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And in three years our Matrix units have become the industry standard.

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This good news is brought to you by Versatec. Electrostatic specialists with the broadest line of electrostatic devices anywhere. Leading the silent generation.

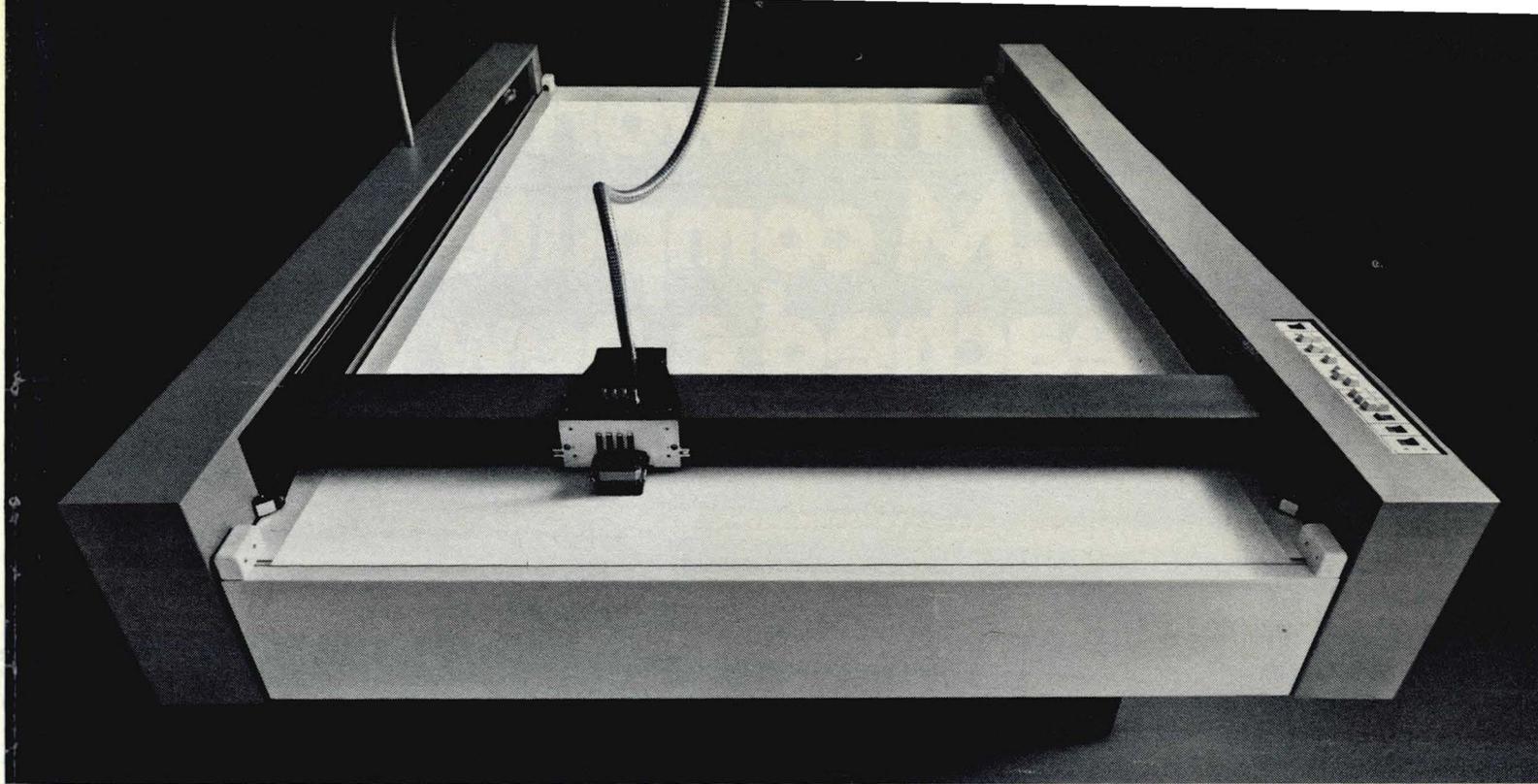
Versatec Inc., 10100 Bubb Road, Cupertino, California 95014 (408) 257-9900

VERSATEC



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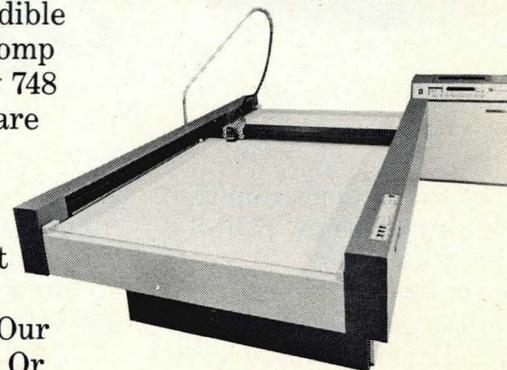
coated materials and cut strippable film. At peak speeds!

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

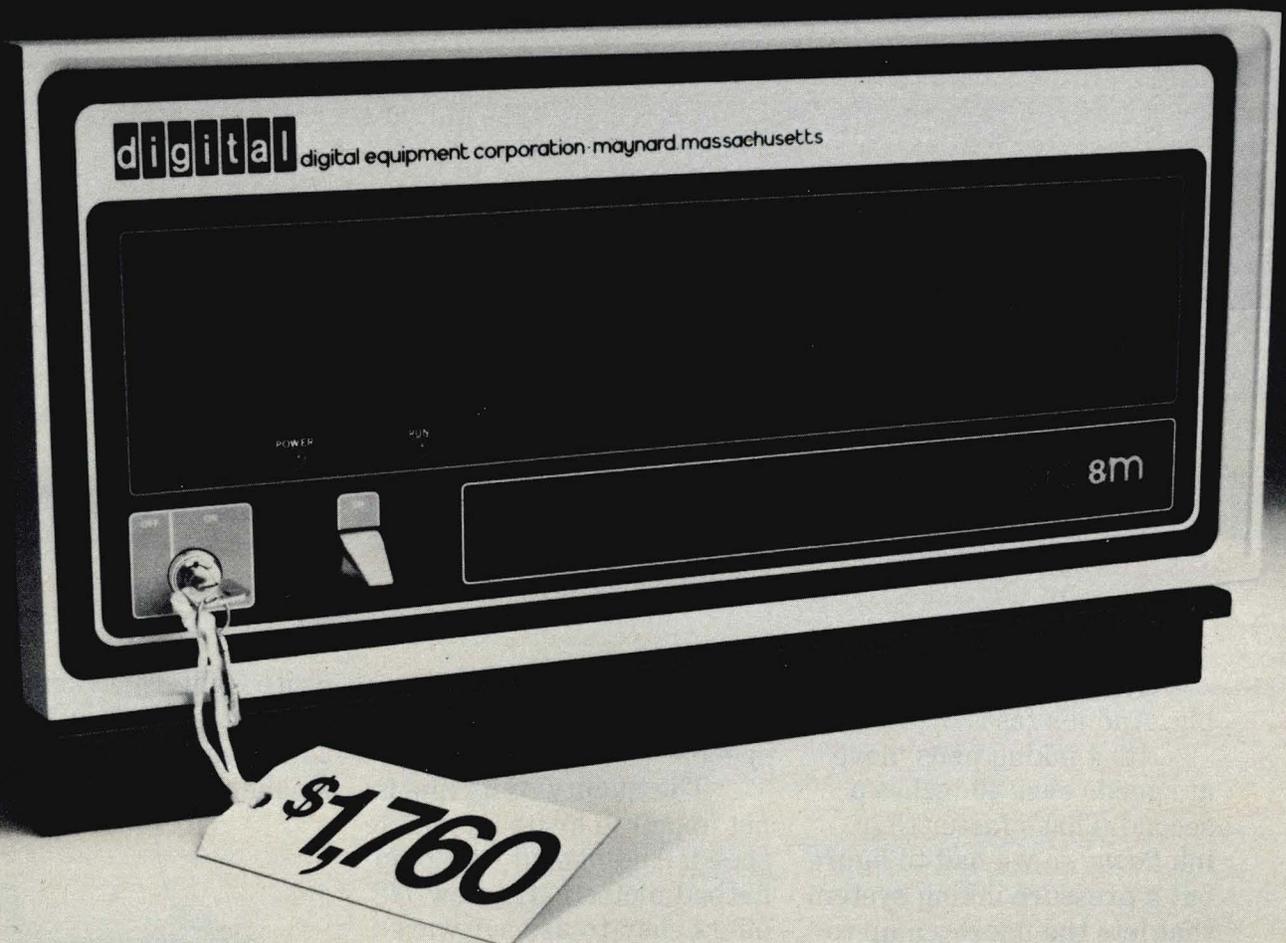
write California Computer Products, Inc., MD-M1-74, 2411 West La Palma Avenue, Anaheim, California 92801.



