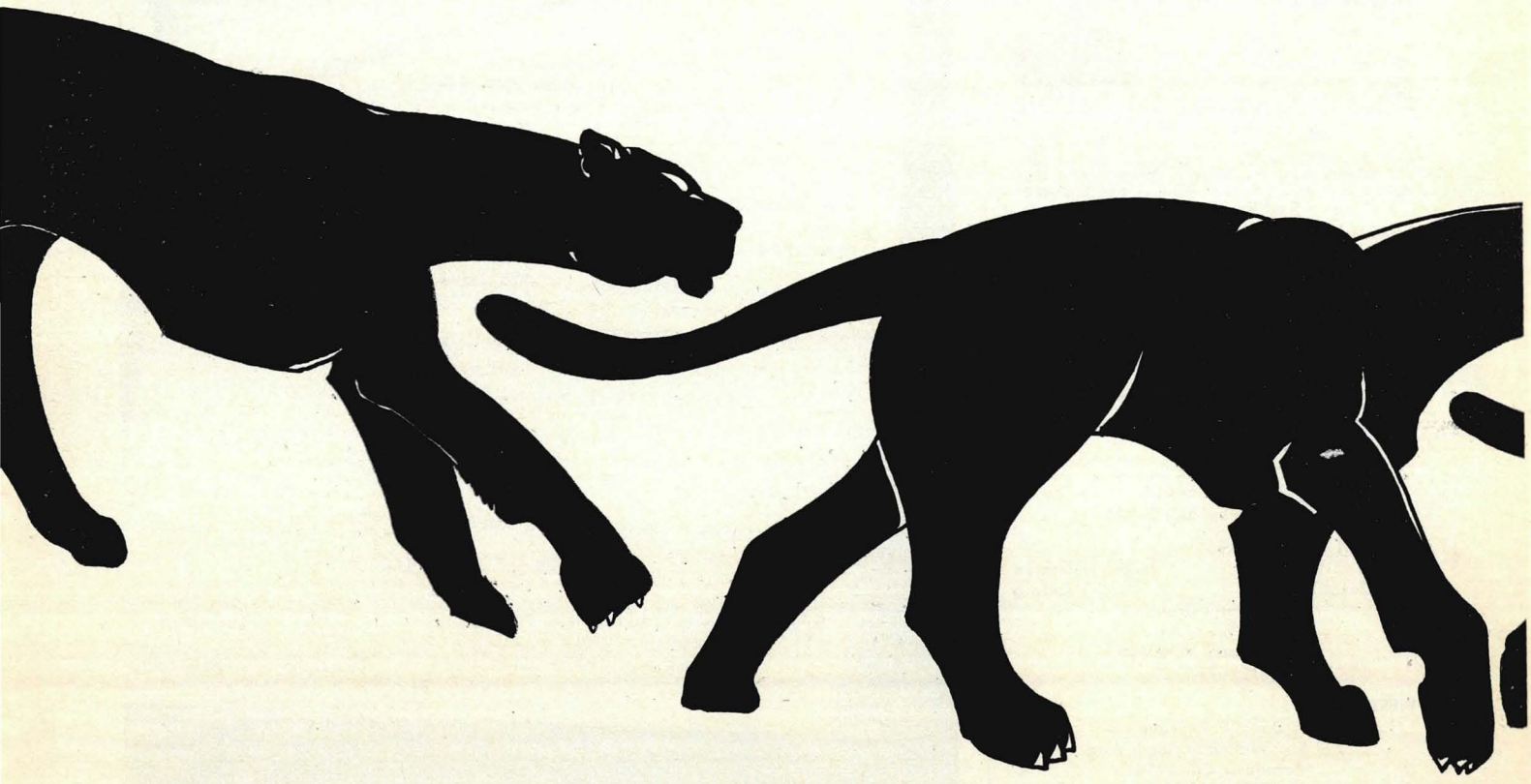
Introducing the Mini Killers.



A name like mini, sticks. And even when you've outgrown it, it's still hard to kill.

Varian computers have come a long way from the little black box functioning as a controller. At this speed. Or that memory. With input/output activity that was location dependent.

Varian's new family of computer systems is changing a lot of ideas of what a mini can do. In terms of hardware/software capabilities and cost/performance ratios.

Our new V-70 family can do anything computers can do, period. Only for far less money. With radically new open-ended architecture and memory mapping that delivers up to 256K in memory, you can take the technological sophistication of our hardware for granted. Add microprogramming and a flexible software operating system that lets the advanced hardware show off. And Writable Control Store with a micro assembler with macro capabilities. Micro simulation that lets you debug your micro-instructions off-line or in the background. Finally, a full program of Varian applications engineering and programming and maintenance support that keeps your computer system operating right on the money.

Introduce yourself to the Mini Killers. But be warned. In terms of combined hardware/software capabilities and cost/performance ratios, you'll have to think of Varian as bigger than mini.

We do.

For additional information on the new V-70 series, write Varian Data Machines, 2722 Michelson Drive, Irvine, California 92664. Or call (714) 833-2400.

The mini killers
varian data machines

Introducing RCA

Behind our new FLEXITERM™ custom terminal, there's a system of **people.**

Our engineering **people,** for example, believed in the idea that a highly intelligent and readily customized terminal could be produced having an economy price tag.

And they delivered.

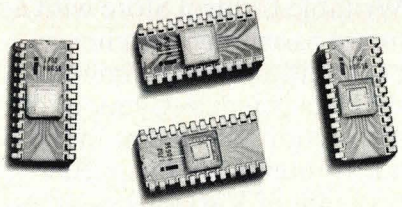
But it takes more than sophisticated hardware to make a modern and effective information network.

And that's where the **people** in our systems analysis team come in. They personally study your data information needs in depth. Then they custom configure each FLEXITERM to meet those needs.

Next, the **people** in our service organization go to work. They make sure that installations are carried out as specified. RCA has one of the nation's largest technical product service organizations to service the equipment as required.

As a custom terminal manufacturer, RCA has much to offer in terms of **people** capability.

And that's important. Because a hardware system can't be any better than the system of **people** behind it.



Non-destruct memories prevent lost routines.

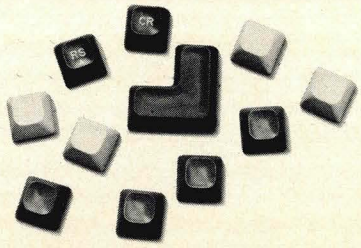
Each FLEXITERM terminal has its own built-in FLEXIMITE™ micro-processor, specially programmed for your particular application.

For example, the microprocessor can perform special data editing and validation right within the terminal, thus saving expensive mainframe time and memory as well as transmission line time.

Intelligence is derived from alterable firmware program boards. Besides permitting extensive application customizing, these read-only, non-destruct memories never require loading and will not lose routines due to power failures or other interrupts.

Matching keys that match the job.

Even the FLEXITERM keyboard can be custom configured with nomenclature and symbols pertinent to your application. And color-coded by function category to make operation as simple as possible.



We save, you save.

Most important, customization or modification of FLEXITERM terminals is relatively easy and inexpensive. It's simply a matter of switching keys and firmware memory boards.

This means that it costs us a lot less to produce a highly customized terminal for your specific application.

And they cost you a lot less to buy or lease.

For a free booklet with complete capability and costs figures, call George Turner, Marketing Manager, at (213) 894-8111. Or write him at this address:

RCA Custom Terminal Systems, 8500 Balboa Blvd., Van Nuys, California 91409.

RCA

custom terminal systems.

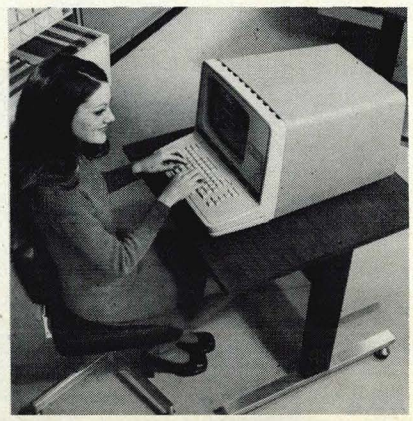
If you use more than one of these media

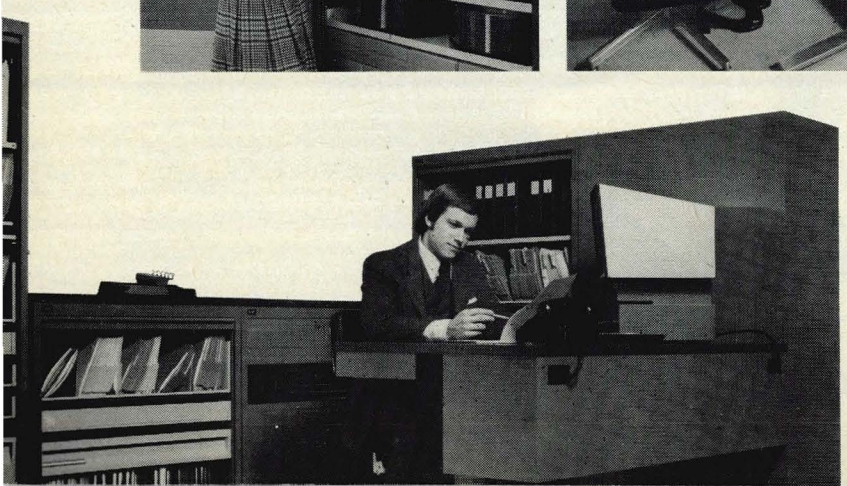
WE CAN HELP YOU MANAGE BETTER

Just look at all the different types of media you are using today.

As a manager, how can you organize your operations to get the highest productivity from the people and machines that use these media? And, if you are adding such things as microfilm, microfiche, word processing equipment, terminals and computer reports; how can you create storage systems and work station environments that will provide high efficiency, reduced worker fatigue and better housekeeping?

One thing you can do is to recognize the fact that the office furniture you've been used to all these years just can't adapt to the media explosion.





That's why we started with the basic problems of media and the people who work with them and designed an entirely new concept in equipment for the office and computer room.

THE OPTIMEDIA™ CONCEPT

It's called Optimedia because it allows you to tailor your systems to provide optimum use of media by both people and machines. Optimedia also gives you a built-in hedge against obsolescence since it is a living system which you can change at any time to meet your changing requirements. We'd like the opportunity to show you how the Optimedia concept can help you manage better. It's detailed in our new brochures. To receive copies, just circle the readers service number, or contact your nearest Wright Line Media Management Specialist. You'll find him in all principal cities.

Wright LINE

MEDIA MANAGEMENT SYSTEMS

160 GOLD STAR BOULEVARD, WORCESTER, MASS. 01606

A DIVISION OF BARRY WRIGHT CORPORATION

CIRCLE NO. 8 ON INQUIRY CARD

Yes, I'd like to meet the ENTREX family of key-to-disk systems. Please tell me how we can get together and know each other better.

I'm interested in a demonstration ☐ I'd like literature only ☐

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Company_____

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The Entrex System 280

The Entrex System 480

Meet the family.

The ENTREX System 480 is the best thing yet in key-to-disk data entry. Its powerful processor provides up to 10,000,000 bytes of intermediate disk storage and controls up to 32 DATA/SCOPE keystations. It features an easy-to-use CRT and our exclusive HELP! key (notice how many look-alikes there are since we introduced the DATA/SCOPE three years ago?). Today, more than 200 System 480's, with more than 3,000 DATA/SCOPES are installed across the country.

And now we have even more to talk about. Our new System 280. It's ideal for the smaller user who needs only 1.8 million characters of intermediate disk storage and up to 8 DATA/SCOPES. Or the larger user who wants to perform remote data entry and communicate to System 480 or directly to the mainframe. Best of all, you can up-grade any time you desire, as all ENTREX systems are expandable by adding more disk capacity, more tape capability, even extra memory. Which means ENTREX systems are compatible . . . with each other . . . with your computer system. There's no generation gap in the ENTREX family!

We'd like you to meet the ENTREX family of outstanding key-to-disk systems. To get acquainted, just call or send in the coupon today. Once you get to know us, you'll agree . . . ENTREX has the answers in data entry!

CIRCLE NO. 9 ON INQUIRY CARD

Caught in the old cassette vs. ½"-drive, price vs. performance crunch?

With a choice like that you pay the price no matter what you do.

So we've come up with the first real alternative you've ever had.

The "Scotch" Brand Data Cartridge.

It's a unique approach to digital tape storage that's priced like a cassette but performs like a ½"-compatible drive.

It operates at speeds up to 90 ips, starts/stops with accelerations up to 2000 in/sec^2 and offers transfer rates up to 48,000 bps.

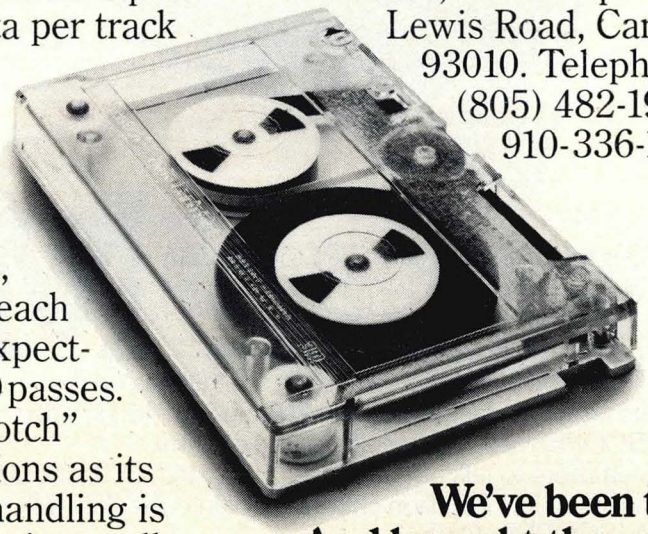
It uses ¼" tape and records at up to 3200 frpi, so it stores up to 5.5 million bits of data per track on 1 to 4 tracks.

It needs only a single point drive and no external tape guidance, so tape can never cinch, spill, stretch or break and each cartridge has a life expectancy in excess of 5000 passes.

Because the "Scotch" Data Cartridge functions as its own transport, tape handling is fast, accurate and precise at all times. It's ideal for: Word processors and terminals. Point-of-sale data capture and computer data entry. Minicomputer I/O and paper tape replacement.

And if you need more information, you've got a choice there, too.

Just contact any of the major peripheral manufacturers or Data Products, 3M Company, 300 South Lewis Road, Camarillo, Calif. 93010. Telephone: (805) 482-1911. TWX: 910-336-1676.



We've been there.
And brought the answers back.

3M COMPANY

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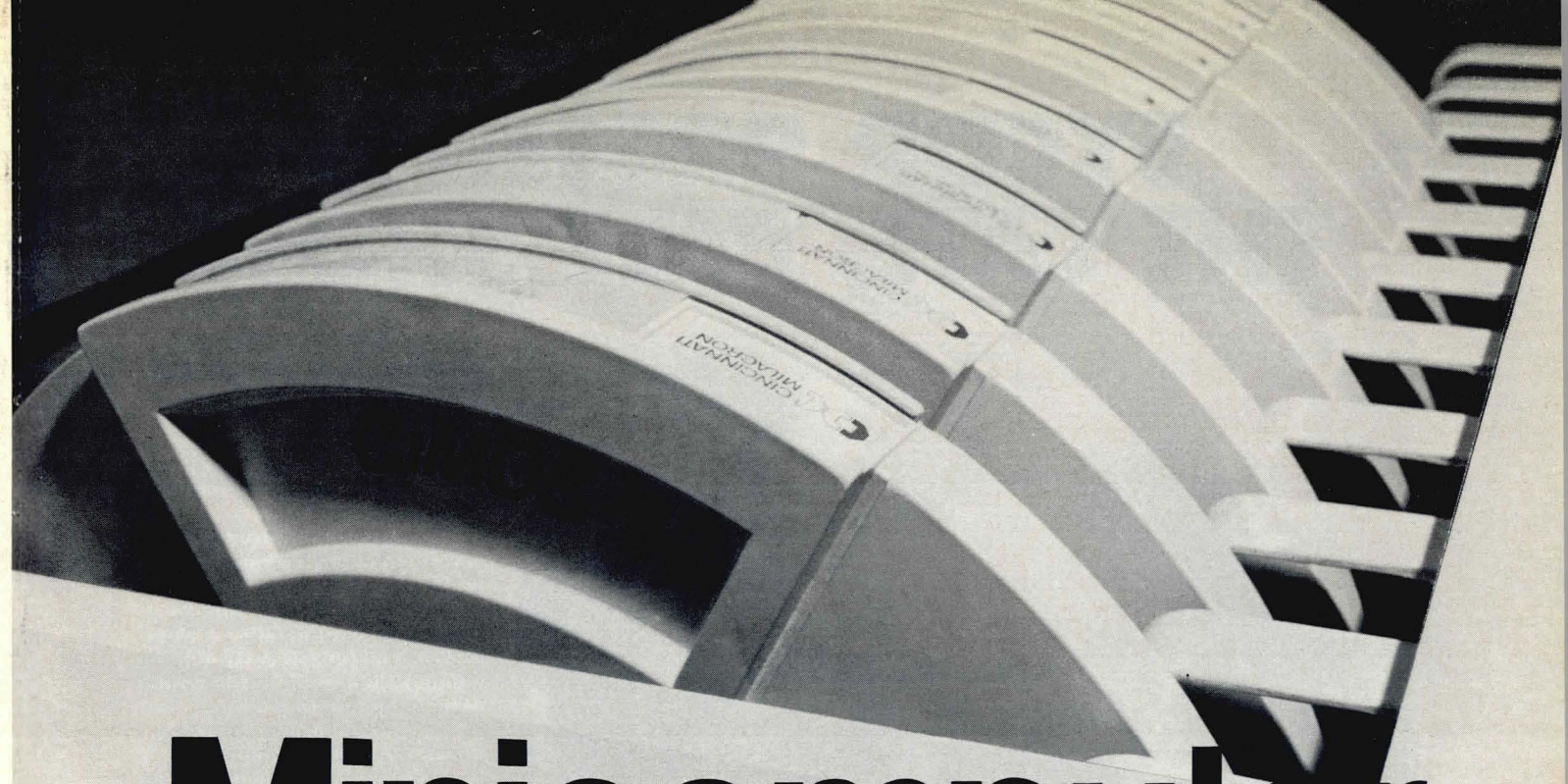
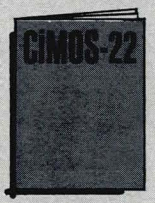


Minicomputer SOFTWARE

Here's an exciting new operating system with RPG that dramatically simplifies and speeds data processing applications

CiMOS-22 is a disk-based operating system for the CIP/2200 minicomputers which consists of language processors, programming and debugging aids and services that simplify data processing applications. The capabilities of CiMOS-22 are packaged in a flexible system design so that each user can tailor the operating system to his individual needs. From either RPG or assembly language programs, the user can take advantage of the high-level data management facilities of CiMOS-22. These facilities include the ability to organize, catalog, store, retrieve and update data files. From a system console or assembler language program the user can create and delete disk-based files. On-line editing capability permits the user to build and maintain data files as well as source and object program libraries. There is much more to CiMOS-22 that you should know about. It's all detailed in our new brochure shown here . . . and it's yours free. Cincinnati Milacron, Process Controls Division, Lebanon, Ohio 45036.



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minicomputers

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Chemicals
Plastics
Plastics Processing Machinery
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Alone.

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Next day, the processed data is waiting with your morning coffee.

Our Sycor 340's knack for clean source data entry is what makes it all possible. By making it impossible to enter the wrong data in the first place.

Using our powerful, yet easy to use T.A.L. programming language, you can tailor the 340's 8K bytes of memory to your specific applications.

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And, thanks to T.A.L., you do it at a fraction of the cost of developing your own software.

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You might sleep a little easier tonight.

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Of course if you'd rather not wait for a power failure, call us now. While you can still see the phone.

Elgard Uninterruptible Power Sources are available in .5kVA, 1kVA, 2.5kVA, 5.0kVA and 10kVA models. They supply up to ten minutes of instantaneous reserve in case of power failure; and they have self-contained, maintenance-free batteries. Ideal for IBM Systems 3 and 7, DEC PDP/8, PDP/11, and Data General Super Nova. Priced from $1,895.