CALCOMP

CIRCLE NO. 2 ON INQUIRY CARD

PDP-8: The world's top OEM computer just reached a new low.



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\$1760 in 100 quantities.

It's called the PDP-8/M-M.

It combines 1K programmable read only memory and read/write memory to give you computer-control capability without having to pay for a lot of read/write memory you may not need. What's more, it comes complete, including CPU, power supply, chassis and oper-

ator's panel. You can use it for control applications, data collection, instrument monitoring, repetitive manufacturing operations and a host of other dedicated applications.

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Or write: OEM Products Group, Digital Equipment Corporation, Maynard, Mass. 01754. (617) 897-5111, Ext. 3356. European headquarters: 81 route de l'Aire, 1211 Geneva 26. Tel: 42 79 50. Digital Equipment of Canada Ltd., P.O. Box 11500, Ottawa, Ontario K2H 8K8. (613) 592-5111.

digital

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SUBSCRIPTION AND READER INQUIRY CARD.....OPPOSITE PAGE 64

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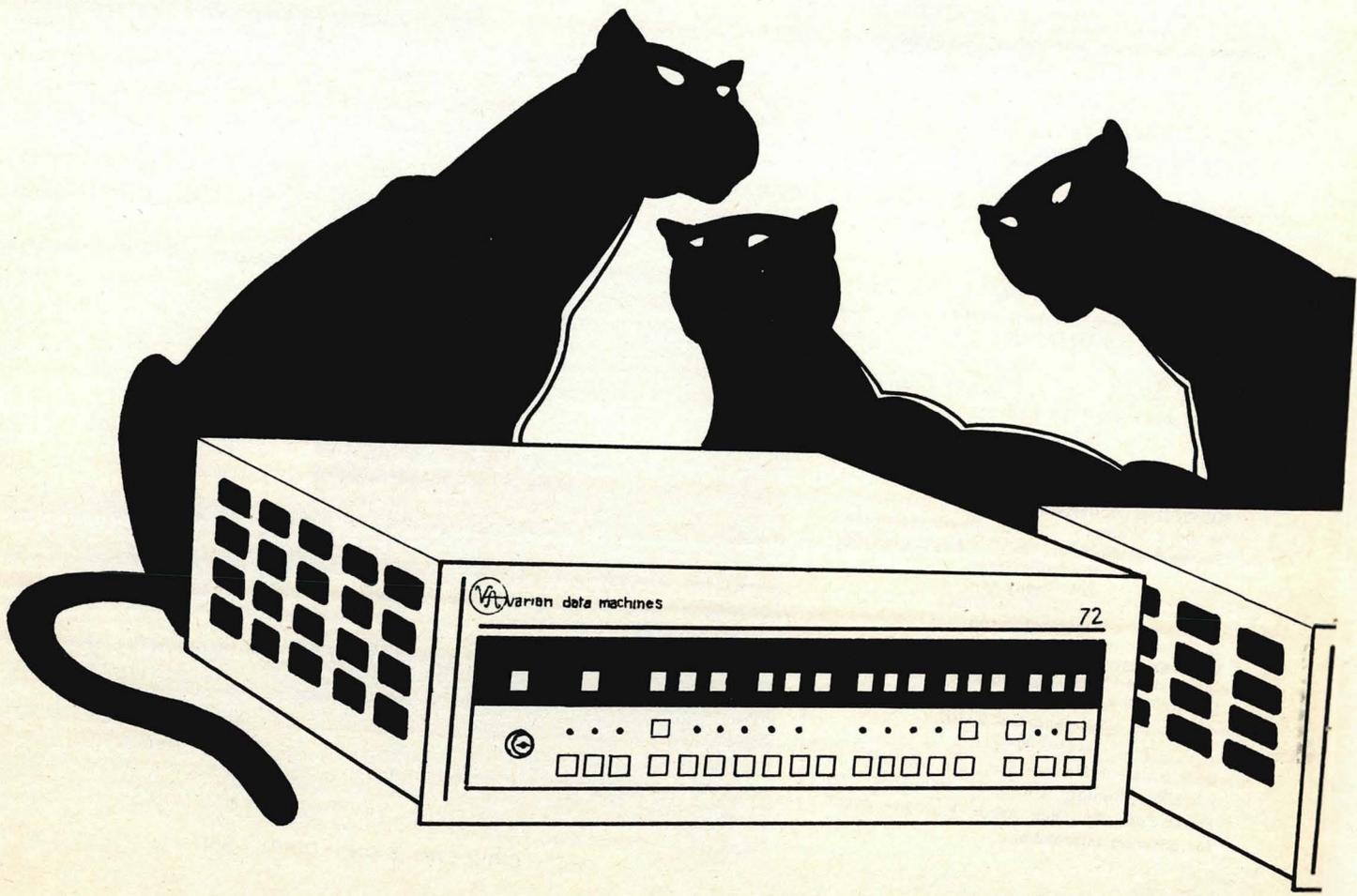
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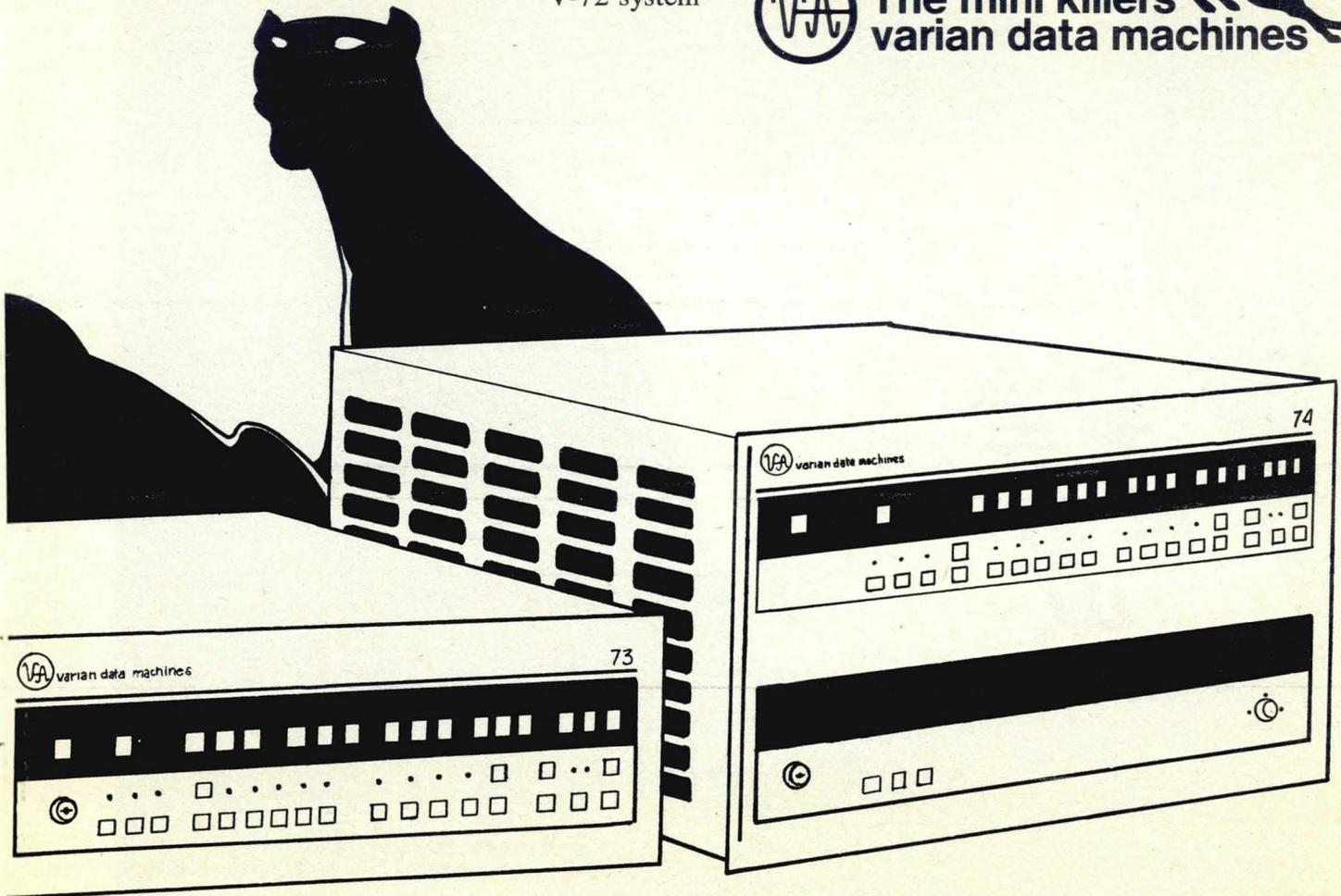
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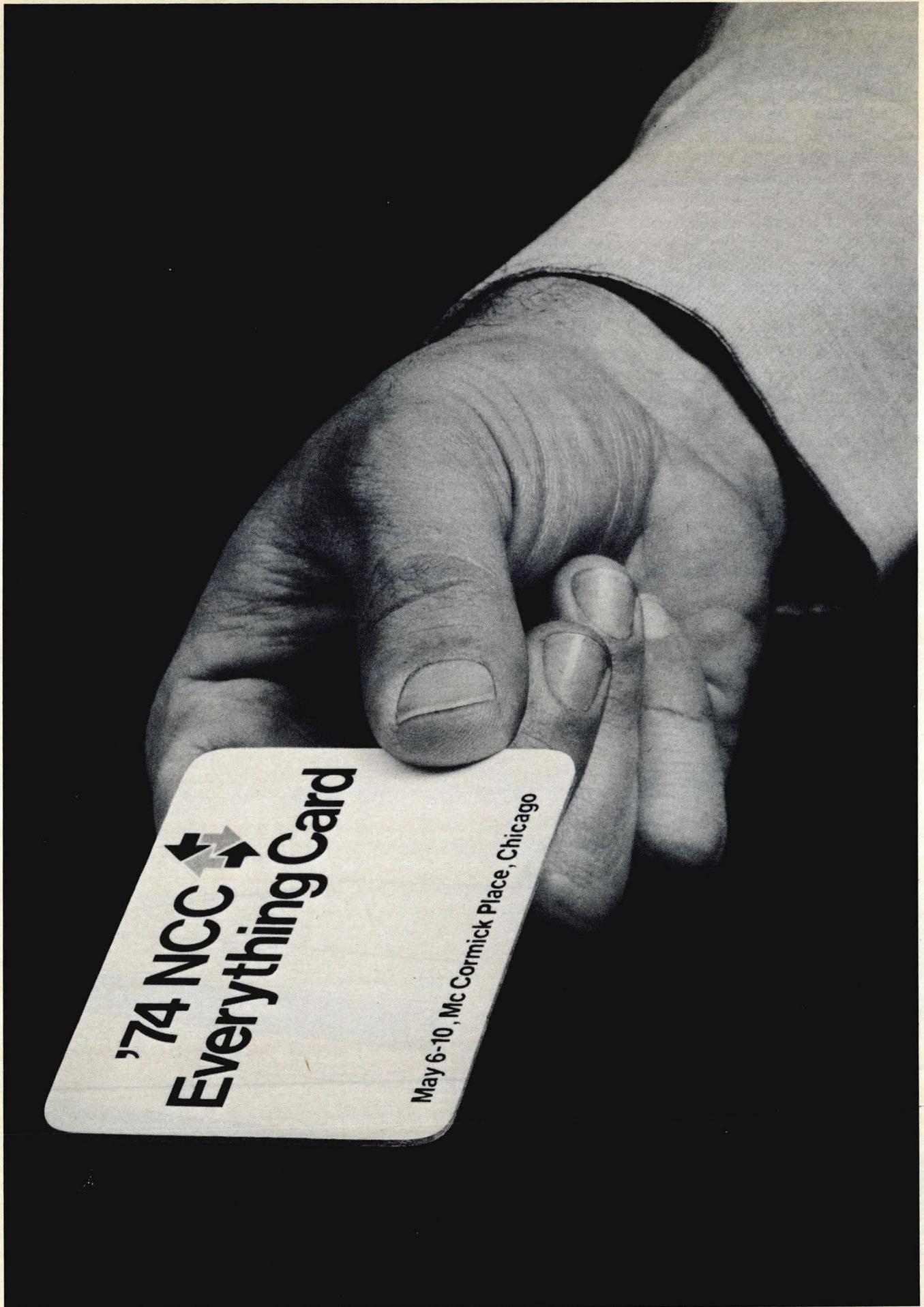
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**The mini killers
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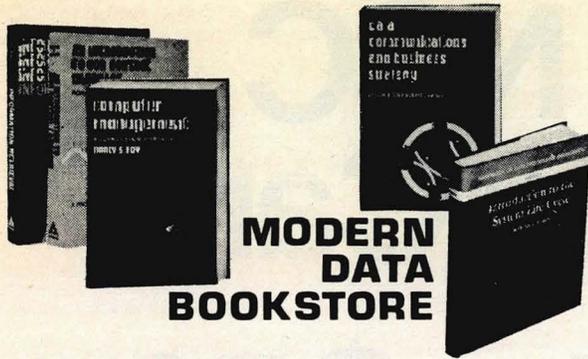
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BOOK REVIEWS

MODELING AND SIMULATION, Volume 4. Edited by W.C. Vogt and M.H. Mickle, Univ. of Pittsburgh. 532 pages, \$25.00. Published and distributed by Instrument Society of America, 400 Stanwix St., Pittsburgh, Pa. 15222.

This book comprises the proceedings of the Fourth (1973) Annual Pittsburgh Conference on Modeling and Simulation sponsored by the School of Engineering, University of Pittsburgh, in cooperation with the Pittsburgh Sections of the IEEE and ISA. The 120 papers included cover topics in energy resources and power, socioeconomics, arms control, education, health care, mass transportation and urban planning, and computer graphics.

EVALUATION AND MEASUREMENT TECHNIQUES FOR DIGITAL COMPUTER SYSTEMS by M.E. Drummond, Jr. 338 pages, \$14.00. Prentice-Hall, Inc., Englewood Cliffs, N.J.

The author's purpose is to "... supply *some* guidance and information about the basic techniques used in evaluation and measurement . . . sufficient to allow analysts to perform *simple* but meaningful investigations into the activity of a system." We have supplied the italics to capture the gist of this book. The treatment is uneven, wanders, and tends to be repetitive and sketchy. For example, timing formulas for determining the expected running time of a job are discussed, but little information is given as to how these formulas were derived.

Almost all examples of measurement and monitoring hardware facilities are drawn from various IBM 7000 Series installations. Presumably, substantive guidance would have consisted of doing something more than merely mentioning the existence of the numerous hardware and software measurement and analytical tools available today. That which is discussed is generally correct, but limited and possibly misleading.

This book is unique in that it presumes little prior mathematical or hardware knowledge. Since some guidance in the evaluation and measurement of computer system performance is sorely needed and simplistic analyses are better than none, one would be better off reading this book than none at all.

— B.B.

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NEWS & COMMENT

MEMORY IMPROVEMENTS

Memories have always accounted for most of the computer hardware dollar and it is doubtful this situation will change. What has been changing, however — and dramatically — is the improved price/performance of semiconductor memories. Improvements have come so rapidly that many industry observers predict that semiconductor random access memories soon will not only completely replace core main memories, but direct access (disc, drum) auxiliary memories as well. For example, Cambridge Memory Systems has already delivered several of its "Dotram" moving magnetic domain memories as replacements for small disc systems, and Intel Memory Systems recently delivered a 43.2 megabit shift register memory system, believed to be the world's largest, to replace a drum memory. The Intel System is made up of Intel 3 MHz (clock rate) 20K word by 10 bit memory cards which are unit-priced under \$.01/bit. Price erosion in the RAM main and ROM control memory markets has been particularly dramatic. Last month Electronic Arrays dropped the average price of its MOS ROMs by 48%, and Fairchild Camera and Instrument announced that single units of its F10405 128-bit, 15nsec. RAMs had been reduced from \$60.00 to \$19.80.

TEALE CENTER

A \$19.9 million contract to equip California's Stephen P. Teale Consolidated Data Center has been awarded to IBM without competitive bidding. Additionally, a \$700,000 contract went to Data 100 Corp. for satellite processors, and Boeing Computer Services picked up a \$250,000 training contract. Control Data, Univac and Honeywell, as well as IBM, had responded to two earlier RFP's, but were either rejected or withdrew. The Teale Center will handle the EDP requirements of 34 California state agencies.

PITNEY BOWES BOWS OUT OF POS

The Pitney Bowes-Alpex venture, which has made that firm the third largest vendor of point-of-sale systems (after Singer and NCR), is no more. Pitney-Bowes Inc. announced it was writing off its \$37 million, 64% interest in PB-A as of Sept. 30. Alpex Computer Corp. filed a \$75 million lawsuit against PBI for the move. Alpex joined with PBI in 1970, and until last July had retained voting control and 50% of equity in PB-A.

The dissolution comes shortly after IBM and Univac announced their entry into the POS market. The threat of that new competition, more than the \$28 million PBI says it has lost on the "Spice" POS system to date, is seen as the major factor in PBI's decision to bow out. PB-A's revenues in 1972 were \$9.8 million, up from \$1.2 million in 1971.

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CIRCLE NO. 7 ON INQUIRY CARD

What Hath Babbage Wrought

MODERN DATA XMAS PREVENT

Because of a typographical error in MODERN DATA's October issue Table of Contents page, what should have read: "Digicom's new 'Digicoder' *presents* digital data in graphic form . . ." appeared as ". . . *prevents* digital data . . ." This was noted by reader Larry D. Gregory of Tulsa, Oklahoma, who sent us a Xerox of the page marked with the following instruction: "I don't know whether you have something against digital data in graphic form, but if MODERN DATA's type is set by computer, please forward this note to the 'WHBW' Department."

MODERN DATA's type *is* set by computer, and hopefully our \$10.00 WHBW check to Mr. Gregory was received before Xmas.

MODERN DATA will pay \$10.00 for any computer-or-EDP-related item published in our WHAT HATH BABBAGE WROUGHT Dept. Send all submissions to:

WHBW
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3 Lockland Ave., Framingham, Mass. 01701

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IBM IN COURT

Things don't stop moving for IBM's legal department. A quick rundown of recent major events:

— The Justice Department proposed Sept. 30 for the start of trial proceedings in its long-pending (since Jan. 1969) monopoly case against IBM. Justice also revealed it had subpoenaed current domestic and foreign market share data from Univac, Honeywell, Control Data and NCR. IBM objected to both the data and the subpoenas on the basis that it had not been informed of the contents of the subpoenas, and that there would be insufficient time to analyze the data obtained from them. The court scheduled the trial for October 7.