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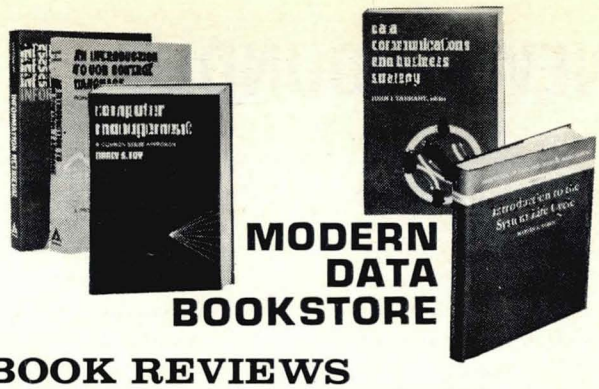

BOOK REVIEWS

THE ERA GUIDE TO MINICOMPUTERS, *by the Electrical Research Association. 297 pages plus index, Ovum Ltd, 22 Gray's Inn Road, London WC1, England.* £29. *($73.00)*

You know, of course, that Digital Equipment Corp., Data General, Hewlett-Packard, and Interdata sell minicomputers. But did you know about Digico, Dietz, or Ferranti? And did you ever even hear of Arcturus Electronics? The Electrical Research Association of Surrey, England, looks at all these and two dozen more in its *ERA Guide to Minicomputers*, a report on minis in Western Europe. Topics include selection of a system, suppliers and products, comparisons, and a glossary. This abridged version of an earlier and more expensive ERA report, *Mini-computers and Europe*, omits only the section which described minis not widely available in Western Europe. — Ernst Barlach

QUICK COBOL *by L. Coddington. 260 pages plus index, Computer Monograph Series (No. 16), Macdonald, London, and American Elsevier Inc., New York, N.Y. $7.95*

Rudolf Flesch, the shirtsleeve stylist, always told his students and readers that the use of contractions and the second person would make their writing clearer. This introduction to COBOL programming proves it. You don't believe it at first, but you can actually *read* the book. And realizing that the author is British makes you appreciate his "plain folks" style even more. But the author's conscientious efforts extend far beyond word selection. His organization, level of detail, patient explanations, use of repetition, and use of examples conjure up a picture of an author who really *cared* whether the beginner would have any unanswered questions after reading his book. Coddington starts you off with some very clear pen-and-pencil analogies to a computer program, carefully introduces you to one new concept at a time, frequently recaps previous material, and takes you right through to direct-access file techniques and advanced table manipulation. And he shows you lots of simple little gimmicks that no one ever remembers to tell beginners about: one example is the use of underlining and leading for more legible printouts. Through all of this, Coddington studiously avoids any discussion of hardware-specific programming — just plain ol' COBOL.

The typography and manufacture of this little volume are not exactly what you'd expect for the price, but you'll get your eight bucks' worth of COBOL knowledge and be glad you spent the money. When you finish this book, you'll have enough courage to crack open the vendor's COBOL manual, which you'll immediately wish Coddington had written. — E.B.

NEWS ROUNDUP

COMMON INTERESTS

National Cash Register and Control Data have jointly funded and staffed an Advanced Systems Laboratory for the purpose of developing an integrated and compatible line of mainframes and software. This latest combined step extends the expertise-pooling policies announced in January of last year when the two firms agreed to form jointly-owned Computer Peripherals, Inc., which has since delivered more than $100-million worth of equipment to its parents.

SEQUEL TO "THE MISSIONARY UNMASKER"

Hewlett-Packard is offering new software to prevent a repetition of the incident described last month in MODERN DATA ("The Case of the Missionary Unmasker"). In summary, a student at Southern Missionary College had defeated the masking algorithm used to code files of examination questions stored in SMC's H-P 2000 timesharing system by comparing an encoded listing of all the questions in one examination with a straight-text printout of some of the questions from the same examination. Since the bit mask remains constant for each character, breaking the code only required constructing a symbol table against which the masked characters could be matched. The technique is described in Edgar Allan Poe's "The Gold-Bug," from which came the lead quotation in our September article.

Don A. Pantle, product manager for timeshare systems at H-P's Data Systems Division, informed MODERN DATA that the new H-P software does not affect the bit mask (which will continue to be created by the file originator), but does prohibit any part of an encoded file from being listed without first entering a password, i.e., it adds another level of security. Pantle said he considered sophisticated masking algorithms, such as those which utilize random number generators initialized from real-time clocks, but rejected them "So our customers won't have to revise any of their programs to increase file security." Concluded Pantle: "I think [the new H-P software] is a good long-term improvement for our timeshare systems. The so-called 'cracked code caper' is over."

CIA DOWN ON DATASPEED 40

The Computer Industry Association is mobilizing to protest the marketing of AT & T's recently-announced *(Communications Clinic, July)* "Dataspeed 40" terminal line. CIA contends that the Dataspeed 40 terminals, which are offered by AT & T's Teletype Corp. subsidiary, "can readily be modified to become 'intelligent,'" thereby violating the FCC's order proscribing common carriers from offering EDP equipment and services. AT & T argues that the system — which includes keyboard, display, and printer — is "nonintelligent" and provides no more than the basic I/O capabilities previously available in Bell System equipment, albeit in a faster and more versatile configuration.

COMPUTER SERVICES INDUSTRY

The Association of Data Processing Service Organizations' seventh annual study reveals that computer service industry revenues in 1972 reached $2.58 billion, a 12% gain over 1971. Nearly 1600 firms were found to be offering computer services in 1972, up 7% from the previous year. Other highlights of the ADAPSO study:

- Data centers (batch-processing) provided the largest portion of revenue — 44% of total ($1.15 billion).
- On-line services has grown from 4% in 1966 to 23% of total in 1972 ($580 million).
- Software provided 15% of market share in 1972 ($390 million).
- Keypunching, OCR use, COM, training, and facility management accounted for 18% of the total market in 1972 ($460 million).
- In 1972 the industry employed 52,000 people, had 4,145 computers, and served 179,520 customers — a net average increase per customer of 10.5 employees from 1971.

The complete study is available from ADAPSO, 551 Fifth Ave., New York, N.Y. 10017 for $95.00/copy.

MEMOREX WRITE-OFFS

Subject to approval by the Securities and Exchange Commission, Memorex will write-off $35 million in R & D and lease acquisition costs by changing from deferred to accrual accounting. Together with inventory write-offs expected to exceed $50 million, the company's negative net worth would be approximately –$55 million. Comments in the financial press that Control Data is talking with Memorex about a possible merger or acquisition have not been confirmed by either company.

BITS & BYTES

Four days before the collapse of a New York subway tunnel trapped hundreds of commuters and caused at least one death, Data General announced that engineers at the University of Texas were using a D.G. system developed for the U.S. Bureau of Mines to detect weak spots in the roofs of mine tunnels.

Cambridge Memories, Inc., has announced that IBM has approved "regular" maintenance of CMI's new series of "transparent" main memories, which can quadruple the nominal 64K storage capacity of 360/30 computers. This appears to be the first time that IBM has extended other than a "best efforts" level of maintenance to an independent supplier of extended 360/30 memory.

Miffed that the Postal Service has not issued a commemorative stamp for the computer industry, the Data Processing Management Association is urging EDPhilatelists to prod the Posties by writing to: Citizens' Stamp Advisory Committee, c/o Executive Functions Group, Washington, D. C. 20260

The 27th consecutive IEEE Northeast Electronics Research and Engineering Meeting, to be held this November 6-8 in Boston's Hynes Auditorium, will include seminars on display systems, signal processing, and minicomputer business applications. For more info, contact the NEREM business office at (617) 527-5151.

The long-standing argument about whether programmers should slash the zero or the "oh" finally may be resolved by The Canadian Standards Association, which has proposed to its Sectional Committee on Computers, Information Processing and Office Machines that the issue finally be decided.

It's not that their graphics terminal is dumber.

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The Computek 300S:
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Let's face it. When you're talking low-priced, high quality graphics terminals, you're talking us and them. You already know about them, so now we're going to tell you about us. And in the process, we hope to impress you with a few significant differences.

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Selective erasing.

An especially good thing about our raster scan 300S is this: it lets you selectively edit vectors and characters quickly, easily, and one at a time. No need to erase and re-write the entire screen, which is what you have to do with theirs.

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Maybe one of the nicest plusses we offer is our scroll feature, which lets you roll the display up just like an actual scroll. It's a truly useful convenience, and once you've used it you're spoiled forever. We're happy to say that of the low-priced two, we're the only one who has it.

Other bright features.

The Computek 300S has a lot of standard features that help make it a standout in its field. It's highly interactive. Its picture build-up is very fast, even from slow data rate channels. It has a complete Fortran-based software package. Its video output can be fed directly to standard TV monitors. It has hard copy and graphics input options. It has serial and parallel computer interfaces available off-the-shelf. It's compatible with our Series 400 line of storage-tube terminals. And it complements our Series 200 line of programmable alphanumeric terminals and our GT50 graphics tablets.

The right byte.

You may have heard a lot about the wonders of 10 bit display. We won't deny that it's good. But a low-priced graphics terminal with 10 bit display will cost you in one of three ways: (1) More money. (2) Less features. Or (3) less quality. So we ask you to consider this: Why pay more for 10 bit when 8 bit will do just as well? (We'll tell you an interesting story about 8 bit vs. 10 bit when you ask us for information on the 300S.)

The right price.

We offer this very attractive graphics terminal at a very attractive price. A price, we're happy to say, that many satisfied users found irresistible. And if you're an OEM, or you order in quantity, we'll make it even more attractive with a nice sizable discount.

Smart Money.

Now that we've given you a peek at our 300S, we expect you'll want to see a whole lot more. So get in touch with us soon, and we'll get back to you with all the literature we have. We're anxious to show you why the smart money is on the Computek 300S: the brightest graphics terminal of the low-priced two.

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CIRCLE NO. 14 ON INQUIRY CARD

INTERNATIONAL NEWS

JAPAN USED COMPUTER MARKET

According to reports by a Tokyo electronics weekly, the Japanese Ministry of International Trade and Industry (MITI) has initiated a special financial assistance program which makes it possible for certain organizations to obtain used Japanese computers for as low as 15 per cent of their original price.

This is seen in the U.S. as a move to counteract the forthcoming total import liberalization which is expected to become effective in 1975. MITI fears that once computer imports become de-restricted, many Japanese users will be tempted to import large numbers of used American-made computers.

The measure appears to have stirred-up resentment among some Japanese firms as well. Japanese service bureaus worry that the sudden availability of low-priced systems — regardless of where they were manufactured — will reduce demand for their own services.

NORWEGIAN MINI

A successful bid for computers to CERN, the European Atomic Energy Agency, has focused attention on Norway as a computer manufacturer. Although Norwegian computers are hardly known outside of the Scandinavian countries, Norway has had its own small computer for several years. The NORD-10 is a 16-bit mini manufactured by A/S NORSK DATA-ELEKTRONIKK of Oslo. It is claimed to be a virtual memory machine competitive with DEC's PDP 11/45, and comes with Basic, Algol, Fortran IV, and a real-time operating system.

CANADIANS DRAFTING CASSETTE STANDARD

The Canadian Standards Association has organized a committee to draft a national standard on the Magnetic Tape Cassette for Information Interchange. The committee will operate under the jurisdiction of the CSA Sectional Committee on Computers, Information Processing, and Office Machines. Persons wishing to participate in the development of the standard are invited to write H.Z. Rogers, Standards Division, CSA, 178 Rexdale Boulevard, Rexdale, Ontario.

POLAND'S COMPUTER PRODUCTION PICKING UP

When the Second National Information Processing Conference was held in Poznan last April, the value of information processing equipment manufactured in Poland during 1972 was said to be approximately equal to the value of all such equipment produced in Poland at that time. During 1972, Polish ELWRO plants manufactured a total of 500 computers, of which 180 units were exported to the Soviet Union, East Germany, Czechoslovakia, Romania, Hungary, Bulgaria, North Korea, and Pakistan. Production is expected to double in 1973, but even so Poland will not be able to meet its demand for minicomputers, memories, discpacks, and data input systems. Four different types of minicomputers are now under development in Poland: The MKJ-25, K-202, ORDA1325, and MOMIK 8B.

INDIA TARGETED FOR SOVIET RIAD SERIES

Advertisements for Soviet RIAD computers are appearing in the Indian press. While not a very large market at present, India nevertheless presents excellent opportunities for Soviet computer marketeers. Second-generation IBM 1401 machines, most of them locally "refurbished" after having been discarded by other countries, are common in India. The Indian computer industry never liked being a "dumping ground" for used computers and may show a certain hostility to further Western penetration of the same type. The RIAD machines are IBM 360 compatible and would make a logical replacement for Indian 1401s able to take advantage of existing 1401 to 360 conversion software.

MEXICAN EXPOSITION

By July 1974 Mexico will have about 800 computers installed and operating, up from an estimated 650 at present. The high growth rate in Mexico of about 20% per year in computer installations is expected to continue at least until 1976. This was the opinion of the Sociedad Mexicana de Computacion in its booklet describing the International Computer Exposition which took place in Mexico City this summer. Thirty manufacturers took part in the exposition, including Burroughs, CalComp, Computer Machinery, DEC, Singer, General Automation, H-P, IBM, Inforex, NCR, Olivetti, TI, and Xerox.

HUNGARIAN COMPUTERS

At present there are about 150 computers installed in Hungary and this number is expected to grow to 400 by the end of 1975. By that time about half of all the computers in Hungary are expected to be used in industry and agriculture and one-fifth for scientific and research institutes. One-tenth of the machines are planned for educational applications. The Hungarian state computer manufacturing firm is Videoton, which employs 14,000 and includes several production plants and research institutes as well as a foreign trade organization. Videoton produces the Hungarian RIAD R-10 minicomputer and the VT 1010/B computer based on the French CII 10010 license. The company also manufactures the Videoton 343 line printer under license from Data Products of California.

QUICKLY AROUND THE WORLD

Bulgaria: Watch for aggressive marketing of the home-grown IZOT 310 mini, a *non*-RIAD-compatible 12-bitter with 1.6 microsecond full cycle time. *Izotimpex* is the foreign trade agency for Bulgarian manufacturer IZOT.

USSR: Michail Lavretyev, Soviet scientist and member of the Academy of Sciences of the USSR, indicated in an article that the Academy's Institute of Precision Engineering and Computing has been working for several years on laser memories capable of access time in the several million operations per second category.

Republic of China: Commenting on future liberation of export controls to increase sales of computers to communist countries, a panel of DoC officials noted that even without U.S. controls, Soviet objections would likely prevent substantial U.S. high-technology exports to the People's Republic of China.

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And, unlike chemical carbonless paper, the image transfer is instantaneous and permanent.

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CIRCLE NO. 15 ON INQUIRY CARD

D.C. DATASCAN

PRODUCTIVITY: Automation and management improvements have reduced wage costs by more than $200-million since 1967 in those Federal organizations that maintain individual citizens' records, according to a joint research project report prepared by the General Accounting Office, the Office of Management and Budget, and the Civil Service Commission. The three agencies teamed to study productivity in the Federal Government over a period of six fiscal years, 1967-72. The agencies that chalked up the automation and management improvements, according to Comptroller General Elmer Staats, include the Social Security Administration, Selective Service System, and the Internal Revenue Service. "By use of automation and streamlined procedures," Staats said, "this group [of agencies] has been able to hold its employment growth to only 2% a year. Thus its productivity growth has averaged 3% a year." The impact of automation on productivity has also been pronounced in the overhaul and repair of heavy equipment by the industrial activites of the Fed, according to the Comptroller General. "We found an annual rate of improvement in productivity of 6% — worth to the taxpayer between 1967-72 at least $350-million in lower payroll cost."

OTP VIEW OF PRIVACY: In testimony before the Subcommittee on Foreign Operations and Government Information of the House Committee on Government Operations, Clay T. Whitehead, director of the Administration's Office of Telecommunications Policy, said, "Privacy as a fundamental value is essential to a democratic system, which has, as its highest goal, the liberty of the individual. Privacy, however, is not absolute. There is an inherent conflict, for example, between the Government's need for information to pursue justice and an individual's need for personal privacy." Whitehead informed the subcommittee that OTP is investigating the adequacy of common law, statutes, and Federal regulations to protect individuals regarding the privacy of their electronic communications and the security of the systems carrying them. "This is being done," he explained, "with the view toward identifying what policies, standards, or legislative safeguards are necessary."

Another problem area discussed was the potential of Government information systems for propagandizing: "Efforts to . . . utilize various types of information systems . . . could possibly become new avenues for Federal propaganda, even though that is not the intended result."

NEW GOVT. EDP PUBLICATIONS

Order prepaid from: Superintendent of Documents, U.S. Govt. Printing Office, Washington, D.C. 20402.

Recorded Magnetic Tape for Information Interchange (800 CPI, NRZI). $.20 — SD Catalog No. C13.52:3/1.

Flowchart Symbols and Their Usage in Information Processing. $.20 — SD Catalog No. C13.52:24.

A Study of Six University-Based Information Systems by B. Marron et al. $1.25 — SD Catalog No. C13.46:781.

Controlled Accessibility Bibliography by S. Reed and M. Gray $.35 — SD Catalog No. C13.46:780.

Alan Drattell, Washington Editor

ERVIN AND ABZUG: Two advocates of civil liberties, Sen. Sam J. Ervin Jr. (D-N.C.) and Rep. Bella Abzug (D-N.Y.), have introduced identical bills in the Senate and House, respectively, called the "Freedom from Surveillance Act of 1973." The bill protects the constitutional rights of American citizens by prohibiting the Armed Forces from collecting information or conducting surveillance upon persons unaffiliated with the military. The bills are a result of the 1971 hearings held by Ervin's Subcommittee on Constitutional Rights.

CRIMINAL DATA BANKS: Rep. Don Edwards (D-Cal.), in introducing a bill in the House to regulate the operation of criminal data banks, said that Congress can no longer assume that the necessary security and privacy precautions will be established without Congress exercising its responsibility to legislate parameters for their operation. He was particularly critical of the National Crime Information Center (NCIC) maintained by the FBI. "There is presently a controversy raging between the Justice Dept. and the State of Massachusetts as an example of difficulty with NCIC, in particular, because there are no statutory guidelines providing for the privacy and security of these [criminal] records." He also cited the fallibility of raw arrest records, which merely record an arrest but not necessarily a conviction. Of the 8.6 million arrests per year for all criminal acts, excluding traffic offenses, approximately four million are never prosecuted or have the charges dismissed, Edwards said. However, access to these raw records by government agencies not necessarily connected with the task of law enforcement, private industry, and credit bureaus "is a widespread practice."

SYMPOSIUM: Problems faced by the data manager in the design and maintenance of automated systems will be the subject of a symposium to be held Jan. 24-25, 1974, at the National Bureau of Standards, Gaithersburg, Md. NBS and the American National Standards Institute's Committee on Representations of Data Elements are co-sponsoring the meeting. Some of the areas to be covered include automated data element dictionaries, data element management, the organizational placement of the function of data element management, and the impact of changing the form of data presentations in integrated data bases. For program and registration details, contact Mrs. Hazel McEwen, Institute for Computer Sciences and Technology, NBS, Washington, D.C. 20234, or call her at 301-921-3551.

SEMINARS: A series of three-day seminars on "ADP Procurement in the Federal Government" will be given this fall and winter by Government Sales Consultants, Inc., a marketing support firm. The seminars will include workshops on solicitation structuring, evaluation criteria, protest procedures, and protective clauses in contracts. Contact Government Sales Consultants, Inc., 1730 N. Lynn St., Suite 400, Arlington, Va. 22209.

ORDERS AND INSTALLATIONS

Systems Control, Inc. (Palo Alto, Cal.) announced receipt of a $1.3-million contract from the Naval Electronics Systems Command to design and operate a new computer system to interface with ARPANET, the military data and communications network, as well as the ILLIAC IV ultralarge-scale computer at Ames Research Center in Sunnyvale, Cal.

The General Services Administration has renewed its contract with Computer Sciences Corp. for services provided federal agencies nationwide by the company's INFONET remote data processing network. The renewal, effective July 1, 1973, extends for one year a contract awarded in March 1972 containing options for three one-year renewals. CSC revenues from its current GSA contract exceed $550,000 monthly.

Fiat, Europe's largest automobile manufacturer, has ordered a Univac 1110 computer system valued at approximately $11.2-million for installation at the concern's headquarters in Turin, Italy. Delivery is scheduled for early in 1974.

The order is the second to be received by Sperry Univac, a division of Sperry Rand Corporation, for a large-scale Univac 1110 system from the automotive industry. Last December, Toyota Motors Company took delivery of a Univac 1110 2 x 2 model at their facilities in Nagoya, Japan.

Leader Corp., a bank d-p firm based in Alamogordo, N.M., has signed Seattle Trust and Savings Bank to a five-year facilities management contract valued at more than $4-million. Leader was recently affiliated with Boeing Computer Services, Inc.

What Hath Babbage Wrought

"CDCUCACNCE" INDEED!

One of our students was writing an interactive program which he thought should begin with an appropriate and heart-warming comment. However, after entering his name while testing the logic of the program, he received the following response, which was something less than heart-warming.