— Judge A. Sherman Christensen reduced by \$93 million the \$352.5 million award originally levied against IBM in the Telex case. The reduction stemmed from a failure to take into account that portion of Telex' revenues which reflected gains from espionage. Judge Christensen also softened several of the injunctions originally set against IBM, but he let stand the \$21.9 million awarded to IBM for Telex' misappropriation of trade secrets. Perhaps of greatest importance was his refelction that, except in isolated cases, IBM had not reduced prices below a substantial level of profit — a statement that IBM interprets as defeating charges of predatory pricing. Both IBM and Telex appealed the amended judgement, and a joint request for an expedited appeal has been granted.

— California Computer Products filed an antitrust action against IBM seeking \$100 million in damages. IBM counter-claimed that CalComp had misappropriated IBM trade secrets, infringed on IBM patents, and was itself guilty of monopolizing the digital plotter market — all of which was hotly denied by CalComp.

— Hudson General Corp., a leasing firm with an inventory of Telex peripherals valued at about \$34 million, claimed \$28 million in injuries attributed to IBM's alleged monopoly powers.

BITS & BYTES

Xerox has promised an ANS Cobol compiler for its 16-bit Xerox 530 by third quarter, 1974. RPG II and ANS Fortran IV were previously announced for the 530.

IBM raised prices 2% on most equipment, and 10% on maintenance calls and new S.E. contracts. A 2% rental increase will become effective March 1 on FTP and ETP leases signed after Nov. 26, and on TLP contracts signed after Nov. 23 or involving deliveries after March 1.

A \$210,000 contract to develop production techniques for bubble memory devices has been awarded to Rockwell International Corp. by the Army Electronics Command.

Gulf Research & Development Co. has ordered three Univac 1108 systems, valued at approximately \$6 million, for seismic data processing and production research.

AT&T calculates that the electricity it will save each year by converting all Bell System vacuum tubes to solid state devices would power a city of 30,000.

Penril Modems offer the OEM and End User advantages in . . .

CUSTOM DESIGN

Our facilities and capabilities enable us to provide both OEM and End Users with low, medium and high-speed modems tailored to meet their specific system requirements and cost objectives.

RELIABILITY

Our modems use hermetically sealed semiconductors and ceramic integrated circuits exclusively. Vibration, burn-in, and complete electrical and mechanical testing is performed on every unit prior to shipment. Perhaps these are the reasons our modems are experiencing MTBF's ranging from 35,000 hours to 200,000 hours.

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No special tools or equipment are required to install, operate or maintain our modems. Built-in diagnostics obviate the need for test equipment and minimize the time and labor involved in performing system fault isolation. Many of our units feature a unique tele-metric test capability whereby non-technical personnel can test the entire link and isolate faults therein all from one site.

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The bit error rate probability of our modems is 1×10^{-6} or better over leased lines or the dial network. Our units are virtually unaffected by the major line impairments affecting data transmission.

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Euro Network, Ltd. Eastleigh, Hampshire, England

INTERNATIONAL NEWS

U.S.S.R. CLOSING COMPUTER GAP

According to remarks by Mikhail Rakovskiy, Deputy Chairman of the State Planning Committee of the U.S.S.R., the United States has eight times as many computers as the Soviet Union, but the gap is smaller if it is measured in terms of computing power. He was replying to questions posed by Dr. Henry Lieberman, director of Science, Technology, and Education at the New York Times, who visited the Soviet Union recently. Dr. Lieberman also met with other Soviet computer notables, who told him that the U.S.S.R. expects to achieve self-sufficiency in computer production during the 1975-1980 Five Year Plan period. He also learned that as many as 250 RIAD computers will be manufactured in 1973, and that the Russians are well on their way towards establishing a national software library.

FRENCH MARKET

The United States is the principal supplier of EDP equipment to France, accounting for \$113 million of a total of almost \$300 million of imports during 1972. By 1977 the U.S. Dept. of Commerce estimates U.S. exports to France will run at an annual level of \$211 million. Total French market for computers and related equipment was \$693 million in 1972, and is expected to reach about \$1.8 billion in 1977.

EXPORTS/IMPORTS

The United States recorded a positive balance of trade of \$555 million in business machines in the first half of 1973, the U.S. Dept. of Commerce reports, up 30 percent from the positive balance of \$427 million recorded in the first half of 1972. Exports of \$969 million in the first six months of 1973 showed a gain of 20.5 percent over the comparable period in 1972. Imports at \$414 million rose only 9.6 percent from the first half of 1972.

Computers accounted for 82 percent of total U.S. exports of business machines in the first half. Exports of computers, including parts and accessories, were valued at \$796 million, an increase of \$135 million, or 20.4 percent, over exports of \$661 million in the first 6 months of 1972. Major customers were Canada, West Germany, the United Kingdom, and Japan.

Meanwhile, imports of computers declined by 38.7 percent to \$64 million in the first half of 1973 compared to \$105 million in the same period of 1972. First half imports of electronic calculators employing solid state circuitry rose to \$89 million, 102.3 percent over the first half of 1972.

Nationaal Lucht-en Ruimtevaartlaboratorium (NLR), the Netherlands National Aerospace Laboratory, has awarded Control Data a contract valued in excess of \$1 million for hardware, software, and services.

The Italian Ministry of the Treasury has ordered two Univac 90/70 systems with a total value of \$3.3 million. They will be used to process pension checks, which amount to 10% of the Italian national budget.



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CIRCLE NO. 10 ON INQUIRY CARD

DC DATASCAN

OTP: The Office of Telecommunications Policy has initiated a new communications planning program within the Executive Branch. Its purpose is to foster systematic and coordinated planning of Federal communications systems in five areas — national security, transportation, law enforcement, environment, and administrative communications. The program has three principal objectives: (1) to foster economy in Federal communications systems through resource sharing, common procurement, and other means; (2) to improve the overall effectiveness of Federal Government communications — under both normal and emergency conditions — through appropriate interconnection and compatibility of systems; and (3) to stimulate the application of new communications technology and service concepts to improve the performance of Federal agency missions. OTP says it will closely coordinate plans for communication system development and will review them annually.

EXPANDED PRIVACY BILL: Rep. Edward I. Koch (D-N.Y.), who earlier this year introduced the Federal Privacy Act bill in the House of Representatives, has now introduced an expanded bill, H.R. 9786, which extends the central premise of his original legislation to all of the country's computerized data banks, not just Federal data banks. The new bill was co-sponsored by Rep. Alphonzo Bell (R-Cal.), who explained that it "will not prevent the collection of valid data either by private or governmental agencies, but will impose reasonable controls on what can be collected, or how it can be dispersed so as to protect the privacy of our citizens."