PLEASE TYPE YOUR NAME
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IT IS A PLEASURE CDCUCACNCE! WHLP'Q%J PPP≺≺/&]M&%BD ≺M/@@H/0) 9Z[OAKH/KKKKKK09)/'K1KKB%JJNRJM≺M W X YA] (MIIII≺

Submitted by:
Mr. Duane Meade and Prof. R. Waldo Roth
Taylor University
Upland, Indiana

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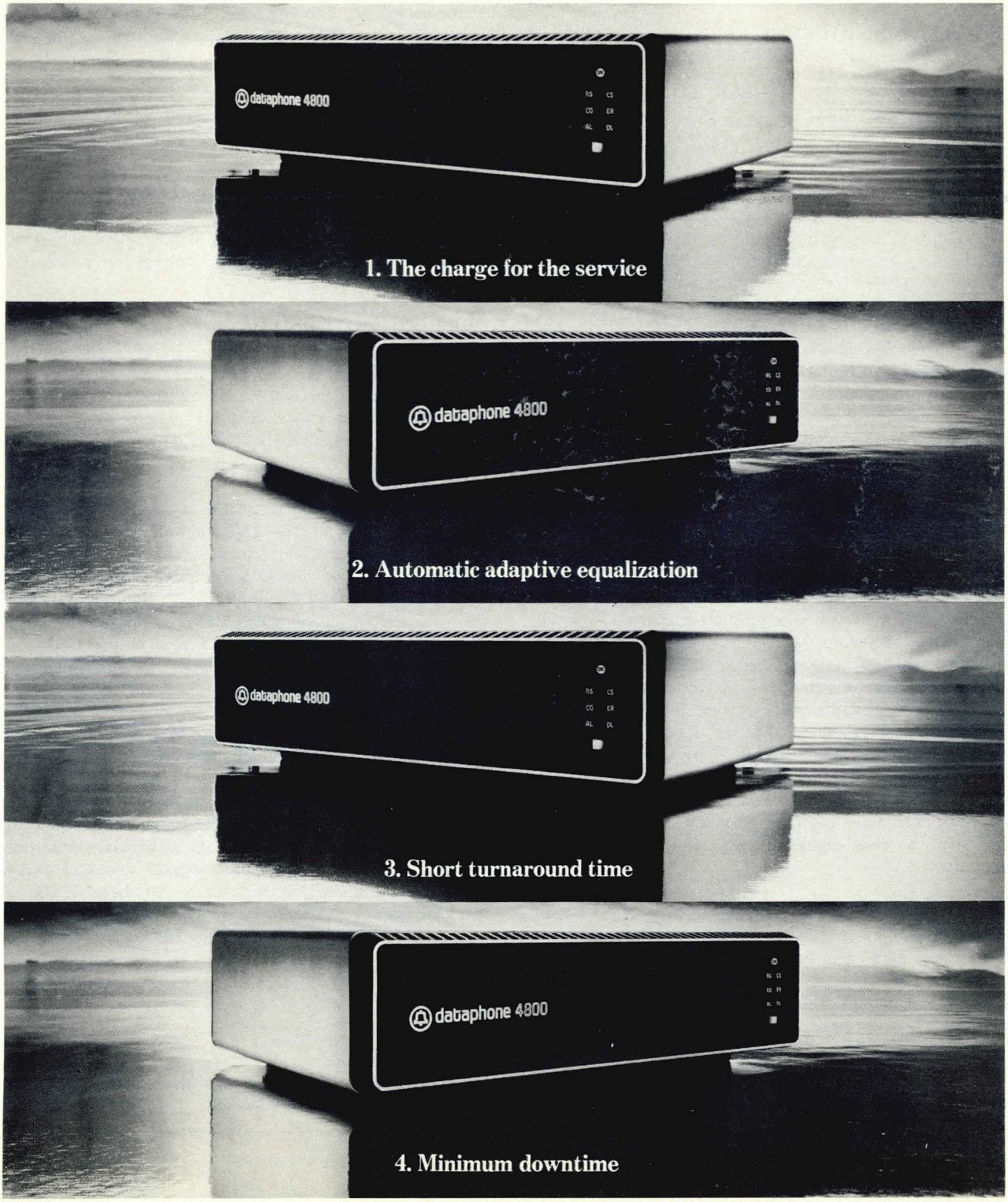

CORPORATE PROFILE

Featured this month:

RYDAX, INC. (Over-the-Counter)

San Rafael, California

OFFICERS & DIRECTORS: ***Isaack Herman,*** Chairman of the Board, Secretary-Treasurer; ***Chandos A. Rypinski,*** President, Director; ***Ralph W. May,*** Executive Vice President, Director; ***Jaime E. Pera,*** Vice President-Engineering; ***Edward L. Machulak,*** Director; ***Leonard Goldstein,*** Director; ***Isaac Lamon,*** Director; ***Stephen A. Luce,*** Director.

BACKGROUND: Rydax, Inc., a California company, was incorporated in January 1969 as the successor to C.A. Rypinski Company, the sole proprietorship of Chandos A. Rypinski, Rydax' co-founder and president. The proprietorship designed and produced a digital data system for commercial vehicular radios under a contract with RCA through 1968. By 1969, Rydax had successfully produced an electronic system for reliable transmission of high-speed teleprinter messages over noisy and unstable high frequency radio circuits. In early 1970, the company offered a family of circuit modules for interfacing computers with radio and telephone systems. Rydax became a public company in November 1972.

Isaack Herman, a co-founder and currently Chairman of the Board, has been for ten years the sole proprietor of I. Herman Co., a communications consulting firm. He was a founder and vice president of Secode Corp., and has been employed in various capacities by General Electric Co. Chandos A. Rypinski, co-founder of Rydax, has been president, treasurer, and a director of the company since its inception. Previously he was vice president for engineering at Secode Corp., and before then he was associated with Collins Radio as engineering group leader. Ralph W. May, vice president-marketing, was previously associated with I. Herman Co. Prior to that, he was employed by Northrop-Page Communications, Washington, D.C., as vice president for international marketing, and before that by General Electric as western regional manager for telecommunications. Jaime E. Pera, vice president for development, was previously Project Engineer and Chief Engineer of C.A. Rypinski Co. Before that, he was engineering group leader of Secode Corporation.

FACILITIES: Rydax leases a total of 3,703 ft.^{2} in two buildings. Machinery and equipment consist mainly of manufacturing assembly and test equipment. Most electronic test equipment is leased on an annual basis. Rydax currently employs 44 people, of whom eight are in administration, four in marketing, 16 in engineering, and 16 in production. This nucleus is supplemented by subcontract engineering and manufacturing personnel as needed.

PRODUCTS: Rydax designs and manufactures data communication and instrumentation equipment. The principle products are vehicular status reporting (VSR) systems and telephone traffic data recording (D101) systems. To a lesser extent, the company also manufactures data acquisition and control systems (DACS), teleprinter automatic control terminals (TACT), and mobile telephone systems (ACS).

VSR systems transmit digital information over short-wave radio channels. These brief (fraction-of-a-second) transmissions can be used, for example, to report the location and status of a taxicab to a central dispatcher without the high levels of noise often present on such frequencies. VSR systems are used by OEMs in their 2-way radio products.

D101 equipment collects statistical telephone usage information needed to design exchanges and cables, distribute traffic, and calculate long-distance toll sharing among telephone companies. The equipment — including master terminals and displays, data accumulators, and data communication components — is used in the construction of end-user telephone reporting systems.

DACS systems perform remote control and telemetry functions over low-grade, noisy communication channels.

TACT terminals transmit and receive hard-copy messages over low-grade short-wave channels, and are principally used where telephone circuits suitable for teleprinter services are not available.

"All Channel Signaling" (ACS) mobile telephone systems are two-way voice communication systems for stationary or mobile use.

CURRENT POSITION: VSR equipment typically accounts for slightly more than half of the company's revenues, and D101 systems contribute approximately 90% of the remainder. Rydax now enjoys about 1% of the total market for these products. The great majority of sales are to OEMs, primarily to RCA, Canadian Marconi, Digital Telephone Systems, and Hawaiian Telephone Co.

OUTLOOK: By extrapolation of data on existing markets of related products, and the application of its own knowledge of the field, Rydax management estimates that the total market potential for the company's products will increase to some $95-million in 1973. Beyond 1973, the growth rates of these markets, some of which Rydax is just now entering, should greatly exceed the growth rate of the GNP. The company is now developing additional products which it intends to sell directly to end-users.

FINANCIAL SUMMARY: In November 1972 Rydax completed its initial public distribution, consisting of 100,000 shares of common stock priced at $5 per share. Darwood Associates, Inc., New York City, was managing underwriter. The present capital structure of the company shows 381,072 shares issued and outstanding, with additional unexercised options and warrants for another 65,327 shares at various prices from $1.28 to $5.50 per share. Of these, 12,366 are qualified options to employees. Order backlog was $850,000 as of August 20, 1973. The company has no long-term debt. Federal income tax loss carry-forwards are available in the following amounts: 1974, $150,000; 1975, $145,000; 1976, $5,000.

Period Ending	Revenues	Net Income (Loss)	Earnings (Loss) per share
12 mos. 12/31/70	396,383	(142,420)	(0.77)
12 mos. 12/31/71	528,959	(3,924)	(0.02)
12 mos. 12/31/72	745,752	44,390	0.16
6 mos. 6/30/72	344,432	31,080	.10
6 mos. 6/30/73	533,832	24,764	.07

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CIRCLE NO. 19 ON INQUIRY CARD

CORPORATE AND FINANCIAL NEWS

MARKETING RIGHTS: TRW Inc. has been granted exclusive international marketing rights for the commercial distribution of Datapoint Corp. products for the next ten years. Equipment marketed under the agreement will be designated as TRW/Datapoint products. The new agreement expands a previous one under which TRW served two years as master distributor overseas for selected Datapoint terminal products.

MERGERS AND AQUISITIONS: **California Computer Products, Inc.** has purchased the assets and liabilities of **Signal Galaxies, Inc.**, a subsidiary of The Signal Companies. Operations will continue as CalComp Galaxies, Inc. . . . **Compu-Serv Network, Inc.**, a national data services firm based in Columbus, Ohio, with network services in twenty-one metropolitan areas, has acquired **Alpha Systems, Inc.** of Dallas, another remote computing firm. . . . **Lynch Communications Systems, Inc.** has acquired **Cirtel North Inc.**, of Mountain View, Cal., for an undisclosed amount. Cirtel North, a wholly-owned subsidiary of Cirtel Inc. of Irvine, Cal., manufactures printed circuit boards. . . . **Rockwell International Corp.** is offering to purchase all outstanding shares of **Collins Radio Co.** at $25.00/share. The offer, which is not conditional on any minimum number of shares tendered, will lead to a proposal of merger if more than 1.68 million shares are acquired. Rockwell already has a majority of directors on Collins' board as a result of its September 1971 purchase (for $35-million) of Collins convertible preferred stock and warrants. . . . **Western Union Corp.** has consummated its previously-announced acquisition of **National Sharedata Corp.** of Dallas. The acquisition was completed as planned through a tax-free pooling-of-interests transaction in which .387 share of Western Union common stock was exchanged for each outstanding share of National Sharedata common . . . **Okidata Corp.** (Moorestown, N.J.) and **Photon, Inc.** (Wilmington, Mass.) announced an agreement under which Okidata will acquire **Bridge Data Products, Inc.** of Philadelphia, Pa., a wholly-owned subsidiary of Photon. Terms of the agreement were not disclosed.

BOX SCORE OF EARNINGS

COMPANY	PERIOD		REVENUES	NET EARNINGS (Loss)	EARNINGS (Loss) PER SHARE
Advanced Computer Techniques	3 mos.	6/30/73	901,000	28,300	.04
		6/30/72	797,000	20,500	.03
Cambridge Memories	9 mos.	5/31/73	8,271,910	425,682	.33
		5/31/72	2,636,495	129,546	.13
Comress	6 mos.	6/30/73	2,589,100	(193,800)	(.03)
		6/30/72	2,898,900	71,700	.01
Cybermatics	12 mos.	3/31/73	6,992,366	(776,595)	(.78)
		3/31/72	5,836,993	200,702	.20
Data 100	6 mos.	6/30/73	17,091,000	1,226,000	.42
		6/30/72	3,782,000	(3,938,000)	(3.08)
Datronic Rental	12 mos.	6/30/73	4,118,124	352,772	.52
		6/30/72	3,349,897	(709,062)	(1.03)
ECRM	6 mos.	6/30/73	2,439,385	(112,042)	(.10)
		6/30/72	2,381,724	408,452	.43
Elect. Mem. & Mag.	6 mos.	6/30/73	51,644,000	3,426,000	.54
		6/24/72	33,889,000	560,000	—
Electronic Assoc.	6 mos.	6/29/73	21,997,000	1,023,000	.38
		6/30/72	18,787,000	418,000	.16
General DataComm Industries	9 mos.	6/30/73	4,905,698	372,733	.25
		6/30/72	3,411,459	370,828	.30
Gould	12 mos.	6/30/73	619,458,000	23,862,000	2.83
		6/30/72	471,289,000	19,340,000	2.30
Harris-Intertype	12 mos.	6/30/73	447,469,000	16,363,000	2.60
		6/30/72	370,908,000	13,788,000	2.17
Hewlett-Packard	9 mos.	7/31/73	462,745,000	33,804,000	1.26
		7/31/72	342,583,000	24,458,000	.93
Industrial Nucleonics	6 mos.	6/30/73	26,811,000	1,985,000	.58
		6/30/72	19,712,000	1,774,000	.53
Info. Magnetics	6 mos.	6/30/73	7,960,815	291,110	.23
		6/30/72	1,888,287	78,598	.08
Int'l. Timesharing	12 mos.	5/31/73	4,090,827	(184,593)	(.09)
		5/31/72	3,247,573	(27,304)	(.01)
Mathematical Applications Group	3 mos.	6/30/73	885,795	13,315	.02
		6/30/72	414,208	(66,719)	(.08)
Mentor	12 mos.	6/30/73	4,720,219	201,552	.15
		6/30/72	3,205,480	279,524	.26
No. American Philips	6 mos.	6/30/73	359,855,000	16,113,000	1.81
		6/30/72	319,598,000	10,895,000	1.22
Optronics Int'l.	6 mos.	6/30/73	1,043,422	109,736	.17
		6/30/72	574,395	96,878	.15
Rapidata	6 mos.	6/30/73	4,552,721	498,284	.27
		6/30/72	3,718,510	452,735	.24
Saxon Industries	6 mos.	6/30/73	182,755,700	3,578,900	.47
		6/30/72	153,856,900	3,947,200	.52
Sealectro	6 mos.	6/30/73	7,410,059	312,830	.31
		6/30/72	5,730,493	(44,565)	(.04)
Sierra Research	6 mos.	7/1/73	8,848,863	36,660	.04
		6/25/72	7,184,475	112,867	.14
Simplicity Comptr.	6 mos.	4/30/73	1,136,463	99,588	.20
		4/30/72	1,471,620	104,029	.21
Storage Technology	26 wks.	6/29/73	23,040,000	3,120,000	.91
		6/30/72	9,580,000	932,000	.30
Sys. Development	12 mos.	6/24/73	72,435,000	1,531,000	.80
		6/25/72	51,154,000	1,239,000	.71
TEC	12 mos.	6/30/73	7,473,293	758,662	1.11
		6/30/72	4,806,541	272,545	.40
Technitrol	6 mos.	6/30/73	4,968,779	214,406	.15
		6/30/72	2,229,642	(21,697)	(—)
Tymshare	6 mos.	6/30/73	11,172,597	907,691	.30
		6/30/72	7,609,029	394,842	.13
Vernitron	26 wks.	6/30/73	20,867,040	1,185,638	.28
	27 wks.	7/1/72	17,676,237	709,967	.20

EXPANSIONS: Cambridge Memories, Inc. of Concord, Mass., has purchased a 49-acre site with two plants located in Poughkeepsie, N.Y. Cambridge will use the facilities to produce chips for its MOS-LSI memories. . . . Sperry Univac will construct a three-story, 200,000 ft.^{2} office building on its Blue Bell, Pa., complex. The multi-million dollar facility will be located next to the company's present administrative headquarters, and will house all marketing personnel . . . General Automation, Inc., has leased a 130,000 ft.^{2} building adjacent to its present corporate headquarters in Anaheim for manufacturing and warehouse operations.

RECENT ENTRIES: I.P. Sharp Associates of Toronto and Sligos of Paris have formed a jointly-owned company, provisionally to be known as **APL Europa.** The new firm, to be established in Brussels, will offer APL timesharing services via various operating companies (some already established) to European firms . . . The former v-p and co-founder of Signal Galaxies, Inc. (see *Mergers and Aquisitions*) has formed his own company, **Carl Lekven Co.,** specializing in systems research and "advanced memory organizational work" . . . **Three Phoenix Co.** has been formed by the former v-p/gen'l. mgr. and former engrg. mgr. of Wabash Computer Corp. The new firm has acquired the disc products of Wabash and will continue marketing them — as well as a newly introduced transceiver utilizing the 3M ¼" tape cartridge . . . The formation of a new, jointly-owned company to be headquartered in Brussels was announced by *Lockheed* and *SAIT Electronics, S.A.* to be known as **Lockheed-SAIT Electronics, S.A.** The new Belgian corporation will market and service Lockheed "SUE" minicomputer and SAIT peripheral equipment . . . *Lynch Communication Systems, Inc.,* headquartered in Reno, Nevada, has formed a new distributing company to handle sales of PABX equipment, key systems, and speech scramblers to the interconnect market. The new company, **Lynch Interconnect Supply, Inc.,** will be the exclusive distributor for PABX products of *Information Dynamics Corp.,* Plano, Texas, and for all Lynch interconnect products, including key systems manufactured by *Transcom Electronics, Inc.,* Portsmouth, R.I., a wholly-owned subsidiary of *Lynch.*

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It probably won't interest you that this charisma cost us a bundle. But you might be impressed to know we adapted its building-block circuitry from our field-proven (albeit homely) Series 200. To give you charisma *plus* uncompromised performance, reliability, and economy. And to sell more display terminals.

DESIGN III is available in 16 off-the shelf RO, KSR, and ASR models and 78 basic optional configurations. Choice of 6 display formats (up to 3200 characters) plus upper/lower case. Single quantity prices start under $1000. OEM prices can't be discussed in mixed company.

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. . . creating new ways to communicate

CIRCLE NO. 21 ON INQUIRY CARD

MAGNETIC LARCENY

Print paper money, and thieves will use presses;
issue plastic money, and thieves will use embossers;
encode magnetic money, and thieves will use tape recorders.

The potential for credit card fraud achieved a high degree of public visibility in August, when a *Business Week* article disclosed the "how to" details of three ingenious but simple card-counterfeiting methods that had been hinted at earlier in the year. The schemes contained a touch of irony: they all depended on the magnetic stripe that many card issuers are now using for rapid, online credit authorization.

The simplest and cheapest of the potential swindles involved tickets for San Francisco's Bay Area Rapid Transit System (BART). Similar in appearance to a bank or travel card, the BART ticket has a magnetic stripe that stores a dollars-and-cents value which is decremented each time the card is used in a turnstile. Unfortunately for the transit system, the heat from a household iron can be used to transfer the magnetically-encoded value of a new $20 ticket to an ordinary piece of recording tape, which can then be glued onto a used-up ticket.

But the fraud potential doesn't stop with streetcar fares. The use of the magnetic stripe is already widespread, and has been gaining considerable momentum this year. American Express, which began to attach the stripe to its 4-million travel and entertainment cards way back in March 1972, will begin this month to install "many thousands" of Addressograph-Multigraph Credit Authorization Terminals (AMCAT — see photo) in its major affiliated service establishments. Mutual Institutions National Transfer System (MINTS), an affiliate of the National Association of Mutual Savings Banks, is busily building a nationwide funds transfer system around its own card. And several regional banking groups have had similar systems up and running for some time.

The potential market for terminals to read these cards is enormous. There are more than 60-million bank credit cards alone in the United States. Add in the airline, travel and entertainment, oil company, and retail store plastic and the total is somewhere between 200- and 300-million cards. And terminal equipment suppliers apparently are banking on the magnetic stripe technology. Besides Addressograph-Multigraph, current vendors of magnetic-card-reading terminals include IBM, Burroughs, Litton Industries, and Pitney-Bowes. New terminals, from both domestic and foreign manufacturers, are appearing all the time.

In the midst of all this magnetic momentum, is anyone really worried about the sophisticated thief? Many are not, or at least not publicly. MINTS, Chase Manhattan Bank in New York, and at least one regional banking group all say they have run tests and are satisfied. The American Bankers

Addressograph-Multigraph's AMCAT terminal — a mag stripe reader.

Association, which has endorsed the stripe, conducted 18 months of tests and found not one case of fraud "in a live environment."

But others do worry. Carte Blanche, for one, is standing on the sidelines waiting for more substantial encouragement. The worst doubts came from First National City Bank in New York, whose Transaction Technology subsidiary has an alternate card-reading system. In fact, it was Citibank's sponsorship of a fraud-engineering contest earlier this year that elicited the ingenious card-tampering methods later disclosed by *Business Week*. The announcement of the contest results immediately brought accusations of "vested interest" against the bank, since its machine-readable card uses a secret recording medium different from magnetic tape. In any event, the vigorous criticism of the bank's "grandstanding tactics" — a phrase attributed to John Fisher, vice president of City National Bank (Columbus, Ohio) in a *Wall Street Journal* article — may very well have masked some real fears.

Whether the magnetic stripe, or Citibank's mysterious medium, or some other means of machine-readabe recording is to be used on plastic cards, there is a broader question here: *Should the security reside in the card, in the computer system, or in both?* And while the users, potential users, and vendors of these systems are all trying to agree on that one, they might also pause to consider whether some old-fashioned means of verifying the card *bearer's* identity, like a photograph, may still be a useful element in any security system. ▲

Digicoder processor, tape transport and Versatec electrostatic printer.

DIGICOM'S DIGICODER: A SIGHT FOR SORE EYES

Tired of analyzing large masses of data? Digicom's line of "direct digital graphic" display products could be more helpful than eyedrops.

The Phoenicians, they say, had a system. They called it "0123456789." Nobody could pronounce it, but everybody liked it. It not only looked good on papyrus, but it worked so well that nobody called for any improvements for a couple of thousand years.

Well, some people finally got too much of a good thing. Specifically, people who analyze great masses of computer-generated data, say from continuous test and monitoring equipment. For these bleary-eyed analysts, an optically-weighted font produced by the Digicoder processor of Digicom Inc. (North Chelmsford, Mass.) looks like it could offer far better relief than eyedrops.

The optical-weighting technique, originally conceived by the Lowell Technological Institute Research Foundation, was utilized by Digicom in a specialized line of scientific equipment. The Opti-Font, as Digicom calls its optically-weighted hexadecimal font, is now available on a line of *general-purpose* Digicolor systems.

The sixteen numerals in the Opti-Font (see Fig. 1) are constructed of squares in a 4 x 5 matrix, with each successive numeral formed from a larger number of squares. The effect, of course, is that higher numbers look blacker, thereby lending a quasi-graphic appearance to printouts. Using this technique, analysts who make a living spotting trends, anomalies, discrete events, and deviations in large masses of numerical data can make initial judgements merely by visual in-

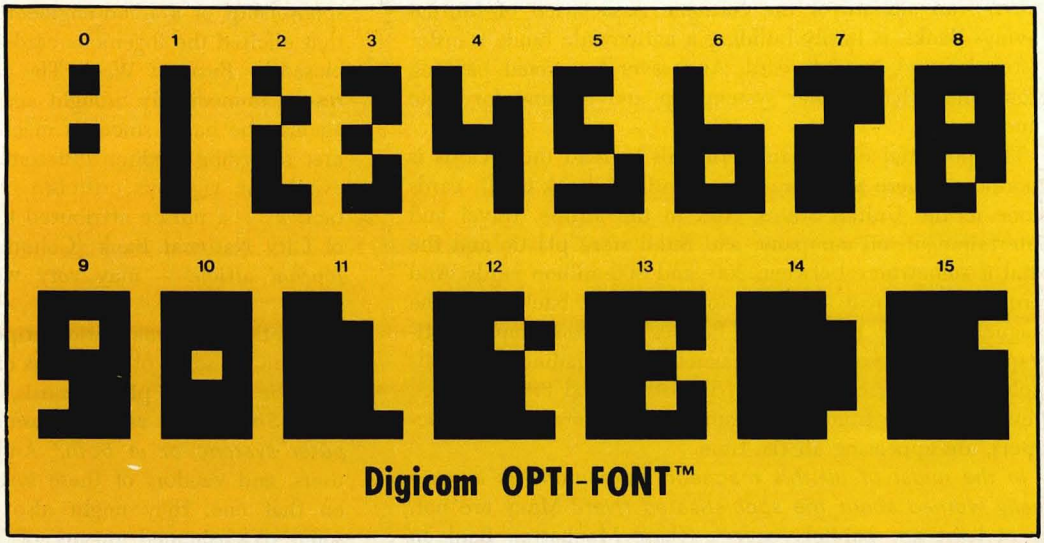


Fig. 1 — This set of sixteen special numeric characters, whose coverage (or apparent grayness) increases with value, is the key to Digicom's direct digital graphics technique.

The new split-platen TermiNet* 300 SP printer

- **2 platens operate independently**
- **2 separate forms**
- **Unlimited application flexibility**
- **Reduces costs of printers**
- **30 characters per second**

With General Electric's new split-platen TermiNet 300 SP printer you now can prepare two separate forms at the same time.

The applications for this new concept in printers are endless. Any data communication system that requires hard copies for parallel but dissimilar information will find the split-platen TermiNet 300 SP printer an efficient and cost-saving method.

On-line inventory control, an order entry system providing simultaneous orders and credit memo, hospital admission systems are just some examples where the split-platen is ideally suited. In some cases the cost of printers can be reduced over 50%.

For more information on the split-platen TermiNet 300 SP printer and pedestal write: Section 794-08, P.O. Box 4197, Lynchburg, Virginia.

The TermiNet 300 and 1200 printers, in addition to the split-platen 300 SP printer, are available in pedestal configurations. These compact and convenient units offer major savings on premium floor space.

GENERAL ELECTRIC

CIRCLE NO. 25 ON INQUIRY CARD

*Trademark of General Electric Company.

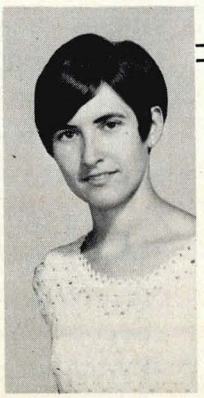
PENELOPE J. BARRETT

ECONOMIZING WITH LINE CONCENTRATORS AND MULTIPLEXERS

Q ***What are line concentrators and multiplexers?***

A Among the original patents on line concentrators, the following definition was given: "A line concentrator is essentially a switching device which provides for connections between a large plurality of subscriber lines and a small plurality of talking trunks." These subscriber lines can be either physical lines or carrier or multiplex channels. Similarly, a multiplexer is a device for combining a number of individual message circuits for transmission over a common transmission path. When used outside the central office (C.O.), both concentrators and multiplexers require fewer physical circuits to the central office than there are subscribers in the field.

For subscribers located at a considerable distance from the central office, the cost of physical circuits for each subscriber, and the time needed to install them, becomes quite substantial. This is especially true when dealing with a rapid influx of new subscribers. Both concentrators and multiplexers can provide this needed new service quickly and economically. But they each provide this service in a different way and the grade of service is affected by different factors.



ABOUT THE AUTHOR . . .

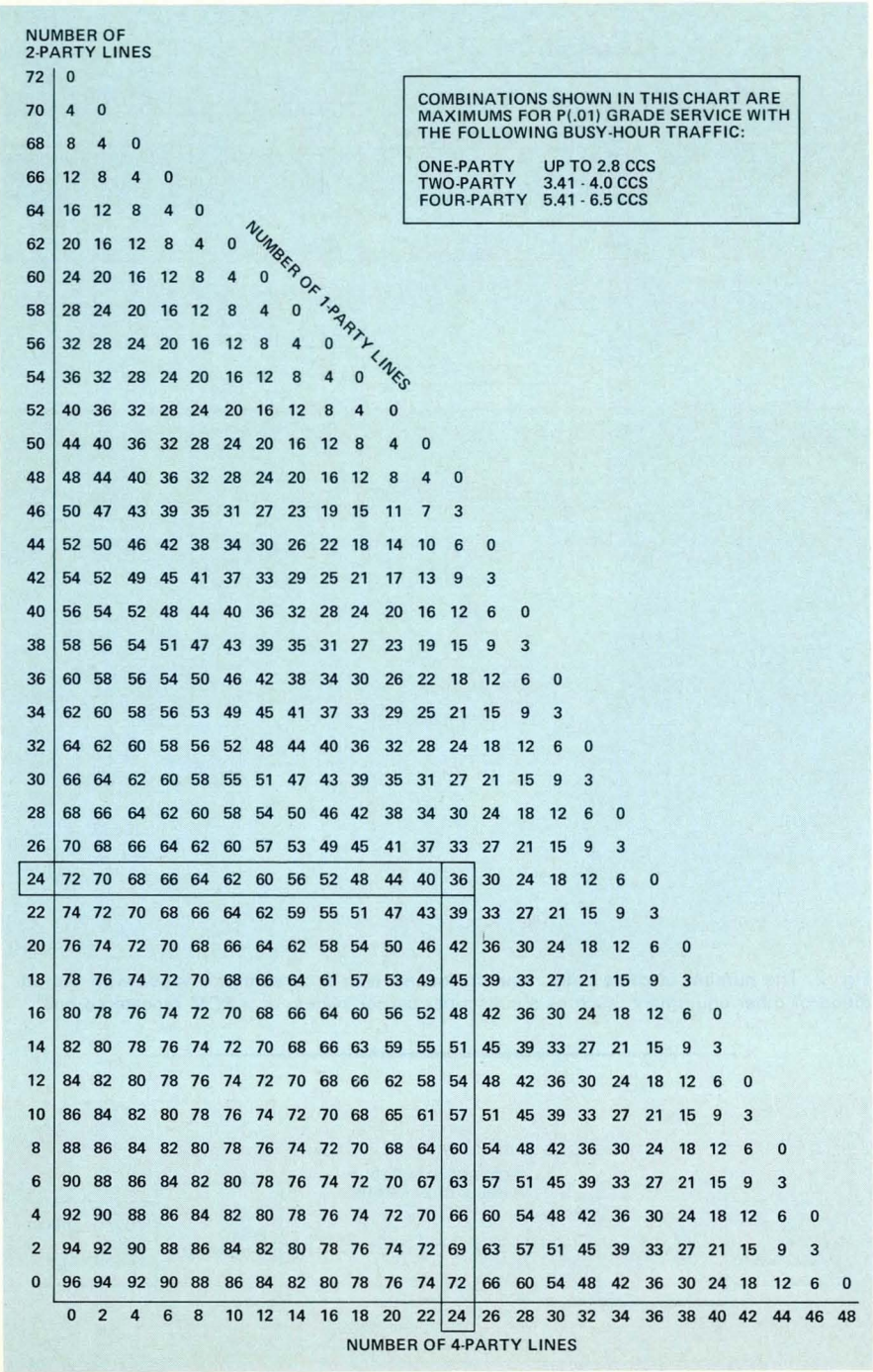
Penelope J. Barrett received a B.S. with a major in engineering from Harvey Mudd College in Claremont, California in 1967. Before coming to GTE Lenkurt, Mrs. Barrett worked as a mechanical engineer designing feedback controls for inertial guidance systems and special-purpose image recorders. Since coming to GTE Lenkurt in 1969, she has worked as a technical editor in the Public Affairs Department. For the past two years Mrs. Barrett has also been in charge of product advertising for GTE Lenkurt.

Q ***How do they differ?***

A Multiplexers provide a trunk to the C.O. for each incoming voice or data channel by sharing frequency bands (FDM) or time slots (TDM) on a predetermined basis. Thus a multiplexer has the same instantaneous total input and output rate capacity. Concentrators, on the other hand, use a sharing or switching scheme in which some number of input channels share a smaller number of output channels on a demand basis. Consequently, it is not possible to have all concentrator subscribers using their phones simultaneously. For this reason, statistics and queuing play an important role in the planning and use of concentrators in an attempt to insure that trunks are available when needed.

Q ***What determines the kind and quality of service?***

A Traffic loading has to be considered when planning to use a concentrator for service to remote locations. Telephone service is discussed in terms such as CCS, or erlang, for measuring traffic, and often refers to a grade of service as P(.01). The CCS stands for one hundred call-seconds, or the use of one telephone line for 100 seconds. Since there are 3,600 seconds in an hour, the maximum possible traffic rate on an individual line is 3,600 call-seconds per hour or 36 CCS (or 1



2-party \ 4-party	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
72	0																								
70	4	0																							
68	8	4	0																						
66	12	8	4	0																					
64	16	12	8	4	0																				
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58	28	24	20	16	12	8	4	0																	
56	32	28	24	20	16	12	8	4	0																
54	36	32	28	24	20	16	12	8	4	0															
52	40	36	32	28	24	20	16	12	8	4	0														
50	44	40	36	32	28	24	20	16	12	8	4	0													
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42	54	52	49	45	41	37	33	29	25	21	17	13	9	3											
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36	60	58	56	54	50	46	42	38	34	30	26	22	18	12	6	0									
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30	66	64	62	60	58	55	51	47	43	39	35	31	27	21	15	9	3								
28	68	66	64	62	60	58	54	50	46	42	38	34	30	24	18	12	6	0							
26	70	68	66	64	62	60	57	53	49	45	41	37	33	27	21	15	9	3							
24	72	70	68	66	64	62	60	56	52	48	44	40	36	30	24	18	12	6	0						
22	74	72	70	68	66	64	62	59	55	51	47	43	39	33	27	21	15	9	3						
20	76	74	72	70	68	66	64	62	58	54	50	46	42	36	30	24	18	12	6	0					
18	78	76	74	72	70	68	66	64	61	57	53	49	45	39	33	27	21	15	9	3					
16	80	78	76	74	72	70	68	66	64	60	56	52	48	42	36	30	24	18	12	6	0				
14	82	80	78	76	74	72	70	68	66	63	59	55	51	45	39	33	27	21	15	9	3				
12	84	82	80	78	76	74	72	70	68	66	62	58	54	48	42	36	30	24	18	12	6	0			
10	86	84	82	80	78	76	74	72	70	68	65	61	57	51	45	39	33	27	21	15	9	3			
8	88	86	84	82	80	78	76	74	72	70	68	64	60	54	48	42	36	30	24	18	12	6	0		
6	90	88	86	84	82	80	78	76	74	72	70	67	63	57	51	45	39	33	27	21	15	9	3		
4	92	90	88	86	84	82	80	78	76	74	72	70	66	60	54	48	42	36	30	24	18	12	6	0	
2	94	92	90	88	86	84	82	80	78	76	74	72	69	63	57	51	45	39	33	27	21	15	9	3	
0	96	94	92	90	88	86	84	82	80	78	76	74	72	66	60	54	48	42	36	30	24	18	12	6	0

Fig. 1. Traffic loading charts like this are used in determining the maximum number of subscribers that can be served by a concentrator.

erlang) per hour — this would be continuous usage of the line. The term "P(.01) grade of service" refers to the probability that one call out of one hundred may be blocked due to lack of a free trunk. Similarly, a P(.02) would mean there is a probability of two calls out of one hundred being blocked; P(.03) of three; etc. Good central office practices call for a P(.01) grade of service during the busy hour of the average day.

With a multiplexer, the grade of service of the C.O. is not affected and is only a function of the traffic loading. While with a concentrator, the grade of service is a function of the C.O. traffic loading *and* the traffic loading at the remote concentrator.

If a P(.01) grade of service is to be maintained, the number of subscribers that can be accommodated on a single concentrator system is limited, and is dependent upon the amount of telephone traffic that each subscriber generates. The actual traffic will vary from day to day and hour to hour, but there is an average that can be statistically determined. Service will only be degraded to more than one call in one hundred being blocked during the worst peaks of traffic, such as local emergencies when the calling rate exceeds this statistical average.

The number of subscribers that can be served by a concentrator is also dependent upon the type of service offered. For example, a concentrator system with a P(.01) grade of service designed to serve 96 single-party subscribers, under certain traffic conditions may only accommodate 72 two-party lines or 48 four-party lines. Combinations of single-, two-, and four-party lines can be served by the same concentrator, but the total number of lines offered decreases, for example, to 36 single-party lines, 24 two-party lines, and 24 four-party lines. Fig. 1 shows the chart used to determine the number of subscribers in this specific example.

Q ***How are line configurations optimized?***

A To minimize the number of cable pairs between a remote location and the central office, it is possible for a concentrator system to include a multiplexing technique — transmitting more than one signal on the same transmission channel. For example, a concentrator system that requires 24 cable pairs can serve the same number of customers with only 4 cable pairs if the concentrator is used in conjunction with a subscriber carrier system, such as the GTE Lenkurt 82A. Another concentrator arrangement uses a single (two pair) PCM (pulse code modulation) repeatered line. Fig. 2 shows these concentrator arrangements.

A multiplex system such as the GTE Lenkurt 910A uses a PCM line to serve 24 customers over two cable pairs, or 48 customers over four cable pairs, and provides each of these customers with total access to the central office at all times. Each of these 24 single-party lines can be used for two- or four-party service, making it possible to increase the number of subscribers to 96 per two cable pair. Fig. 3 shows the line arrangement using a multiplexer.

If the area served by a remote concentrator or multiplex system grows to the point where it is economical to put in a central office, an existing PCM multiplex system can be used to provide the trunks between central offices. The concentrator equipment may have to be removed and additional multiplex equipment put in for inter-office trunk requirements if there are not enough cable pairs available.

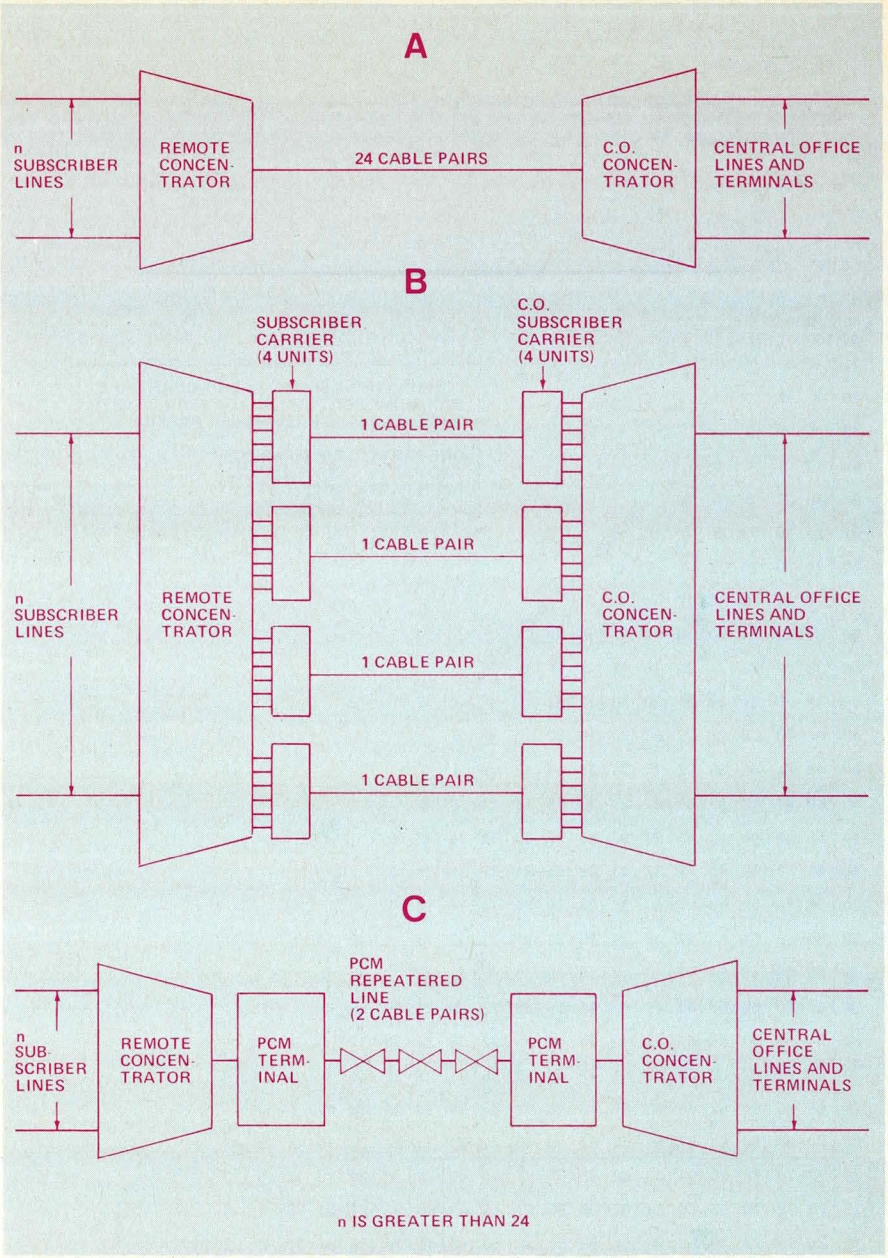

Fig. 2. The number of cable pairs required for use with a concentrator varies with the addition of other equipment, such as a subscriber carrier system or a PCM repeatered line.

Q ***How are simultaneous requests handled?***

A Simultaneous originating and terminating requests made on a concentrator must be queued (lined up) and served preferentially. The concentrator may be simultaneously summoned by more than one line at the remote terminal requesting connection to the central office network. It is also possible for two or more callers to initiate termination requests that reach the concentrator simultaneously from the central office. If the concentrator is

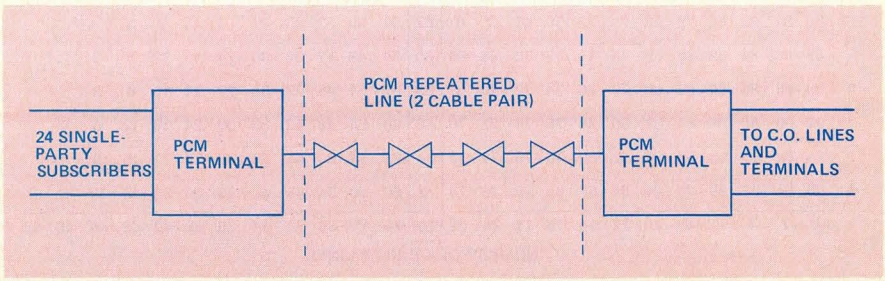

Fig. 3. Using PCM terminals by themselves, it is possible to "concentrate" signals on two cable pairs but still provide total access to the central office by all subscribers.

only able to serve one call at a time, a preference and lockout arrangement must be incorporated into the concentrator's design. Where the simultaneous requests originate at the same point, an electromechanical device is sufficient to provide the necessary preference and lockout. This switching device must be capable of recognizing the lines requesting service, determining which is to be served, remembering the identification of the served line, and preventing others waiting to be served from interfering. Concentrator switching is done in segments which simplifies the queuing process but limits the subscriber's access to the C.O. trunks. Instead of having access to all the C.O. trunks, he only has access to a fraction of them.