ADAPSO: The Association of Data Processing Service Organizations has filed suit in a Federal court alleging that sale of commercial data processing services by Federal Home Loan Banks violates the Federal Home Loan Bank Act. ADAPSO said that contrary to the Act, which prohibits a Federal Home Loan Bank from engaging in commercial activities, the Federal Home

Loan Bank of Cincinnati is presently providing EDP services commercially to thrift institutions. The suit seeks a judicial declaration that the Federal Home Loan Bank Board in Washington, D.C., illegally authorized the Cincinnati bank's dp operation, and that the authorization be voided.

OUTLOOK The 1974 edition of the *U.S. Industrial Outlook*, published by the Dept. of Commerce, deals with point-of-sale devices, computers, data networks, key-to-disc/tape terminals, minicomputers, and intelligent terminals. Highlights:

POINT-OF-SALE DEVICES — These machines should expand at a rapid rate thanks to the adoption in the first half of 1973 of the Universal Product Code by the Uniform Grocery Product Code Council. The code consists of ten digits, and is compatible with the Distribution Number Bank's manufacturer-product code, the standard for the wholesale and retail industries.

COMPUTERS — Shipments of computers should reach \$6.2 billion for 1973, an increase of 12% over the 1972 estimate. There should be an additional 12% increase in 1974, bringing shipments to nearly \$7 billion.

KEY-TO-DISC/TAPE TERMINALS — The cassette data entry market is facing a strong rival in the "floppy disc," which excels the tape cassette in a number of ways. For instance, the floating head gives the disc indefinite life. Also, disposable discs costing no more than 50 cents "are in sight."

MINIS AND INTELLIGENT TERMINALS — These devices are expected to show the largest unit growth in the next few years.

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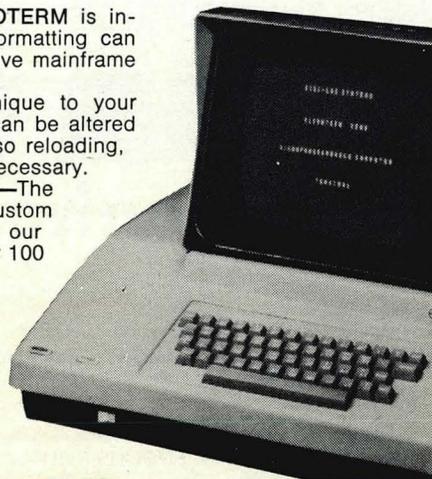
• **Unburden Your Mainframe**—The MICROTERM is intelligent, and tasks such as editing and formatting can be handled in your terminal, saving expensive mainframe time and memory.

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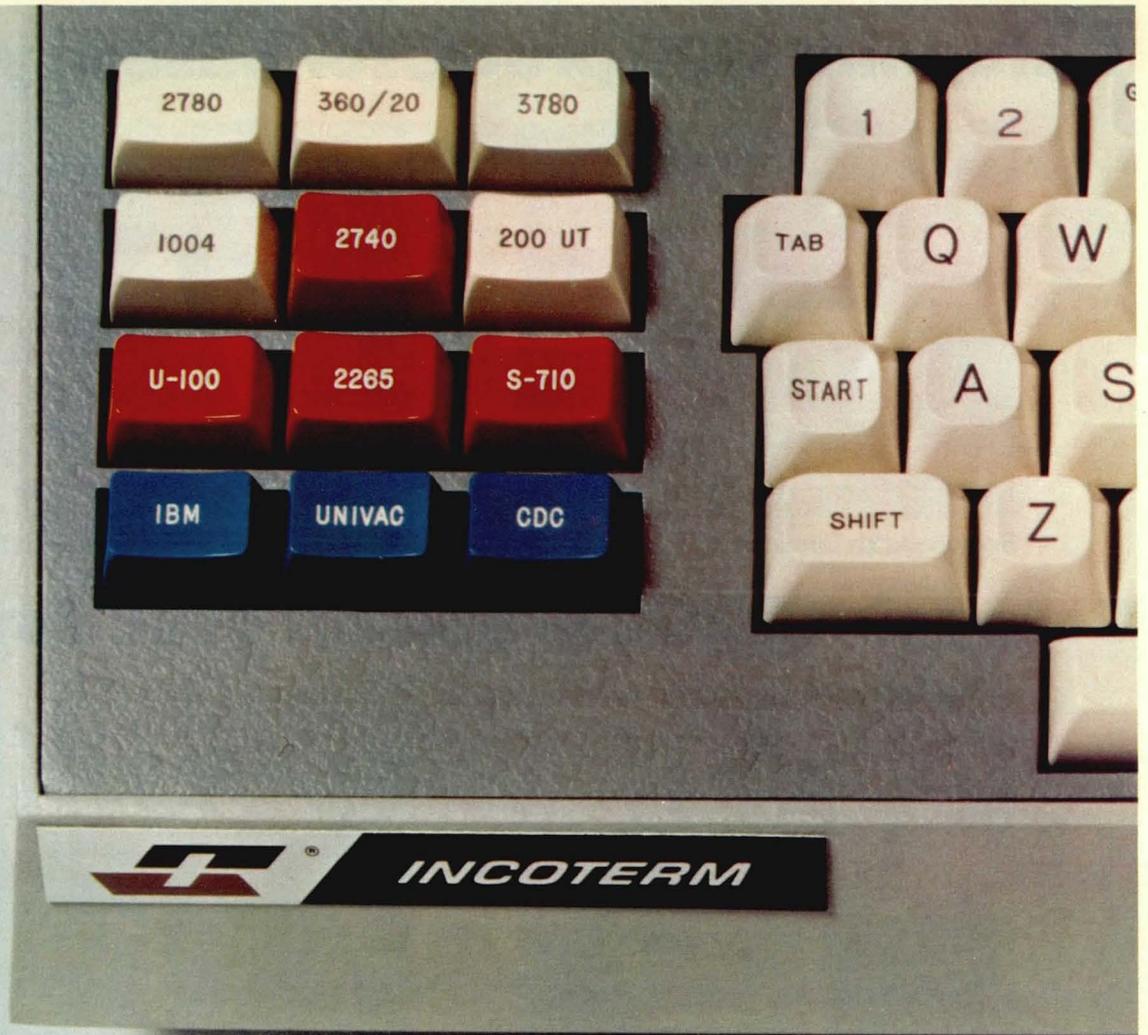
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CIRCLE NO. 11 ON INQUIRY CARD

IN BRIEF

Sen. Lowell Weicker (R-Conn.) has introduced a bill to abolish the Office of Telecommunications Policy, transferring its functions to the Federal Communications Commission.

The National Bureau of Standards is publishing a new monthly magazine, *Dimensions/NBS*, describing the latest scientific and technical advances. Computer utilization will be one of the topics covered. Subscription orders (\$6.50 per order) should be placed with Supt. of Documents, Government Printing Office, Washington, D.C. 20420.