Some concentrators are also designed to recognize requests for service between two parties served by the same concentrator. Therefore it is not necessary to tie up central office equipment or the trunks to the central office, except for dialing. Once the C.O. terminal recognizes an intracall, the call is connected through at the remote terminal of the concentrator. Once these intratrunks are used up, each subsequent call between any other subscribers using the same concentrator must be connected through the C.O. switching equipment requiring two C.O. trunks. This could quickly degrade service if the area served by the remote concentrator functions as a small community, like a retirement community or a mobile home development where intracalls are frequent. Using a multiplex system, on the other hand, any two parties must be connected through the central office. This ties up the central office equipment, but would not prevent other subscribers at the remote terminals from reaching the central office, since each multiplex subscriber has his own trunk to the central office.

"JOHNSON, WOULDN'T YOU BE HAPPIER AT BURROUGHS?"

Assuming the called party's phone is not in use, the use of a multiplexer still does not guarantee that all calls will go through because concentration techniques are used throughout the switched telephone network, and have been for many years. It would be too costly and wasteful to have enough "lines" so that all telephone patrons could be talking simultaneously. Statistics have shown that even at peak traffic periods, telephone usage is only about 50%. It is partially because of this proven usefulness of concentration techniques within the central office that concentrators were proposed for use outside the central office. In remote locations where there is a sudden influx of subscribers, but where there is not enough growth to warrant a new central office, and where there is not enough capital or time to put in cable pairs for each subscriber, concentrators and multiplexers both seem to offer workable solutions.

Q *Concentrators or multiplexers?*

A The decision to purchase concentrators or multiplexers is based on a variety of factors regardless of whether the information being transmitted is voice or data. There are some applications where the choice is obvious because one or the other, but not both, will do the job required. With voice transmission, the choice usually depends on such subjective things as the quality of service – how often is a call actually blocked when using a concentrator? Statistics are fine for predicting the average traffic loading and the resulting quality of the service, but once installed, who's to say whether the actual use will be anything like the predicted average. With a multiplex system, each subscriber can have his own private line to the central office and the switched network, and statistical traffic loading at the subscriber end is no longer a consideration for the system planner. At this point, cost becomes a major factor, not only in the cost of the equipment but also in the facilities needed for installation, plans for future expansion, necessary routine maintenance, and periodic traffic studies. Both concentrators and multiplexers make more efficient use of cable plant, but in some applications, one will be more efficient and economical than the other.

A slightly different version of this article appeared in the August 1973 issue of the GTE Lenkurt *Demodulator*.

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WESTERN UNION DOES IT AGAIN

We recently heard of an interesting, unique, and worthwhile private line service being offered by Western Union. About the same time, the trade and financial press carried stories of a projected 1974 layoff and capital spending cut by Western Union. The principal reason cited was that their private line business wasn't growing as fast as they had anticipated, and they attributed this to a downturn in the economy. A falloff in business when they are offering more versatile systems makes us wonder, but then we are used to inconsistencies from Western Union. They've never been quite the same since they declined the Bell patent in 1877 (at an offered price of $100,000!) on the grounds they could not imagine people really wanting to talk to each other.

The new service of which we just learned is a case in point. Within our firm, we work hard at tracking the communications industry and we think we know something about it. Then we find this service with some 600 terminals already installed or on order. And we find out from a progressive user — not from Western Union. Perhaps a little more marketing effort for something obviously (in our judgment) a superior offering could have precluded any talk of layoffs and cutbacks. And of more pertinence to users, perhaps a little more marketing could have brought more data communication to more users.

Be that as it may, the service offering does appear important and we commend it to users' examination. Called MDS (for Multipoint Data Service), its chief characteristics are the use of a discrete link for each remote terminal, and multipointing by means of digital hubbing rather than analog hubbing. Most multipointing, we understand, is done with split bridges at each terminal, with the analog channel wending its way from bridge to bridge. In such systems the loss of any interim link can result in the loss of all stations after the link. Even where hubbing is involved, it is like pulling teeth to obtain the routing details necessary for the user to manage his network properly. Intrinsic to MDS is the use of a single, discrete, four-wire voice-grade channel for each terminal, connecting the terminal to a hub at a WU office. So far that's not a big deal. At the hub office, however, each terminal channel is connected to a modem, the signals from the terminal are broken down to the EIA interface, and the hubbing is done on a digital basis.

Consider, for example, a hypothetical case involving four terminals in and around Chicago. These would each be connected through a modem to a voice-grade link terminating in a modem in Chicago. The EIA interfaces of the four modems would be OR'd (digital hubbing) together into a fifth modem connected to a voice-grade link going, say, to the host computer. And no extra charge by the way for the modems at the hub.

The advantages of MDS are several. First, the analog line management and conditioning is easier, since only two-point links are involved. This also means that analog noise is not cumulative over several links because there is digital regeneration on each link. Even phase jitter won't build up (as it can through T-carrier repeaters) since reclocking occurs at each hub. A second feature is that uniformly discrete channels to each terminal allows patching-out a defective terminal, leaving the rest of the circuit operational. A third feature is that all terminals can operate a continuous transmit carrier, a feature not possible in analog hubbed multipoint systems. This eliminates clear-to-send delays, although their loss may be paid for by the delay of the additional modems in the path. Whether or not that's a factor, it's still a good buy since WU bills it at HDX rates even though it is (and may be operated as) a four-wire FDX facility.

Western Union also details some performance levels and objectives in their literature. Their bit error rate performance objective is better than 1 in 10^5 with a minimum criterion of 1 in 10^6. We understand they are achieving 1 in 10^7 on at least one installed system. They also report that for a terminal-to-hub link, the MTBF for outages exceeding one minute is 3000 hours, with an average MTTR of 1.8 hours. They will also arrange the terminal modems for fallback operation thru data access arrangements on the switched network. The MDS specifications detail all system tests to be performed by WU prior to turnover to the customer, with minimum acceptable parameters in each case. And if that alone weren't novel, they also spec — get this — white noise, impulse noise, phase jitter, frequency translation, and bit error rate!

For system management, each hub is located in a WU-manned facility, and a low-speed circuit is provided between the hub(s) and the CPU location. The customer may use this to report failure of a station to respond to polls, change in polling pattern, high message rejection rates, etc. Contrast this with other approaches where it's tough enough just to get the Bell test board number, let alone get someone there to believe your report.

Finally, if you still don't trust them, they'll install a system management console at your CPU location. This tariffed item provides such monitoring/test capability as bit error rate, analog levels, keying and clock presence indication, signal-to-noise ratios, and both analog and dc patch capabilities. An optional extra is a programmable CRT for terminal or control station simulation, and line monitoring.

All of the present installed systems are at 2400 bps and the specifications are developed around this speed. However, we understand that they have some 4800 bps orders and these possibilities are being reviewed. Again, the charges are those for normal interstate, HDX voice-grade channels. The billing is determined in the normal way, i.e., least path between drops, and not for the actual terminal-to-hub links. The customer is billed for terminal modems but not for those at the hubs. And even at the terminals the customer may install his own modems if he desires and if they are compatible.

All in all, a very commendable offering solidly geared for user interests and WU merits a pat on the back. *Further information is available from their Special Systems and Services Department at WU's McLean, Virginia office, 703-790-2000.* Call before the 1974 cutbacks take place. ▲

Communications Clinic is a regular monthly column written by the staff of **Berglund Associates, Inc.**, consultants in telecommunications. Readers are invited to submit questions on any aspect of communications or suggestions for future Clinics to:

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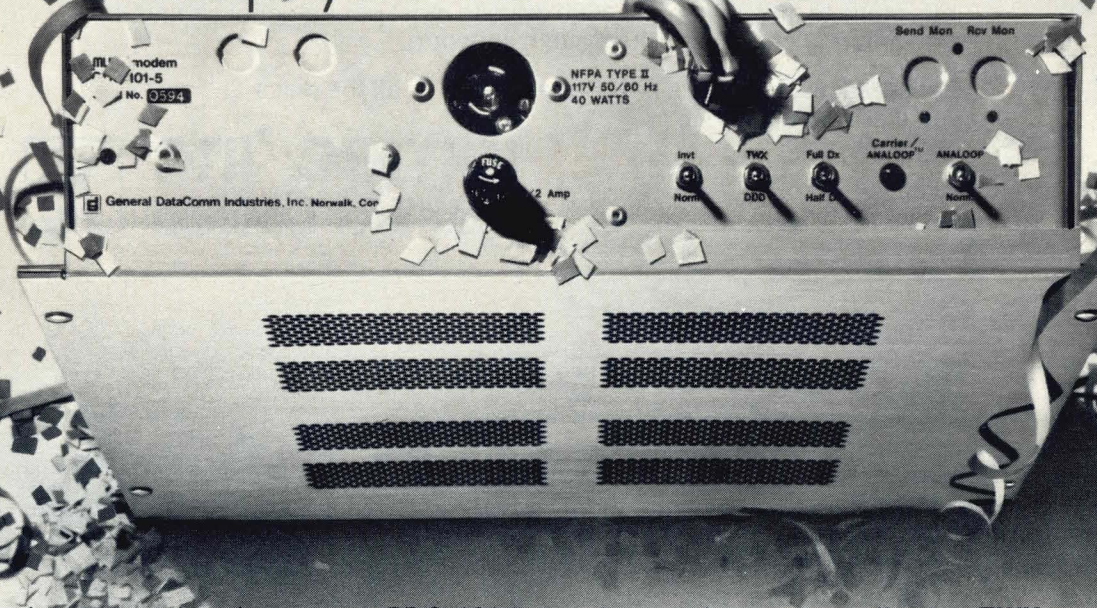

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CIRCLE NO. 27 ON INQUIRY CARD

PLUG-COMPATIBLES

Part II — Storage & Printer Peripherals

John R. Hillegass ● Vice Pres. & Exec. Editor, Datapro Research

It's well known today that you can be an IBM computer user without buying or renting all your equipment from IBM. Some of the nation's largest and most sophisticated EDP users take fierce pride in pointing out that the central processors are virtually the only devices in their computer rooms that still bear IBM nameplates. All of their disc drives, tape drives, printers, and (where feasible) main memory units have long since been replaced by independently manufactured units that deliver significant reductions in cost and/or improvements in performance.

The development and rapid growth of the plug-compatible peripheral market has removed one of the security blankets that was formerly available to those responsible for selecting EDP equipment. To many, it is comforting to select an IBM computer simply because so many others have done it that the choice can hardly be faulted. But even a user who fully subscribes to this viewpoint can hardly ignore the presence of IBM-compatible peripheral devices and memories that can directly replace the equivalent IBM units. Once again the user must make a conscious decision to stay with IBM or see what the rest of the industry has to offer.

Just as there are viable alternatives to IBM computer systems, there are also viable alternatives to IBM peripherals and memories. These alternative units are available from dozens of suppliers. Their prices are generally lower than IBM's. Their performance is frequently higher. In many cases they offer useful additional features. And — most significantly — they work.

For many computer users, dealing with an equipment vendor other than IBM represents a new and thoroughly disquieting experience. Despite the generally favorable press which the independent peripheral makers have received, prospective buyers are likely to be left with a host of nagging questions: Are these devices reliable? Are they fully compatible with the IBM units they replace? Will the maintenance service be as good as IBM's? Will program changes be required? Will the use of these devices harm our relations with IBM? Are the cost savings worth the risk?

Rest easy, prospective users. On the basis of four years of intensive research into all the functional aspects of these plug-compatible devices and the experiences of their users, we can confidently state that the answers to the foregoing questions, in the great majority of cases, are quite reassuring on all counts.

This Profile summarizes plug-compatible products, recent developments, and users' experience in each of four important product areas: Disc Drives; Magnetic Tape Drives; Printers; and Add-On Main Memories.

A plug-compatible device is one that can replace an existing unit made by the mainframe manufacturer (or, for that matter, by another independent maker) by the simple process of unplugging the old unit, wheeling it out, wheeling in the new unit, plugging it in, testing it, and resuming operations.

Actually, there are two types of plug-compatibility. One can be called subsystem compatibility, and the other, component compatibility. A subsystem is compatible if it will interface directly with the computer's I/O channel and function in the same manner as the subsystem it replaces. A component is compatible if it will interface directly with the appropriate controller.

Other manufacturers cannot legally obtain detailed IBM device-to-controller interface specifications until three months following the first delivery. Consequently, a manufacturer cannot be absolutely sure of achieving direct component compatibility until then. Although the interface specifications for the input/output channels of IBM's System/360 and System/370 have long been known, subsystem compatibility is not necessarily an automatic procedure either. The exact command structure must be known in order for the plug-compatible devices to function within the framework of IBM-supplied software without changes. Because of these considerations, the availability of IBM-compatible peripheral devices normally lags behind that of the counterpart IBM products.

Mr. Hillegass is the founder and Executive Editor of DATAPRO 70, a looseleaf information service on computer systems, peripherals, and software. Before joining Datapro Research, he was associated with Auerbach, another EDP reference publisher, as Manager of their Computer Technology Unit, and with Air Products & Chemicals Inc., as Senior Staff Engineer responsible for programming and training at the company's EDP facility. Mr. Hillegass has a B.S. in Chemical Engineering from Lehigh Univ., and is a member of Phi Beta Kappa and the ACM; he also holds the DPMA Certificate in Data Processing, and has written numerous articles and given frequent seminars on computer technology and data processing.

TABLE 1 — INDEPENDENT SUPPLIERS OF COMPATIBLE DISC

COMPANY	IBM 360-/370-COMPATIBLES					IBM 1130 MAINFRAMES
	2311	2314	2314 Double Density	3330	3330 Double Density	
Ampex	——	DS-314	DS-324	DS-330	——	——
California Computer Products	CD 1	CD 12/14 CD 22/14	1015 A	1030	1030 DD	DS 12 2314 replacement
CIG Computer Products	——	——	——	CIG 6730	——	——
Computer Hardware	——	——	——	——	——	CHI 1114 2314 replacement
Control Data	——	23141	23142	33301	OEM-only to date	——
International Peripherals Computer	——	——	——	IPC 6730 (controller)	——	——
International Systems Organization	——	——	——	——	——	——
Itel	——	——	3100/3101 3200/3101	7830/7330	——	——
Logicon	——	——	——	——	——	LPS/DD 2314 replacement
Memorex	620 630	3660	——	3760	——	3610 2314 replacement
Mohawk Data Sciences	MDS 2500	MDS 2800	MDS 2900	MDS 8830/8330	——	——
Potter Instrument	DD 4311	DD 4314/ DC 5314	——	DD 4330 (drive only)	——	——
Storage Technology	——	——	——	STC 3835/3335	STC 8000	——
Telefile Computer Products	——	——	——	——	——	——
Telex Computer Products	5311	5314	5600	6330	——	——

* Table compiled by staff of MODERN DATA

DRIVES & STORAGE*

OTHER COMPATIBLE/ REPLACEMENT DISC UNITS
2314 replacements for Univac disc & drum units on Univac 400/1100 CPUs 2314 replacements for DEC PDP-10 CPUs
1144-2314 double-density replacement for Fastrand drums on Univac 400/1100 CPUs
6770/6780 channel adapter units which allow 2314/3330 interfacing to 360/30+ & 370 CPUs
— —
— —
controller allows 3330 interfacing to 360/65+ & CPUs
adapter unit which allows 2314 interfacing to 360/22 CPUs
7835/7305-fixed-head system replacement for IBM 2305-2/2835 SPX adapter unit allows 3330 interfacing to 360/65+ CPUs
— —
adapter unit allows 3330 interfacing to 360/65+ CPUs
adapter unit allows 3330 interfacing to 360/65+ CPUs
— —
— —
DC-10-0 & DC-10-B controllers for interfacing 2311/2314/3330 drives to DEC PDP-10 CPUs DC-32 controllers for XDS Sigma CPUs
adapter unit allows 3330 interfacing to 360/65+ CPUs

It's important to note that not all plug-compatible devices are IBM-compatible. There is a thriving market for peripherals and memories that are compatible with other large mainframes, or with popular minicomputers produced by DEC, Data General, Hewlett-Packard, Varian, and other manufacturers; miniperipheral devices are outside the scope of this article, and will be covered in the December issue of MODERN DATA. Among the major mainframe manufacturers, only IBM's huge base of installed computer systems has been deemed large enough to attract much attention from the plug-compatible equipment suppliers to date. In recognition of this undeniable fact of life, this article is devoted mainly to the IBM-compatible devices on the market today.

DISC DRIVES

Independent peripheral manufacturers introduce disc drives compatible with IBM System/360 mainframes at lower cost and with higher performance than IBM's own. IBM introduces improved models. Independents introduce new models with similar capabilities. IBM lowers its prices through extended leasing plans. Independents cut their prices. IBM repackages its discs and moves the controllers into the System/370 mainframes. Independents shave their prices again. IBM acts. Independents react. Etc., etc.

That brief scenario summarizes the frantic developments that have rocked the disc drive industry since late 1970, when the independents' penetration of IBM's disc drive market passed the 10 percent level and IBM unleashed its program of massive retaliation. For the user, the net result of all these developments is more processing power per dollar, whether he elects to go with the independents or stay with IBM.

At present, the independents are concentrating their resources upon direct replacements for IBM's high-performance 3330 series drives. Replacements for IBM's older 2311 and 2314 series drives are still widely available, but development and new production of these devices has essentially stopped. In fact, many of the independent counterparts of the 2311 and 2314 drives are now coming off rent as their users move up to 3330-style drives, and the older drives can often be obtained at significantly reduced prices. The same can be said about the "double-density" 2314-style drives, an innovation of the independents that had no direct IBM counterpart and enjoyed a brief surge of popularity during the period between announcement and delivery of the IBM 3330 series drives.

At this writing, the independents are still pondering their responses to two important new IBM disc products: the 3340 "Winchester" drive, and double-density models of the 3330 series drives.