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CIRCLE NO. 12 ON INQUIRY CARD

Datapoint 1100 processor based systems



Remote Batch Terminal



Intelligent Terminal

Datapoint 2200[®] processor based systems



Remote Job Entry



Terminal Processor

Datapoint 5500 processor based systems



Local Processor



Remote Processor

The pictures indicate a typical growth pattern of 1100-2200-5500 usage as a field office's work load increases. In the left-hand column, normal progression begins with the Datapoint 1100 for Remote Batch Terminal applications. In this mode, card readers, tape units, communication equipment, and printers are utilized as peripheral devices for efficient transmission of data between the remote location and host computer. In the second phase, the Remote Batch Terminal operation is upgraded to a 2200 to provide stand alone processing power to expedite Remote Job Entry applications. In addition to the expanded processing power of the 2200, disk capability and RPG II substantially enhance the effectiveness of the 2200 used in this way. In the third phase, a stand alone Datapoint 5500 is utilized as an independent Local Processor to meet all the dispersed processing requirements at the remote site without relying

on a central host facility.

In the right-hand column, the first picture shows the Datapoint 1100 used as a powerful Intelligent Terminal for data entry and limited processing tasks. In the next phase, field office needs have grown to an intelligent multi-station requirement and are satisfied by the Datapoint 2200 used as a Terminal Processor. In this mode, a single Datapoint 2200 can provide "intelligence" for up to eight keyboard/display stations with subsequent transmission of data between the host and remote sites. The final progression is to the Datapoint 5500 Remote Processor, used in field offices as local "computer utilities," still linked to the host processor system, but now providing substantial independent compute power of their own to an array of peripherals and terminals located in the field offices.

Dispersed data processing the Datapoint way — as easy as 1100-2200-5500



Dispersed data processing the Datapoint way is the productive, economic approach to providing your field offices with the on-site computer power needed to compete in today's business world, while yet being linked to a central computing operation. Datapoint's trio of upward-compatible dispersed processors—the 1100, 2200 and 5500—offer you a capability that can be readily and painlessly augmented as office work load increases, as your company's communications network becomes more sophisticated and your field office personnel more knowledgeable.

Let's look at these processors: the Datapoint 1100, available with 4K or 8K central memory, is the new Intelligent Terminal system from Datapoint Corporation that can bring your field offices into the on-line computer age immediately. Competitively priced, and with extensive capability for business processing tasks such as on-line (or off-line) data conversion and entry, it is a basic building block for creation of a multi-use dispersed data processing and data handling capability in your field offices. Once installed, the 1100 can do double duty for progressively more sophisticated data processing and data communications assignments including

remote batch applications through utilization of card reader, magnetic tape, and printer peripherals. In software, Datapoint provides a CTOS operating system, Assembly Language, and the new DATAFORM language for sophisticated data entry and editing. Initial deliveries of the 1100, with a monthly lease price of \$138, will begin in January.

When your field office work load grows beyond the capability of the 1100, it is an easy, painless transition to a more powerful Datapoint processor, without the need for jarring systems redesign and expensive software revision. The secret is in the upward compatibility of the 1100 with the well-established Datapoint 2200 Terminal Processor and the new Datapoint 5500 Remote Processor. It is as simple as pulling the plug on the 1100, plugging in the 2200. No complex systems changeover, no costly software rewriting is entailed; the user obtains the needed increment in dispersed data processing power in his field offices without disruption. The 2200, a widely used and well-established system with up to 16K central memory and dual ECMA standard cassette drives, will do everything the 1100 will do, and also provide an expanded on-site computer power. In a multi-station mode, it can service up to eight low-cost terminals for data entry and related tasks.

The 2200 is a natural step towards the 64K Datapoint 5500 Processor (deliveries in third quarter, 1974), which will do everything the 2200 does and also constitutes an on-site "computer utility" in your field offices. This system will provide computer power for a large number of associated peripherals and for a variety of low-cost, non-programmable terminals while simultaneously furnishing a high

speed link to a central computer facility. These three Datapoint communications-oriented dispersed processors, progressively larger, faster and more powerful, open a new world of capability to the network-oriented user who sees the need for a growing satellite computing capability in his field offices, while still accessing a central computer facility for heavy duty processing and primary file storage.

Chalk up another innovative approach from Datapoint Corporation to the solution of business data processing problems. With the versatile Datapoint 1100, the proven Datapoint 2200 and the powerful Datapoint 5500; with their associated peripherals including line and serial printers, 7- and 9-channels magnetic tape units, a cartridge disk system, and synchronous and asynchronous communications adaptors; with full operating systems and extensive programming language capability including RPG II, BASIC, DATABUS and others under development, no other source can serve your dispersed data processing and field data handling needs so effectively, so economically. For further information on the growing Datapoint family of dispersed data processing systems, peripherals and software, contact the sales office nearest you or write or call Datapoint Corporation, San Antonio, Texas 78284, (512) 696-4520.

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CIRCLE NO. 13 ON INQUIRY CARD

CORPORATE AND FINANCIAL NEWS

Sperry Rand and Honeywell have dropped their mutual claims of patent infringement. In an out-of-court settlement, Honeywell received \$3 million from Sperry Rand. The suit had been initiated in 1967.

In a complex \$10 million transaction, Fabri-Tek will acquire Data Recall Corp., and CIG Computer Products will purchase all of Fabri-Tek's installed base of IBM-compatible memories. CIG, which had been Data Recall's exclusive marketing representative, will now rep both Fabri-Tek and Data Recall memories.

MILESTONES: Six-year-old Sycor, Inc. recently delivered its 10,000th intelligent terminal to an office of InSCO Systems Corp., the dp subsidiary of Continental (Insurance) Corp. Sycor is currently producing more than 700 terminals/month, up from 400 terminals/month less than six months ago . . . Applied Data Research reported that it recently made the 1000th installation of its "Librarian" source program retrieval and maintenance system, introduced in 1969. The company named as the 1000th user is Mattel Inc. of Hawthorne, Cal. . . . Decision Data Computer Corp. has installed its 5000th 96-column data recorder at the offices of a Philadelphia-based plumbing wholesaler . . . Cincom Systems Inc. announced that sales of its TO-TAL data base management system have surpassed the \$10 million mark.

WHITHER ALLEN-BABCOCK? In response to Tymshare's recent termination of a proposed agreement to merge Allen-Babcock into a Tymshare subsidiary, ABC sued Tymshare for breach of contract — a suit Tymshare says is without merit because Allen-Babcock failed to meet certain conditions of the agreement. On October 9, one week after ABC announced the suit, National CSS announced a facilities rental agreement with ABC under which NCSS would provide services to former ABC customers, and possibly acquire ABC itself at some future date. By late October, those plans had gone sour as well. The latest word is that International Timesharing Corp. is now dickering to pick up ABC.