The 3340 Direct Access Storage Facility, introduced in March 1973, features a totally new approach to interchangeable-cartridge disc storage: the discs, access arms, and read/write heads are all sealed into a removable cartridge called the 3348 Data Module. This feature has two notable effects. One is the increased reliability of the sealed container, which eliminates any danger of damage due to airborne particles and enhances read/write reliability because

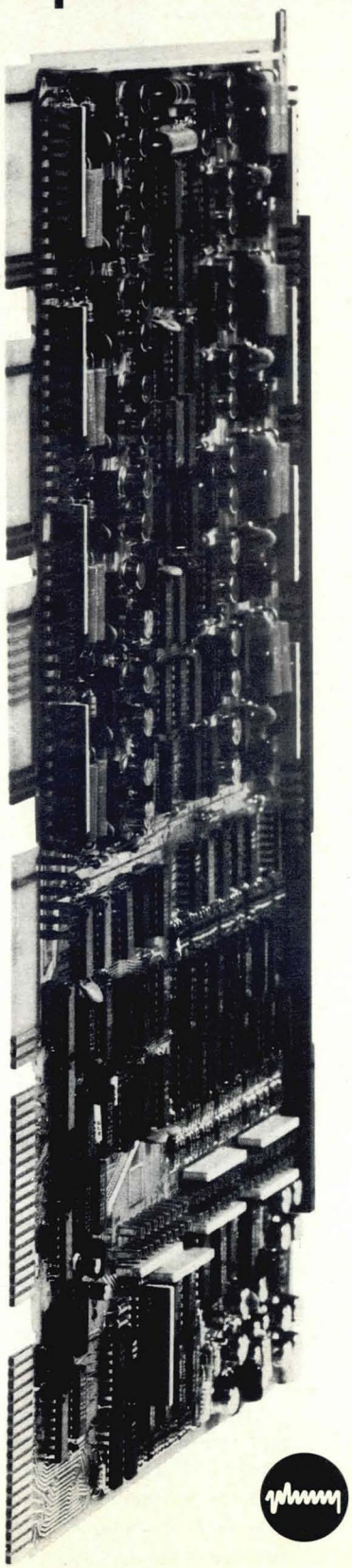
TABLE 2

INDEPENDENT SUPPLIERS OF COMPATIBLE MAGNETIC TAPE TRANSPORTS*

Company	IBM 360-/370-Compatibles				Other Compatible/ Replacement Tape Units
	2401/2402	2420	3420 Models 3/5/7	3420 (6250 bpi) Models 4/6/8	
Ampex	TM204X/TC38 (2401-5 & 6) TM1624X/TC38 (2401-2/3/5/6)	TM2024X/TC38 & TM34/TC38	TM34/TC38	—	TM1629X Series for IBM 729 transports
California Computer Products	340/1040A (2402-1 thru 6)	340/1040A	340/1040A (3420-5 & 7)	—	—
Control Data	—	—	34201/38031	—	100 & 150 ips intermediate 3420-type models of 34201 transports
Datum	—	—	—	—	5091 Magnetic Tape I/O System for IBM 1130 CPUs
Infotec	—	—	—	—	TS-1130C Magnetic Tape System for IBM 1130 CPUs
Itel	—	—	7420/7803	—	—
Kennedy	—	—	—	—	8400 Series compatible with IBM 2415 or 3410/3411 systems
Logicon	—	—	—	—	LTD/LTS tape system for IBM 1130 CPUs
Mohawk Data Sciences	MDS2700 (2401-5) MDS8420/8803	MDS8420/8803	MDS8420/8803	—	MDS8410/11 System compatible with IBM 3410/3411 systems
Peripherals Systems Research	—	—	—	—	Tape System for IBM 1130 CPUs
Potter Instrument	AT/SC2402/3/5/6 (2401-2/3/5/6)	AT2425/27	AT/SC3423/5/7 TC5805	AT3424/6/8 TC5805-2	150 ips intermediate 2420-type model of AT2425/27 transports SC729X Series for IBM 729 transports
Storage Technology	ST2400/3800 II (2401-3/5/6)	ST2400/3800 II	ST3400/3800 III	STC3600/3800 IV	150 ips intermediate 3420-type model of ST3400 transports 1600/6250 bpi dual-density 3420-type STC3600 models
Telex Computer Products	4800 Series	5400 Series	6000 Series	6000 Series	4700 Series for IBM 729 & 6410/6411 for IBM 3410/3411 1600/6250 bpi dual-density 3420-type 6000 Series models

* Table compiled by staff of MODERN DATA

Plessey stacks the DEC's 16K per card for PDP-11's



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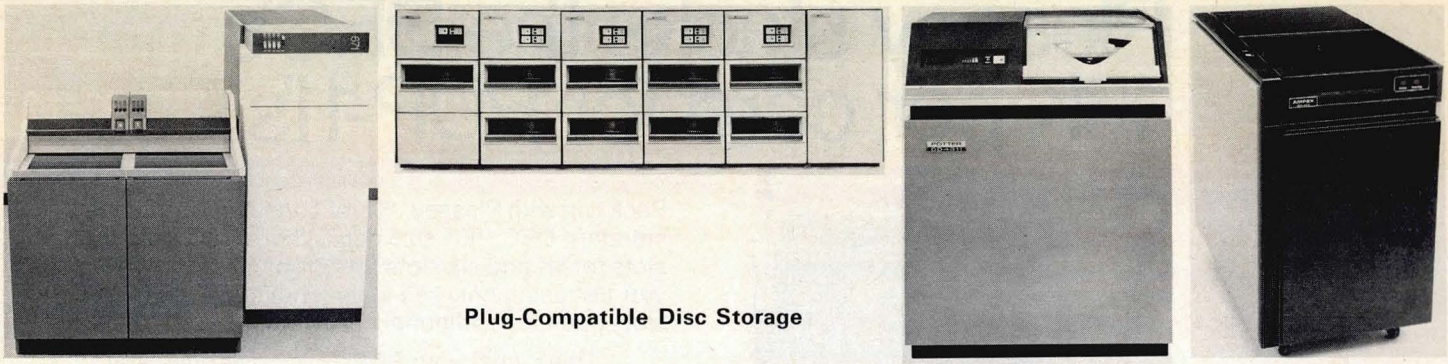


Plug-Compatible Disc Storage

the same head always serves the same track. The second is the increased cost of the pack. An IBM 3330 pack (the 3336) costs $1000 and stores 100 million bytes. The 3348 Data Module, by contrast, costs $1600 in the 35-megabyte size or $2200 in the 70-megabyte size.

By removing the heads and access arms from the 3340 drives, in the wake of its earlier announcements that moved the disc controllers inside the System/370 mainframes, IBM has left very little for the independents to replace. No independent counterpart of the 3340 drive has been announced at this writing, but such devices can be expected to appear soon after IBM begins delivering the 3340 in November 1973. It is harder to predict when, or indeed whether, the independent disc pack manufacturers will find it feasible to become alternate sources of supply for the complex 3348 Data Module.

The double-density 3330 Model II drives, unveiled in July 1973, represent a much smaller challenge to the ingenuity of the independent disc drive makers. They need only follow IBM's lead and double the number of tracks on each disc surface, thereby increasing the storage capacity of each pack from 100 million to 200 million bytes. Any associated technical problems should be surmountable without undue difficulty. Indeed, CalComp announced its plug-compatible equivalent of the 3330 Model II within two weeks after IBM's long-expected announcement.

How well satisfied are the users of IBM-compatible disc drives? To find out, DATAPRO 70 conducted an extensive survey of its subscribers early in 1973. A total of 145 user responses was received, representing 1743 installed IBM-compatible drives. Combining the users' ratings of all makes and models yields the following profile of overall user satisfaction with the current IBM-compatible disc drives:

	Excellent	Good	Fair	Poor
Overall performance	56%	34%	10%	0%
Ease of operation	69%	30%	1%	0%
Hardware reliability	48%	34%	13%	5%
Maintenance service	51%	32%	10%	7%

(Detailed survey results, showing the user ratings earned by each model, are available from Datapro Research.)

The responding users were asked to describe any difficulties they encountered in installing their plug-compatible disc subsystems; 81% experienced only minor problems or none at all, while the other 19% reported problems they considered to be significant. The users were also asked to describe any difficulties they encountered in diagnosing problems or obtaining service; 75% reported their problems in this area to be minor or nonexistent, while the other 25% experienced significant problems.

The widely feared problem of strained relationships and "finger-pointing" between independent and IBM maintenance personnel turned out to be insignificant. Only six users felt strongly enough about the situation to mention it, and in only one case could it be called more than a mild problem. The one recurring complaint (12 mentions) involved a shortage of adequately trained maintenance personnel among several of the independent vendors.

In summary, the survey results make it clear that most users are well pleased with their IBM-compatible disc drives and have had no reason to regret their choices.

MAGNETIC TAPE DRIVES

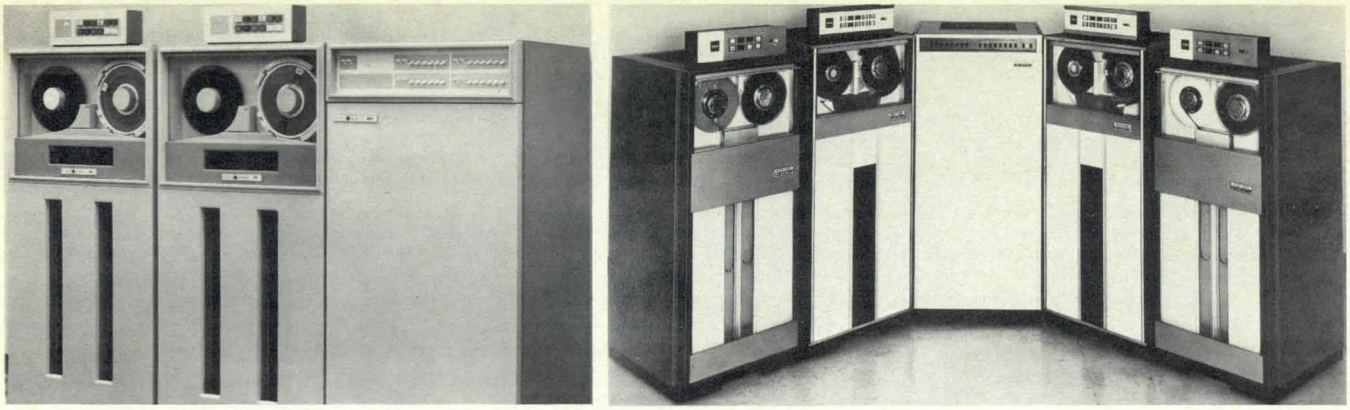
The early emphasis in the plug-compatible peripheral industry was on replacements for IBM tape drives. The principal focus has long since shifted to disc drives in line with the industry-wide trend toward disc based processing. Yet there is still a substantial market for tape drives, and a number of capable suppliers offer a wide range of high-quality replacements for IBM drives.

There are a host of IBM tape drive models in the field — over 30 if you count the 729 models for the second-generation 1400 and 7000 series computers. Every one of these IBM models has been imitated by one or more manufacturers, and most of these replacement drives are still on the market, although many of the older models are no longer in production.

System/360 and System/370 users are concentrating on two families of IBM tape drives today; the low-performance, low-cost 3410/3411 family and the high-performance, high-cost 3420 family. Not surprisingly, these are the same families that are currently receiving maximum attention from the independents.

Not only have the independents produced tape drives with the same performance as the various IBM models, but they have plugged some gaps with additional models. This gives you a broad choice in selection but makes the decision more difficult; care in matching your needs with the performance of the various models is necessary to achieve maximum economy.

Magnetic tape recording technology, which had remained fairly static for the past several years, took a big step forward in March 1973 when IBM introduced three new, high-performance models of its 3420 Magnetic Tape Units. The new models employ an advanced recording technique called Group Coded Recording (GCR), which permits data to be recorded at an effective density of 6250 bytes per inch on standard ½-inch computer tape.



Plug-Compatible Mag Tape Storage

IBM's new 6250 bpi recording density roughly triples the amount of information that can be stored on a single reel of tape. At an average block length of 2000 bytes, for example, a standard 2400-foot reel holds about 31 million bytes at 1600 bpi and about 93 million bytes at 6250 bpi. Thus, the higher density can yield major reductions in tape handling time, tape costs, and tape library storage requirements. These savings, coupled with the much faster data transfer rates and access times of the new units, should help to ensure the continued widespread utilization of magnetic tape equipment despite the ever-increasing popularity of disc pack drives.

Hardly was the ink dry on IBM's press release announcing the 6250 bpi drives before the independents reacted. Storage Technology Corporation, which had previously upstaged IBM by introducing 3200 bpi drives, quickly announced compatible 6250 bpi drives and quietly dropped the 3200 bpi line. Telex added three 6250 bpi models to its 6420 series in mid-April of this year.

To assess the current level of user satisfaction with IBM-compatible tape drives, DATAPRO 70 conducted another survey of its subscribers in the same manner as for the disc survey described earlier. A total of 72 user responses was received, representing 749 installed tape drives. The following profile of overall user satisfaction combines the users' ratings of all makes and models of IBM-compatible drives:

	Excellent	Good	Fair	Poor
Overall performance	24%	63%	11%	2%
Ease of operation	43%	47%	10%	0%
Hardware reliability	19%	54%	13%	14%
Maintenance	34%	34%	16%	16%

(Detailed survey results, showing the user ratings earned by each model, are available from Datapro Research.)

The users, although generally satisfied, were not as happy with the independent tape drives as they were with the disc drives from many of the same vendors. Some of the reasons were detailed in response to two additional questions asked on the survey form. The users were asked to identify any specific problems they encountered: (1) when installing the drives, and (2) when diagnosing malfunctions and obtaining service. Listed below are the most frequent complaints, along with the number of respondents:

Poorly trained maintenance personnel	11
Difficulty in exchanging tapes with IBM drives	3
Read/write difficulties	3
Difficulty with IBM	3
Parts availability	2

Overall, 35% of the responding users encountered significant problems in installing their plug-compatible tape equipment, and 39% of the respondents encountered significant difficulties in diagnosing problems or obtaining service. In the face of these problems, it is noteworthy that 68% of the respondents nonetheless judged the maintenance service they received to be "good" or "excellent."

PRINTERS

Most of the action in the plug-compatible peripherals field to date has involved disc drives and magnetic tape drives. The reason is clearcut: the other two staple types of on-site peripheral devices are punched card units and line printers — and in these two categories, unlike tape and disc drives, IBM's products are superbly engineered and hard to surpass on a price/performance basis. What's more, tape and disc subsystems account for considerably higher shares of the equipment costs of most computer installations than do punched card units and printers.

For these reasons, only a few plug-compatible replacements for IBM card readers and punches have been announced to date, and these have received a luckwarm market reception at best. Line printers, however, are a different story. Despite the strengths of IBM's printers and the comparatively limited market, numerous independent manufacturers have entered the lists with an interesting array of IBM-compatible printers.

The IBM 1403 Printer, introduced well over a decade ago and now available in a wide range of models and speeds, is the standard of comparison for all other line printers and the natural target at which the independents have taken aim. But users looking for an improved printer should not overlook the fact that IBM itself now offers two of them. The IBM 3211, introduced in 1970, is a high-performance train printer rated at 2000 lines per minute. The IBM 3203, announced in March 1973, is an updated version of the 1403 that offers a variety of worthwhile improvements. Available in two models rated at 600 and 1200 lines per minute, the 3203 is currently usable only with System/370 Models 115 and 125.

Users interested in replacing their IBM printers have a choice of two basic approaches: on-line or off-line. On-line plug-compatible printers physically replace their IBM counterparts in the same straightforward manner as the plug-compatible tape and disc drives.

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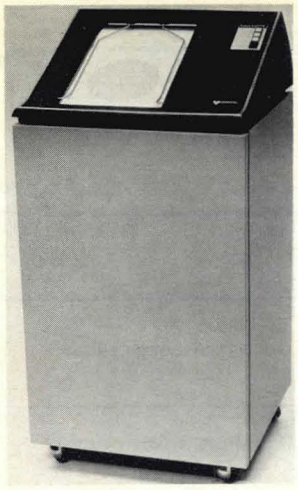
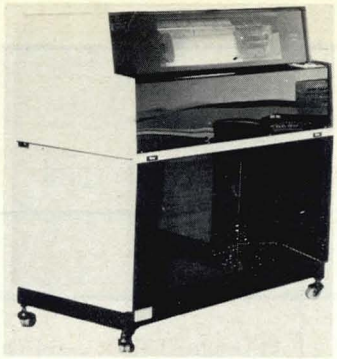




Plug-Compatible Printers & Printer/Plotters

Off-line printers are free-standing units that generally accept 7- or 9-track magnetic tape written by a computer as their input and transcribe the data into printed output; thus, the term "plug-compatible" is not truly valid, and some software and operational changes are likely to be required when one of these units replaces an on-line printer. The chief advantage of off-line printers is that they can increase a computer system's throughout by relieving it of time-consuming on-line printing chores — but the widespread acceptance of multiprogramming and disc spooling has considerably reduced the value of this benefit.

While shopping for a replacement printer, you may want to look beyond conventional impact-type printers to the more exotic non-impact models. The on-line Gould 4800 is the current leader in this slow-growing market segment, with over 200 units installed; it uses an electrostatic technique to print up to 3000 lines per minute. An impressive recent entrant is the Xerox 1200 Computer Printing System, the first direct application of xerographic copying technology to the computer output problem. Rated at 4000 lines per minute, the Xerox 1200 is available in two models: one for off-line printing from IBM-compatible magnetic tape, and the other for on-line use with a Xerox Sigma 6 or 9 computer only. The 1200 shares with all other non-impact printers the disadvantage of being able to produce only one copy at a time.

DATAPRO 70 has not yet conducted a large-scale survey of plug-compatible printer users, but it has interviewed users of most of the popular products. In general, these users are well satisfied with the performance and reliability of the equipment — but nearly all agree that the IBM chain and train printers still represent a hard-to-beat standard for print quality.

ADD-ON MAIN MEMORIES

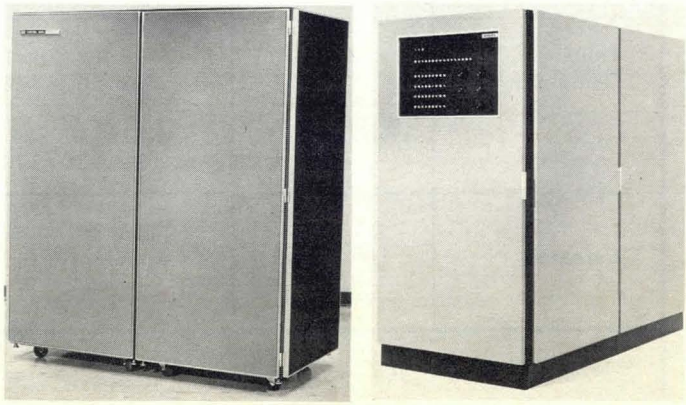
Add-on main memory units can represent a highly effective weapon in the data processing executive's eternal struggle to achieve maximum computer throughput at minimum cost. These products are core or semiconductor memory units, supplied by companies other than the mainframe manufacturers, that can be connected to computer systems to replace and/or expand the capacity of their original main memories. Once installed, the add-on units function in exactly the same manner as the mainframe manufacturer's own memory units.

The term "plug-compatible" can be a misnomer when applied to the add-on main memories. In many cases, such as the IBM System/360 Models 22 through 50, fairly extensive changes are likely to be required in the CPU backboard wiring, circuit cards, read-only control storage, and/or operating system. But all of these changes are straightforward and well-defined, and the whole installation and testing process can usually be completed in less than eight hours.

To date, most of the action in the add-on memory market has involved units designed for the IBM System/360 computers. Users and leasing companies quickly recognized that these add-on memories, more than any other single development to date, can dramatically improve the performance and prolong the economic lives of thousands of installed System/360 computers. During the past two years, most of the add-on memory suppliers have introduced similar units for the newer IBM System/370 computers. Add-on memories are also available for the Univac 400 and 1100 Series computers and for most of the popular minicomputers.

In addition to directly replacing IBM main memories, most of the independents offer "enhancements" — their term for extensions of main memory beyond the IBM-specified maximum capacities. It has long been clear that IBM's memory size limits are imposed by marketing rather than technical considerations; from IBM's point of view, it was comforting to know that a Model 40 user whose memory requirements expanded beyond 256K would have to move up to the considerably more expensive Model 50 Processing Unit. But that's no longer true. Most of the independent main memory suppliers now offer enhancement capacities up to twice the IBM-specified limits for the various System/360 models. A few suppliers have gone much farther (e.g., CHCS now offers up to one million bytes for the Model 30). As a result, a lot of System/360 users whose systems are now memory-bound can get the increased capacities they need without moving up to a more expensive processing unit.

The System/360 add-on memory market has been a large and lucrative one. Demand has been high, especially from the leasing companies that are striving to upgrade the performance of their System/360 equipment in order to keep it on rent as long as possible. What's more, IBM's prices on System/360 main memory are high enough to let the independents price their units far lower and still turn a handsome profit — often on lease terms as short as two years.



Plug-Compatible Main Memory

TABLE 3

COMPATIBLE PRINTERS & PRINTER/PLOTTERS*

COMPANY	MODEL	COMPATIBILITY	FEATURES
Computer Hardware	1103/1403	1403 (IBM 1130) 1443 (IBM 1800)	600 lpm/132 col./64 char. drum impact printer
Control Data	28211/14031	1403 N1/2821 (IBM 360/370)	1200 lpm/132 col./48 char. train impact printer
Datum	5096	1403 (IBM 1130)	300 lpm/120 col./63 char. drum impact printer
Digital Associates	—	1403 (IBM 1130 & S/3)	600 lpm/120 col./48 char. drum impact printer (other printer models & print rates available)
Gould Data Systems	4800 & 5000	(IBM 360/ 370; others)	3000 lpm/132 col./64 char. (4800) & 1200 lpm/132 col./64 char. (5000) non-impact printer/plotters
Infotec	PS-1130	1403 (IBM 1130)	600 lpm/120 col./48 char. drum impact printer (other printer models & print rates available)
Logicon	LPS/LP	1403 (IBM 1130)	600 lpm/132 col./64 char. drum impact printer
Litton/Datalog	1100	(IBM 1130)	200 lpm/128 col./64 char. non-impact printer/plotter
Macro Products	M470B	9242/9243 (Burroughs B300 to B6500)	1800 lpm/132 col./64 char. drum impact printer
Mohawk Data Sciences	MDS 8402	1403 (IBM 360/370)	1250 lpm/132 col./48 char. drum impact printer
Potter Instrument	LP 3403	1403 (IBM 360/370)	1240 lpm/132 col./48 char. chain impact printer
Spur Products	1403 controller	(DEC PDP-10 & Burroughs B3500)	1130 lpm/132 col./96 char. train impact printer
Telex Computer	6721	1403 N1/2821-1 (IBM 360/370)	1200 lpm/132 col./48 char. train impact printer
	5403/5821	1403 N1/2821 (IBM 360/370)	1500 lpm/132 col./48 char. train impact printer (on- & off-line operation; 2540 card punch control)
Versatec	LP/C1130	(IBM 1130)	600 lpm/80 col./64 char. non-impact printer/ plotter (other print-only & printer/plotter models available)

*Table compiled by staff of MODERN DATA

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TABLE 4 — INDEPENDENT SUPPLIERS OF COMPATIBLE MAIN MEMORY & STORAGE*

Company	IBM 360						IBM 370				IBM S/3	Other Mainframes
	22	30	40	50	65+	LCS	135	145	155	165		
Ampex	ARM22 (64K)	ARM30 (128K)	ARM40 (448K)	ARM50 (1.5M)	ARM2365 (4M)	ECM (8M)	—	—	ARM 3360 (2M)	ARM 3360 (3M)	—	Univac 400/1100 ARM1108 (262K words) DEC PDP-10 ARM-10 (128K words)
Business System Technology	—	—	—	—	—	—	—	—	—	—	BST/3 (64K)	—
Cambridge Memories	CC22 (64K)	CC30 (128K)	CC40 (448K)	CC50 (1M)	Core65/67 (2M)	—	—	—	Stor 155 (2M)	Stor 165 (4M)	—	—
CFI Memories	—	—	—	—	—	—	—	—	—	—	CFI S/3 (64K)	—
CIG Computer Products	2200 (64K)	3000 (128K)	4000 (448K)	5000 (1M)	6000 (2M)	LCS (8M)	—	7145 (1M)	55000 (2M) 155+ (4M)	65000 (3M)	—	Univac400/1100 6600/8800/9800 (262K words)
Computer Hardware	—	—	—	—	—	—	—	—	—	—	—	IBM 1130 & 1800 CHI Core (65K)
Computer Hardware C&S	—	3768 (1M)	4768 (1M)	5768 (1M)	—	—	—	—	—	—	—	Accelerator enhancement for 360 CPUs
Control Data	—	23030 (128K)	23040 (448K)	23050 (1M)	23065 (1M)	—	33135 (512K)	33145 (1M)	33155 (4M)	33165 (4M)	—	IBM 370/158 & 168 33158 & 33168 (4M & 8M)
Data Products	—	—	—	—	—	6000 (2M)	—	—	—	—	—	—
Dimensional Systems	—	—	—	—	—	—	—	—	—	—	—	DEC PDP-10 DMS-10 (4M words)
Electronic Memories & Magnetics	—	3650/30 (128K)	3650/40 (256K)	3650/50 (512K)	3650/65 (2M)	—	—	—	3650/155 (2M)	3650/165 (3M)	—	—
Fabri-Tek	MOD22+ (64K)	MOD30+ (128K)	MOD40+ (512K)	MOD50+ (IM)	MOD65/67+ (IM)	LCM+ (2M)	—	—	MOD70+ (2M)	MOD70+ (3M)	MOD10+ (64K)	IBM 360/25 & 44 MOD 25+ & MOD 44+ (48K & 1M)
Fairfield Memory	—	FM30 (256K)	FM40 (256K)	FM50 (1M)	7065 (2M)	—	—	—	7065 (2M)	7065 (3M)	—	—
Information Control	CorPak 22 (64K)	CorPak 30 (256K)	CorPak 40 (448K)	CorPak 50 (512K)	—	—	—	—	—	—	—	—
Itel	—	MMM/360 (128K)	MMM/360 (448K)	MMM/360 (1M)	MMM/360 (2M)	—	MMM/370 (512K)	MMM/370 (1M)	MMM/370 (4M)	MMM/370 (4M)	—	IBM 370/158 & 168 MMM/370 (4M)
Lockheed Electronics	—	—	—	—	—	MM365 (2M)	—	—	—	—	—	DEC PDP-10 MPM-100 (4M words)
Logicon	—	—	—	—	—	—	—	—	—	—	—	IBM 1130 Logicore (65K)
Memory Technology	—	—	—	—	—	—	—	—	MMM/155 (4M)	MMM/165 (4M)	—	—
Standard Memories	SM220 (64K)	SM300 (256K)	SM400 (448K)	SM500 (1M)	Smart 2365 (8M)	—	—	—	—	—	—	—
Storage Technology	—	—	—	—	—	—	—	3745 (1.2M)	3755 (4M)	3765 (4M)	—	—
Telex computer	—	—	—	—	—	—	—	6345 (512K)	6360 (2M)	6360 (3M)	—	—

Figures in parentheses denote total system capacity (IBM/other mainframer memory & independent add-on)
*Table compiled by staff of MODERN DATA.

REFERENCE LITERATURE

For detailed information on the characteristics, capabilities, and application of compatible storage, printer and memory hardware, **circle the appropriate number on the Reader Inquiry Card.**

COMPATIBLE DISC DRIVES & STORAGE

Ampex/Computer Products Div., Marina Del Rey, Cal. 115
California Computer Products, Anaheim, Cal. 116
CIG Computer Products, Stamford, Conn. 117
Computer Hardware, Inc., Sacramento, Cal. 118
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But it appears that the System/360 replacement market has already passed its peak, and the independent memory suppliers are now faced with the unenviable task of attempting to manufacture and market add-on memory units for IBM's newer System/370 computers on a profitable basis. In an obvious effort to keep history from repeating itself, IBM has priced the System/370 main memory far lower than that of the System/360, has switched from core to semiconductor memories, and has integrated the main memory into the CPU cabinet in most of the System/370 models. As a result, the System/370 replacement memory market, though potentially large, looks a lot less attractive to the independents. Nonetheless, most of the suppliers of System/360-compatible add-on memories, as well as a few new contenders, have developed replacement memories for the System/370. The resulting competitive pressure on IBM will continue to benefit IBM computer users whether or not they elect to deal with the independents.

What do the users have to say? The DATAPRO 70 staff has interviewed dozens of add-on main memory users, including users of every known make of IBM-compatible equipment that has been delivered to date. Probably the most significant result is that our staff was unable to locate a single dissatisfied user. To a man, the users indicated that their add-on memory units were performing well and delivering the promised functional compatibility with the equivalent IBM memories. Thus, there can be no denying that the concept is a completely practical and workable one.

Installation times for most add-ons within IBM's standard capacity limits ranged from 30 minutes to three hours. Considerably longer times, ranging up to 48 hours, were required for some installations that involved enhanced capacities or unforeseen problems. In any case, once installed, the units have operated satisfactorily — often for a year or more — with little or no need for emergency maintenance. And the service, when required, has generally been prompt and efficient.

In view of the wide range of plug-compatible computer products now available and the generally favorable user experience with these products, one important conclusion seems clear: virtually every data processing executive owes it to himself and his organization to thoroughly investigate the possibilities for reducing the costs and/or improving the performance of his installation by making use of these plug-compatible products. ▲

MINIPERIPHERALS IN DECEMBER . . .

MODERN DATA's December issue will feature a Product Profile on Minicomputer-Compatible Peripherals. This comprehensive Profile will survey plug-compatible miniperipherals such as add-on/replacement memories; head-per-track disc/drum, disc pack, disc cartridge, and floppy disc storage; magnetic tape and cassette/cartridge storage; paper tape and punch card equipment; serial and line printers or printer/plotters; floating-point, Fourier and array processors; A/D interfaces; and other mini-mainframe interfaced peripherals marketed by the independent (non-mini-mainframer) manufacturer. Companies wishing to submit information on miniperipherals for consideration in the Profile who have not yet completed a questionnaire should contact **John A. Murphy, Associate Editor.**

NEW PRODUCTS

MINI-COMPATIBLE FLOPPY DISC

The AED 2500 floppy disc storage subsystem has CPU-compatible interfaces for Nova, PDP-8, PDP-11, 620/100, and 2100 series minicomputers. The subsystem's formatter/controller can service up to four floppy drives, each capable of storing 131 Kwords, for a total capacity of 524 Kwords. Other features are a data transfer rate of 15.6 Kwords/sec; a 10 msec/track slew access time; and a 10 msec settle time for final track. Prices for a ready to use floppy system start at $2,750. Price includes a disc drive, drive formatter/controller, mini-compatible program I/O interface, power supply, rack-mountable chassis, cables, and software driver package. *Advanced Electronics Design, Palo Alto, Cal.*

Circle No. 255 on Inquiry Card

360/65+ MAINFRAME MEMORY

Standard Memories have enhanced their Smart family of 2365 plug-compatible memories with the introduction of the Mod II. The new memory extends 360/65, 65MP, 67, and 75 mainframes to 8 Mbytes versus a maximum of IBM's 1 Mbyte. 360/65+ machines can thus function in the same range as the 370/158 at much lower cost. *Standard Memories, Ft. Lauderdale, Fla.*

Circle No. 301 on Inquiry Card

GENERAL-PURPOSE CRT TERMINAL

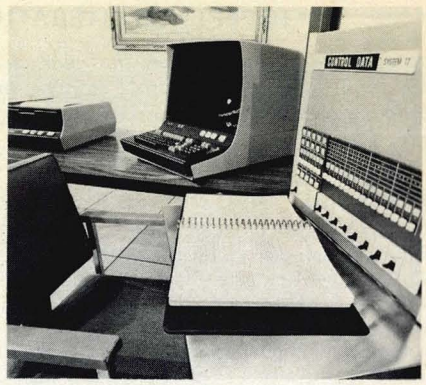
The Mini-Tec terminal provides for off-line buffered mode message composition as well as on-line conversational mode operation. Standard with the terminal are features such as a 960-character 80 x 12 display; RS-232-C, TTL and 20/60 ma current loop serial interfacing; blink, field protect, field tab, and keyboard or computer cursor control; and data transfer rates of 110 to 9600 baud, switch-selectable. A split baud rate feature also allows data transmission at one baud rate, and data input at another. The Mini-Tec goes for a mini-price of $1,300 in to-five unit quantities, and less than $1,000 in OEM quantities. *TEC Inc., Tucson, Ariz.*

Circle No. 261 on Inquiry Card

VARIAN 73 MEMORY EXTENSION

The Memory Map option for Varian 73 minicomputers allows the main memory to be expanded from the present 32K to 256K words. Since memory may be shared by mini processors, a multi-mini system could be expanded to millions-of-words memory levels. The map option also allows short 512-word "pages" of programs or data to be allocated to space anywhere in the 256K of actual memory locations, increasing memory utilization efficiencies. The whole process is transparent to the programmer; programs are written as though a block of contiguous locations are available. Memory Map also provides a protect scheme that permits or forbids read-write operations on a page-by-page basis. Memory Map operates under Vortex II and will accept programs written for an earlier Vortex version. Price for the option, consisting of a 1024 x 12 random access bipolar memory, is $5,000. *Varian Data Machines, Irvine, Cal.*

Circle No. 260 on Inquiry Card



MINICOMPUTER SYSTEM

CDC has announced the System 17 Series, a family of general-purpose minicomputer-based systems for industrial control, health care, and communications applications. The new systems use the Model 1784, an 18-bit minicomputer with 4K to 65K of 600 or 900 nanosec memory, and a full line of peripheral and software support products. The System 17's are also program compatible with the older CDC 1700 line of small computers. Basic purchase price for a 17 with 4K of 900 nanosec memory, hardware multiply/divide, priority interrupt, and DMA is $13,500; one-year lease for the same configuration is $330 per month. *Control Data Corp., Minneapolis, Minn.*

Circle No. 259 on Inquiry Card

SMALL-TO-MEDIUM BUSINESS SYSTEM

DEC has added four new models to its PDP-11 based Datasystem 500 Series of business data processors. Designated as the Models 530, 540, 550, and 560, the new systems feature a commercial timesharing operating system that will support up to 32 simultaneous users. OS software provided with the previously introduced Model 520 is also available for the new Datasystem 500 additions; the software includes a batch oriented RPG-II disc OS, and a data management system. Timeshare software is based on Basic-Plus and can handle jobs ranging from data entry/inquiry to large 32Kbyte programs. All Series 500 systems can support disc cartridge, disc pack, fixed head-per-track disc, and magnetic tape storage. PDP-11 memory ranges from 32Kbytes to 248Kbytes. Complete systems are priced from $62,000 to $400,000. *Digital Equipment Corp., Maynard, Mass.*

Circle No. 257 on Inquiry Card

PORTABLE DATA ENTRY TERMINAL

Designed for inventory control, shipping/receiving reporting, point-of-sale reporting, and order entry applications, the Identicon/Iomec PortaPen terminal allows both keyboard and optical pen reader data entry onto mag tape cartridges. The unit is portable, and can be powered by rechargeable batteries or line AC. All data stored may be transmitted to a CPU or another terminal over voice-grade telephone lines via an internal acoustic coupler. Electronic display or journal-tape listing printer, and full arithmetic functions are available as options. *Identicon Corp., Waltham, Mass.*

Circle No. 264 on Inquiry Card

REMOTE BATCH TERMINAL

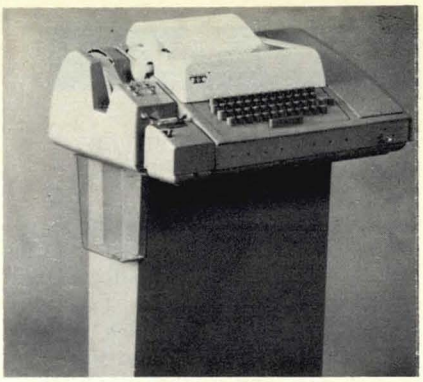
The System/4 RBT is a remote batch terminal that emulates IBM 2780 data communications devices and can also operate as a free-standing computer. The terminal supports bisync communications to 9600 baud over dial-up or dedicated networks. A typical configuration includes a 4K System/4 processor with two integral tape cartridges, CRT display and keyboard; a 150 to 300 CPM card reader; and a 15 cps to 400 LPM printer. The System/4 RBT can operate on-line to any IBM 360/370 utilizing OS, or any other computer or terminal using bisync conventions. The system can also support IBM software, including CICS, BTAM, TCAM, or RJE under HASP, and ASP or Power II languages. Purchase cost for a minimum configuration is $15,420, and monthly rental with maintenance is $335. *Keane Associates, Inc., Wellesley Hills, Mass.*

Circle No. 327 on Inquiry Card

B3500 LINE PRINTER

Spur has introduced a controller-interface that allows operation of a 1403 line printer with a Burroughs B3500 mainframe. The controller-interface may be purchased for $12,686. *Spur Products Corp., Santa Monica, Cal.*

Circle No. 328 on Inquiry Card



DATA ACQUISITION AND CONTROL SYSTEM

Designated as the IDACS 8/C, the system is based on a PDP-8/F minicomputer with crystal clock, power fail auto restart capabilities, and a dual DECtape drive with ROM bootstrap hardware. The IDACS 8/C can be applied to a variety of industrial problems that include on-line testing, prototype development and simulation, process monitoring, and remote intelligent/satellite terminal operations. Basic language real-time industrial software allows the user with little programming expertise to define his process. Typical systems are priced under the $20,000 level. *Digital Equipment Corp., Maynard, Mass.*

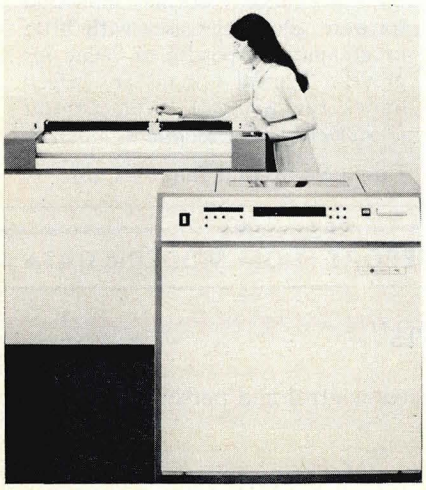
Circle No. 334 on Inquiry Card

NEW PRODUCTS

EDUCATIONAL COMPUTER SYSTEM

Designed and configured for the school to college educational market, WLC's W2000 Educational Computer System is delivered to the user as a turnkey system. Hardware includes an H-P minicomputer, printer, disc and mag tape storage, and a 30-channel optical card reader. Software packages cover budgeting, payroll, grade reporting, attendance accounting, scheduling, accounts payable, computer-assisted and -managed instruction, and other educational areas. The W2000 will support up to 32 users simultaneously on a timeshared basis, and has communications features for teleprocessing with remote, larger-scale CPUs. *Westinghouse Learning Corp., Iowa City, Iowa*

Circle No. 281 on Inquiry Card



INCREMENTAL DRUM PLOTTER

CalComp's top-of-the-line Model 1036 digital incremental drum plotter has a throughput capacity of up to 10 ips, and can operate on-line or off-line with their series 900 or 915 plotter controllers. The 1036 is available with step sizes of 0.002 inches or 0.05 mm, and two interchangeable drums of 36½ or 15½ inches in width. Three pen plotting with programmable pen selection is standard. Liquid ink or pressurized ballpoint pens may be used at full speeds of 5000 increments per second. The 1036 plotter also offers an electronic scaling device to compensate for paper width variations due to climatic conditions or inking variations. Price is $22,720, including one year of maintenance. *California Computer Products, Anaheim, Cal.*

Circle No. 284 on Inquiry Card

SYSTEM/3 ADD-ON MEMORY

The BST/3 is a direct replacement or add-on core memory that extends System/3 capacities above the basic 8Kbytes provided by IBM. The memory, housed in a stand-alone enclosure with power supply, can extend the System/3 memory to 64K in 8K or 16K increments. The BST/3 has a remote/local switch which allows the System/3 to operate in an "IBM-only" mode for diagnostics and maintenance. Rental varies from $174/month for an 8K add-on up to $999/month for a full 56K addition. *Business Systems Technology, Inc., Orange, Cal.*

Circle No. 330 on Inquiry Card

DOUBLE-DENSITY 3330-TYPE DISK PACK DRIVES

The CDC 9780 Disk Storage Unit can store 200 Mbytes on a single 3330-type disk pack and has an average access time of 30 millisec. Other features include transfer rates of 804 Kbytes/sec or 6.45 Mbits/sec, servo voice coil head positioning, internal diagnostics for maintenance and trouble-shooting, and a maximum access time of 55 millisec. Prices for the 9780 range from $9,750 to $10,500, dependent on quantity ordered. *Control Data Corp./OEM Products, Minneapolis, Minn.*

Circle No. 309 on Inquiry Card

NOVA FLOPPY DISK SYSTEM

IDS's Model 5017 Floppy Disk Memory System for Nova series minicomputers consists of a disk drive, PC plug-in controller, drivers, and power supply. The system is DOS-compatible, and features a per-disk capacity of 64Kwords, a latency time of 333 millisec, a track-to-track positioning time of 680 millisec (full disk), and a head engage time of 60 millisec. The 5017 floppy system is priced at $2,475 in single-unit quantities. *Information Data Systems, Inc., Walled Lake, Mich.*

Circle No. 325 on Inquiry Card

MARK SENSE CARD READERS

The "M" series of optical mark readers are capable of handling 40- or 80-column tab cards, reading pencil marks, or punched holes alone or in combination. The readers can process cards at rates of 300, 500, or 600 CPM from 500- and 1000-card input/output hoppers. A combined reflective and transmissive read station provides a greater degree of accuracy than that afforded by single station card readers. Prices of the new series of mark sense card readers start at $1,515. *Peripheral Dynamics, Inc., Norristown, Pa.*

Circle No. 313 on Inquiry Card

CDC CPU-INTERFACED PLOTTERS

The Varian Model 31-115 plotter interface allows the coupling of Statos 3110 plotters or 3111 printer/plotters to any Control Data 3000, 6000, or 7000 computer. The unit is directly plug-in compatible with the standard CDC data channel cables, and comes with an I/O cable that mates with connectors on the Statos plotters. Data throughput is at full CDC rates of 200 Kbytes/sec. Statos models use 176 bytes/line, and with a step size of 0.01" can run at 2.2 inches/sec. The 3111 printer/plotter includes a hardware character generator that provides the full 128 ASCII character set over 132 columns, 6 or 8 lines to the inch. Interface price is $12,000. *Varian Data Mach., Irvine, Cal.*

Circle No. 311 on Inquiry Card

DISK CARTRIDGE DRIVE

The Per Data Series DPX moving head disk drives utilize 5440-type removable cartridges and have storage capacities of 25 to 100 Mbits per drive. Features are a 10 millisec track-to-track access time; a 35 millisec average access time; write protect; a 2.5 MHz data rate; and an integral power supply. Up to four drives may be daisy-chained together, providing on-line capacities of up to 400 Mbits. *Per Data, Hicksville, New York.*

Circle No. 329 on Inquiry Card

120 CPS TERMINAL

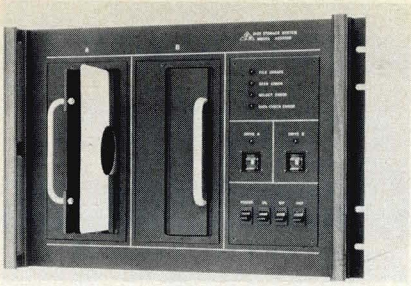
The EDT 33 MSR is a Teletype Model 33 equipped with both a 120 cps cassette buffer and a paper tape buffer. The terminal offers the advantages of more expensive dual cassette terminals and the versatility of a paper tape buffer. The paper tape can provide format control for operator prompting in applications involving multiple transaction tapes; keyed data is then stored on the cassette buffer for bulk transmission at rates up to 1200 baud. The cassette buffer also allows the remote or keyboard control functions of read-on, read-off, write-on, write-off, write gap, backspace, rewind, and automatic 20-character answerback. Searching can be performed manually by using fast forward/reverse controls on the console, or by stop codes with tape being read out by character, word, line, ETX, and DC3. The pricing schedule for the EDT 33 MSR ranges from $108 to $121 per month on a 1-year lease. *Western Union Data Services, Mahwah, N.J.*

Circle No. 303 on Inquiry Card

MINICOMPUTER PRINTER/PLOTTER

The Gould 5000 electrostatic printer/plotter is designed to interface with any minicomputer, and has an alphanumeric print rate of 1200 LPM and a plot rate of 3 ips. The 5000 uses a 64-character ASCII set and 7 x 9 dot matrix character, generating 132 characters per line or plotting with a resolution of 100 dots/inch. Options include 96- and 128-character sets with upper/lower case capabilities. Price of the 5000 is $7,600. *Gould Data Systems, Newton, Mass.*

Circle No. 297 on Inquiry Card



FLOPPY DISK STORAGE SYSTEM

The AED 2500 offers minicomputer users a floppy disk alternative to cassette storage and loader systems. Features include a storage capacity of 262 Kbytes per disk, a transfer rate of 31 Kbytes/sec, a 20 msec track-to-track access time, an 80 msec average latency time and disk media lifetimes in excess of 64 million passes. The formatter/controller can support up to four disk drives, providing a total on-line storage capacity of 10.5 Mbytes. *Advanced Electronics Design, Palo Alto, California.*

Circle No. 305 on Inquiry Card

2400 BPS MODEM

The Penril 2400B-1 Data Modem is primarily intended for 2400 bps operation over direct-distance-dial (DDD) networks. The modem provides on-line compatibility with the Bell 201B-type Data Set, and features automatic answer on calls received on the dial network, an internal call-abort timer, a 1200/2400 bps selectable data rate, instant synchronization and carrier response, and built-in diagnostics. Diagnostics include telemetric test capability that enables an operator at one site to test the entire communications link, including local modem, remote modem, and interconnecting telephone lines. Error rate probability is reported to be 1 x 10^{-7} at a SNR of 12.7 dB over typical unconditioned lines; tolerance to peak-to-peak phase jitter is 60° at 180Hz, and a tolerance of ±20Hz frequency translation is also reported. *Penril Data Communications, Inc., Rockville, Md.*

Circle No. 320 on Inquiry Card

PORTABLE CRT TERMINAL

The Digi-Log Model 33 is a portable, interactive CRT terminal designed to replace or operate in conjunction with Model 33 TTYs. The unit (less TV monitor) weighs less than ten pounds and can be carried in a briefcase. Features include a 1280-character 80 x 16 display; TTY loop, TTL or RS-232-C interfaces; and data rates to 9600 baud when external modems are used. Options include a small portable monitor, blinking cursor, blinking characters, or blinking fields. Single-unit price for the Model 33 CRT is $1,295. *Digi-Log Systems, Horsham, Pa.*

Circle No. 256 on Inquiry Card

IBM IN POS & BANKING

Dropping two shoes simultaneously, IBM has announced new systems for both the Point-Of-Sale and Banking markets. The IBM 3650 Retail Store System features terminals and communications options that allow the capture and processing of information originating anywhere in a retail operation — from the receiving dock to the final POS transaction site. The system consists of a programmable store site controller; a POS terminal with mag wand attachment; a merchandise tag encoder-printer; local-site and remote-site communications; and a CRT display terminal and printer module for back office and inventory operations. An 80 POS terminal system with controller, four CRT terminals, two printers, a tag encoder, and remote communications capabilities goes for $412,690 or $2,697/mo. The IBM 3600 Finance System features a communications controller for remote 370/VS computer hook-up; a variety of teller terminals and passbook or printer attachments; mag stripe read and encode transaction aids; and off-line diskette floppy disc data storage capabilities. A six-teller terminal configuration with one document printer, two passbook-document printers, a cash dispenser terminal, and controller is priced at $95,400 or $2,703/mo. Deliveries of both systems will begin after the second quarter of 1974. *IBM/Data Processing Division, White Plains, N.Y.*

Circle No. 258 on Inquiry Card

OPTICAL MARK READER

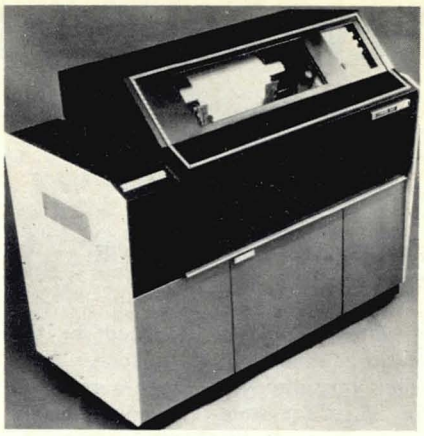
Featuring automatic threshold control, automatic document stacking, and a read rate of five documents per minute, the Model 900 Optical Mark Reader can process standard IBM 1230 forms containing up to 1000 mark positions. The unit is priced at $1,980 in single-unit quantity. *Digi-Data Corp., Bladensburg, Md.*

Circle No. 326 on Inquiry Card

MINICOMPUTER FIXED-HEAD DISKS

Plug-to-plug configurations of Applied Magnetics' M200 series of fixed head-per-track disk memories are available to PDP-11, Nova, H316/516, and other make minicomputer users. The M200 offers capacities of up to 9 Mbits and an access time of 13 millisec. *Applied Magnetics, Goleta, Cal.*

Circle No. 279 on Inquiry Card



360/370 LINE PRINTERS

The CDC 28211/14031 Printer Subsystem is a functional replacement for the IBM 1403 N1 line printer and the 2821 printer control unit that delivers up to 10% faster throughput. The CDC printer attaches to multiplexer or selector channels of 360/370 mainframes with either byte or burst mode multiplexer operation available. The system employs a 288-character type array together with standard buffer storage for two such arrays in the printer controller memory. *Control Data Corp./Peripheral Products, Minneapolis, Minn.*

Circle No. 262 on Inquiry Card

NEW SOFTWARE & SERVICES

BROKERAGE BACK OFFICE PACKAGE

A software package designed for the on-site automation of brokerage back office operations has been developed for Singer's System Ten computer by Cantor, Fitzgerald Computer Services of Beverly Hills, Cal. The package will handle all aspects of brokerage accounting, including cashiering, margin computation and surveillance, inventory profit and loss, fail identification and aging, branch office profit and loss, and will assist in the preparation of regulatory reports as well as net capital computations. Singer Business Machines and Cantor, Fitzgerald will jointly offer the back office system. *Singer Business Machines, San Leandro, California.*

Circle No. 358 on Inquiry Card

ITEM PURCHASE PROGRAM

A program which determines the correct quantity of an item to purchase to maximize savings ahead of an announced price increase is now available on Fortran-supported Univac computer systems. The software, called Optimum, considers all cost factors, including cost of capital, ordering, purchasing, and storage. It shows the buy-in quantity which would maximize savings compared with paying a higher price at the next opportunity to order. The buyer information, furnished on a scope or as a printout, also shows the potential savings from the buy-in decision as an annual per cent. Should a company decide against the optimum quantity, the computer provides alternative analyses of other quantities with corresponding changes in the savings to be realized. A buyer who typically handles many hundreds of items, may be confronted with buy-in decisions several times each week. Optimum provides immediate information to assist him in his decisions. After providing the computer with appropriate demand, old cost, new cost (after the price increase), and unit rate data, the buyer can immediately receive the buy-in information on a scope. *Univac, Blue Bell, Pa.*

Circle No. 340 on Inquiry Card

SOURCE DOCUMENT DATA CAPTURE SOFTWARE

The In-Form new software package provides Sanders 804 intelligent terminals with off-line data capture capability to cassette, dynamic recall, and extensive keyboard editing features, plus remote batch communication. Provided at no additional cost with the terminal, this package is intended for users who wish to capture variable information such as that found on insurance premiums, sales orders, personnel records, shipping reports, invoices, and other source documents. The user-oriented In-Form program permits the creation of formats on tape and predefinition of data fields. Formats closely resembling existing source documents can be devised on the CRT screen. Changes to formats can be made easily via the terminal keyboard rather than by costly reprograming. A remote batch communications program enables the variable data on completed tapes to be transmitted to a remote IBM 360 or 370 computer, and computer-generated reports and other data to be written back to cassette and printed locally. This program employs the same line discipline as that utilized by the IBM 2780 RJE terminal, which makes it compatible with BTAM, QTAM, and TCAM communications access methods. *Sanders Data Systems, Nashua, N.H.*

Circle No. 341 on Inquiry Card

2740/41 & SELECTRIC GRAPHICS

Accugraf is a system comprised of a new Selectric element and a computer graphics program which allows the user to plot high resolution graphics directly on a "Selectric" type terminal. The system has a resolution of 1/30 inch in either direction (900 points/square inch), closely approximating the capability of a draftsman. Under program control, Accugraf provides for automatic scaling, automatic sizing, automatic data magnification/reduction, multiple curve tracing, and complete alphanumerics. The Accugraf system is useful for interactive-mode on-line graphics for data reduction, analysis and design. *Sysdyne, Inc., Calabasas, Cal.*

Circle No. 351 on Inquiry Card

FORTRAN IV DISC SORT

Sort70 is a general-purpose disc file sort program which runs as a Fortran subroutine on any computer or minicomputer supporting Fortran IV with direct access. The program sorts up to five fields of any length by word or byte (regardless of machine word size), in place or out of place, ascending/descending, and will sort all or part of a file. Sort70 requires from 2K to 3.8K, depending on computer type. On large computers it offers the capability of in-line sorting via the Call statement from Fortran source programs. Sort70 is available on a one-time lease fee for $70.00. *Software'70, Anaheim, Cal.*

Circle No. 342 on Inquiry Card

DATA BASE MANAGEMENT SYSTEM

The Integrated Data Base Management System (IDMS) is a subset of the Codasyl Data Base language specification. Developed by B.F.Goodrich (the Un Blimp people), and distributed and supported by Cullinane, IDMS is designed to provide data base facilities for ANS Cobol, Fortran, PL/1, and other host languages which support a Call statement, operating on IBM 360/370's under OS/DOS/VS. It provides data manipulation statements to store, retrieve, and manipulate data stored on random access devices. Data manipulation statements may be included anywhere within the procedure coding of an application program. Before compilation, a preprocessor validates and converts all manipulation statements into Call statements. Working storage is used to establish data base record I/O areas and communications between the user and IDMS, with IBM BDAM used for physical I/O between IDMS and storage. IDMS provides separate language facilities for data description and manipulation. This separation removes the data description function from the application program, and allows the integration of all data and data relations into a data base which is common to all application programs. IDMS requires only 50K of core, can be interfaced with any generalized communications software and, when used with Cullinane's Culprit System, has excellent information retrieval capabilities. Univac, under separate license, has applied IDMS to their 9000 Series. The system is available at $30,000 or $1,000/mo. *Cullinane Corp., Boston, Mass.*

Circle No. 337 on Inquiry Card

MINICOMPUTER MARKET SURVEY

NOW AVAILABLE AT $60

(50% off original price while limited supply lasts)

The results of MODERN DATA's annual survey of the minicomputer market are now available in a special research report.

NOW AVAILABLE AT $60

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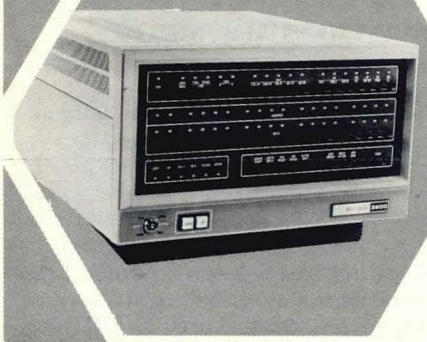

Survey replies from 5,000 participants representing 3,200 minicomputer buyer/user organizations are tabulated and analyzed in this unique report. The respondents reported plans to order a total of 23,000 minicomputers plus an assortment of 41,000 miniperipherals this year. Included among the 45 pages of charts and tables are. . .

* Share-of-market figures for the major minicomputer suppliers
* Current installation figures by model number
* Projection of sales for the top suppliers for 1973
* List of suppliers being considered for sole source procurements and the number of mainframes to be purchased
* Distribution of minicomputers by industry sector, application, OEM/end user mix, and geographic location

NEW.. IN THIS YEAR's REPORT - - - A SPECIAL SECTION ON MINIPERIPHERALS

The survey participants indicated the types, quantities, and vendors being considered for their 1973 peripheral product needs. Forecasts of 1973 orders along with share-of-market percentages for the major peripheral manufacturers are presented for the following products:

* Cassette/cartridge tape transports
* CRT data terminals
* Add-on main memories
* Line printers
* Disk drives
* Teleprinters

The industry experienced a 74% increase in worldwide minicomputer installations in 1972, and the survey projections show another 75% increase coming this year. This annual survey effort represents the most comprehensive assessment of the mushrooming minicomputer market.

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NEW SOFTWARE & SERVICES

360/370 GRAPHICS SOFTWARE

Designed for non-programmer use, Display graphics software can handle a variety of business and engineering line, bar, or pie graphing problems. Using simplified English-like commands and keywords, Display can be used on 360/370 systems supported by OS or DOS for graphic output onto a number of plotting devices, either on- or off-line. *Gould Data Systems, Newton, Massachusetts.*

Circle No. 347 on Inquiry Card

NOVA DOS

Disk operating system software which allows the use of double-density (200 tpi) disc cartridge drives on Nova minicomputers has been introduced by System Industries. Besides giving users independence from mini-mainframer hardware/software, the DOS package may be upgraded to accommodate multi-user or real-time requirements with no software rewrite. *System Industries, Sunnyvale, Cal.*

Circle No. 339 on Inquiry Card

DATA SECURITY

Safeguard, a set of four subroutines, encrypts and decrypts data files for 360/370 systems operating under OS, DOS, VS and ASP, HASP or TSO options. The subroutines may be accessed from programs written in Cobol, Fortran, PL/1, or Assembler. Safeguard encodes data fields according to an algorithm selected by a 16-character key, and offers over 2×10^{38} possible encryption algorithms. Files may also be encoded by a succession of different keys. Fields are encrypted according to the selected alogrithm, with data only decrypted prior to use inside the user program. Only scrambled data is stored, the keys not available on secondary storage for deliberate or inadvertent access. For additional protection, the key specified to Safeguard at execution time is destroyed as soon as the encryption algorithm is selected. Each unique key provides a unique encryption program, and each distribution copy of Safeguard uses a unique algorithm to generate encryption/decryption mapping. Safeguard subroutines are available on a one-time license fee for $250. *Digital Solutions, Troy, N.Y.*

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INVESTMENT RESEARCH SERVICE

Analytics III is a timeshared computer investment research service for the analysis of financial and economic data. The service permits simultaneous analysis via remote terminals of information contained in the Value Line Analytical Data Base-1, developed by Arnold Bernhard & Co., and in an economic data base compiled by Lionel D. Edie & Co. In addition, the service utilizes a securities price data base on the price-volume history of securities listed on the New York, American, and Over-The-Counter exchanges. Analytics III is supported by a variety of languages and subsystems that allow users to access data and generate reports. Provision is also made for storing private data bases for proprietary analyses and report generation. *Interactive Data Corp., Waltham, Mass.*

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INVESTMENT SERVICE SOFTWARE

Portfolio-EDP-Reporter is an information retrieval and report generator system for trust, portfolio, investment, and brokerage applications. The system can produce many reports or files in a single run, minimizing the impact of special report requests on normal EDP operations and providing fast turnaround reporting. Portfolio-EDP-Reporter can run with any existing data file without the need for special conversion runs, including complex data base management systems such as IMS, Total, or RDMS. The system is priced at $15,000 for a two-year period, and 15% of that per year thereafter; purchase and rental plans are also available. *Cullinane Corp., Boston, Mass.*

Circle No. 356 on Inquiry Card

INTERACTIVE COBOL

Tymshare has enhanced their timeshare services with the addition of an interactive Cobol package. Capabilities include a faster compiler, an interactive debugger, indexed sequential files, and shorthand or abbreviation translator. The language also provides a report writer and generator, an interactive editor, subroutine capability, internal and external sorts, and a decision table processor. Minimum monthly service contracts begin at $80, and include access to Tymshare's network and program libraries. *Tymshare, Inc., Cupertino, Cal.*

Circle No. 355 on Inquiry Card

NEW LITERATURE

370/155-165 MAIN MEMORY

Add-on/replacement main memory for IBM 370, Model 155 and 165 mainframes is reviewed in a product folder. The STC 3755/3765 memory systems are available in 256K, 512K, 768K, and 1Mbyte capacities, and are completely plug-to-plug compatible with IBM counterparts. *Storage Technology Corp., Louisville, Colo.*

Circle No. 364 on Inquiry Card

KEYPUNCH RECORDER/VERIFIER

Tab's new 80-column card Punch-Verifier is outlined in a three-page brochure. The buffered keypunch can perform punching, printing, verifying, and correction operations, and features multi-level programming with up to 31 formats on-line, automatic program sequencing, and memory for the storage of 240 constant characters for automatic punching onto cards within a program. *Tab Products Company, Palo Alto, Cal.*

Circle No. 365 on Inquiry Card

OEM PRODUCTS

A product catalog describes CDC's line of OEM peripherals. Covered in the publication are the characteristics of floppy disk, disk cartridge, and disk pack drives; core memories; ticket, serial, and line printers; magnetic tape transports; OCR page and document readers; card readers and punches; and CRT and teleprinter terminals. *Control Data Corp./OEM Products, Minneapolis, Minn.*

Circle No. 367 on Inquiry Card

FREIGHT HANDLING SYSTEM

Loadtrac I, a materials-handling and stock movement reporting system for truck freight terminals, is outlined in a recently issued bulletin. The system combines the best features of mechanical and manual freight handling, and integrates them with computerized records keeping. *Aerojet Industrial Systems, Frederick, Md.*

Circle No. 373 on Inquiry Card

MATHEMATICAL PROGRAMMING SERVICES

A new brochure is available on TI's Triplex (360/195, 370/165, 370/155) computing facilities and mathematical software packages. Software is centered on MPSX, a programming system designed to handle complex mathematical problems; Sprint-360/370, an in-core optimizer; and Gamma 3.2, a matrix generator/report writer. *Texas Instruments/Information Services Div., Dallas, Texas*

Circle No. 369 on Inquiry Card

NOVA DISK STORAGE

Literature is available on Nova mini-compatible head-per-track disk storage. Details are presented on the disk controller and the 64K to 2.5Mword disk drives. *Alpha Data Inc., Canoga Park, Cal.*

Circle No. 385 on Inquiry Card

INTELLIGENT DISPLAY TERMINALS

The 3270-compatible Model 250 terminal is fully detailed in a new brochure. The 250 features an internal microprocessor with 8Kbytes of ROM and 6Kbytes of RAM; stand-alone or cluster configuration; 480- or 1920-character display; keypunch or typewriter keyboard arrangements; 1200 to 4800 baud data rates; and a variety of printer, positioner, and function key options. *Sycor, Inc., Ann Arbor, Mich.*

Circle No. 366 on Inquiry Card

FINANCIAL ANALYSIS LANGUAGE

A brochure describing FAL, GE's Fortran Financial Analysis Language, is available. FAL, with built-in mathematical functions and algebraic formulas for complex calculations, provides financial analysts and planners with the ability to analyze data and generate reports. The language is especially useful in work involving cash flow statements, risk analyses, financial statements, and budgeting. *GE/Information Services, Bethesda, Md.*

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INDEX TO ADVERTISERS

Introducing the Pertec printer. High speed features on a medium speed printer at a surprisingly low cost.

It's a 132 column, 300 lpm printer. And a 160 lpm printer. A printer with Pertec dependability at a lower cost than most comparable single speed models.

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CIRCLE NO. 35 ON INQUIRY CARD

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The Hazeltine 1000 Terminal features a 960-character display (80x12), your choice of transmission speeds up to 9600 bps as well as parity generation and checking. Options include upper/lower case, answerback and an auxiliary EIA output. All at a price that fits easily into your budget.

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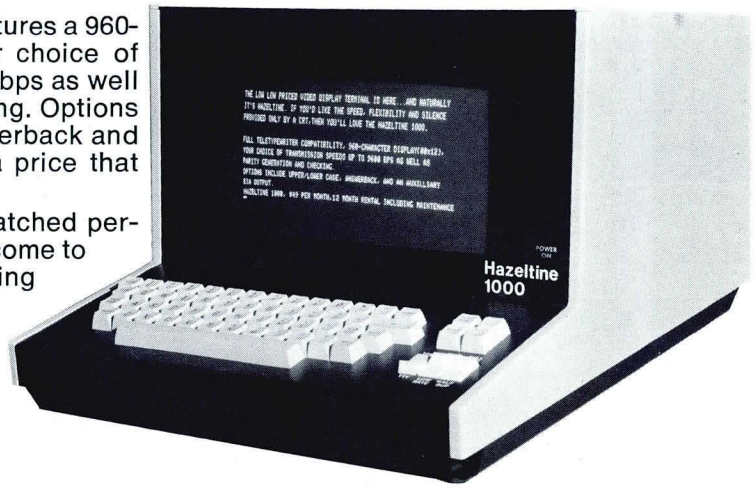

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