BOX SCORE OF EARNINGS

COMPANY	PERIOD	REVENUES	NET EARNINGS (Loss)	EARNINGS (Loss) PER SHARE
AGS Computers	9 mos. 9/30/73	1,499,108	81,356	.19
	9/30/72	936,840	81,387	.19
Ampex	3 mos. 7/28/73	62,653,000	872,000	.08
	7/29/72	55,906,000	(3,155,000)	(.29)
Applied Data Research	9 mos. 9/30/73	8,082,950	259,825	.22
	9/30/72	6,507,234	27,517	.03
Applied Logic	12 mos. 9/30/73	3,237,914	46,491	.02
	9/30/72	2,836,171	271,061	.15
Computer Machinery	9 mos. 9/30/73	35,936,000	1,793,000	.36
	9/30/72	19,912,000	(2,329,000)	(.48)
Computer Products	39 wks. 9/30/73	1,926,867	289,239	.25
	10/1/72	1,179,837	114,743	.11
Com-Share	3 mos. 9/30/73	2,143,991	131,924	.10
	9/30/72	1,868,821	123,473	.10
Conrac	9 mos. 9/30/73	49,214,974	1,987,029	1.48
	9/30/72	42,511,557	1,685,546	1.24
Data General	12 mos. 9/29/73	53,306,000	6,741,000	.83
	9/30/72	30,324,000	3,897,000	.49
Data Recognition	26 wks. 7/1/73	350,084	(227,829)	(.31)
	7/2/72	133,298	(245,395)	(.36)
Decision Data Computer	9 mos. 9/1/73	12,211,311	(926,743)	(.27)
	8/31/72	1,437,978	(1,952,614)	(.77)
Digital Equipment	3 mos. 9/29/73	81,506,000	6,538,000	.58
	9/30/72	51,741,000	3,427,000	.33
Fabri-Tek	6 mos. 9/28/73	16,291,463	1,056,057	.32
	9/29/72	9,808,198	116,007	.04
Graphic Sciences	3 mos. 9/30/73	3,645,000	243,000	.08
	9/30/72	3,044,000	400,000	.13
Inforex	9 mos. 9/28/73	27,142,000	2,572,000	.95
	9/29/72	15,796,000	535,000	.23
Interdata	9 mos. 9/28/73	12,933,500	935,000	.45
	9/29/72	9,270,000	694,700	.36
Keane Associates	9 mos. 9/30/73	3,033,000	272,000	.32
	9/30/72	2,205,000	175,000	.21
Microdata	12 mos. 8/31/73	8,743,110	623,469	.41
	8/31/72	6,243,368	676,643	.52
Mohawk Data	3 mos. 7/31/73	40,970,000	(1,311,000)	(.21)
	7/31/72	33,466,000	289,000	.05
MSI Data	6 mos. 9/29/73	9,104,212	495,884	.25
	9/23/72	6,173,857	209,610	.12
Nat'l Information Systems	9 mos. 9/30/73	6,903,000	269,000	.07
	9/30/72	5,855,000	253,000	.06
Network Data Processing	6 mos. 9/30/73	783,649	15,221	.02
	9/30/72	998,749	75,460	.11
Penril Data Communications	12 mos. 7/31/73	1,772,124	(337,192)	(.27)
	7/31/72	1,350,970	(332,668)	(.34)
Potter Instrument	12 mos. 6/30/73	47,356,571	(2,292,940)	(.83)
	6/30/72	34,928,067	(13,132,544)	(4.76)
Scan-Data	9 mos. 9/30/73	5,103,114	49,685	.03
	9/30/72	3,964,379	(568,389)	(.44)
Varian	12 mos. 9/30/73	241,290,000	6,788,000	.98
	9/30/72	203,757,000	3,790,000	.52
Wyle Laboratories	6 mos. 7/31/73	57,329,000	1,807,000	.52
	7/31/72	43,691,000	781,000	.22
Wyly	6 mos. 6/30/73	100,531,000	771,000	.09
	6/30/72	97,715,000	(3,483,000)	(.42)
Xerox	9 mos. 9/30/73	2,183,693,000	223,307,000	2.82
	9/30/72	1,766,046,000	183,536,000	2.33

CAUSES OF BUSINESS FAILURES:

A total of 9,566 U.S. businesses failed in 1972, with accumulated liabilities of more than \$2 billion, according to Dun & Bradstreet. Although this failure count is lower than many prior years, the average liability per failure is at an all-time peak of \$209,099 — more than double the rate recorded as recently as 1968. According to analysts at D&B, managerial inexperience or ineptitude was the underlying cause of more than nine out of ten of the casualties.

MERGERS AND ACQUISITIONS:

American Hospital Supply Corp. and Central Banking System, Inc., Oakland, Cal., have agreed in principle for the acquisition by AHSC of the Hospital Division of Central Bank Computer Bureau, a wholly-owned subsidiary of CBSI which currently provides financial control services to 50 hospitals . . . Control Data Canada, Ltd. has acquired the data processing card manufacturing division of Source Data Control Ltd. for an undisclosed price . . . Harris-Intertype, which presently has a 26 percent interest in Datacraft Corp., is considering merging with Datacraft . . . Honeywell and General Electric have agreed in principle for Honeywell to acquire GE's Process Control Product Section, located in Phoenix, Ariz., which manufactures and sells GE-PAC 4000 Series products. Honeywell would also obtain non-exclusive license rights to manufacture and sell related GE-TAC remote terminals. (The Boeing Co. also has a license to manufacture GE-TAC products.) . . . Intel Corp. has acquired Transportation Management Services, a Salt Lake City-based computer service company, for an undisclosed amount of cash and contingent cash payments . . . MCI Communications has agreed to acquire N-Triple-C, an acquisition that would significantly extend MCI's private-line communications capability in the Illinois-Texas corridor . . . National Computer Rental and Boothe Computer Corp. have terminated their previously-announced negotiations relating to the acquisition of Boothe by National Computer . . . Southern Pacific Communications Co. has agreements pending with both Video Microwave (a subsidiary of Microwave Associates) and United Video (a subsidiary of LVO Cable) leading to the acquisition of those firms.

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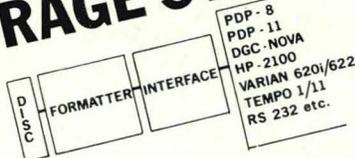
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CORPORATE PROFILE

Featured this month:

T-BAR, INC. (Over-the-Counter)

Wilton, Connecticut

OFFICERS & DIRECTORS: *A. Henry Morgan*, President, Director; *James B. Lambert*, Executive Vice President, Director; *H. Frederick Johnston*, President, Technicorp International, Inc., Director; *James K. Linsay*, Attorney, Director; *James W. Deer*, Partner, Holtzmann, Wise & Shepard, Director.

BACKGROUND: A Maryland corporation, T-Bar was organized in 1959 and was engaged until 1965 in the design, manufacture, and sale of automatic controls. Since 1965 the company has been engaged exclusively in the design, manufacture, and sale of proprietary, state-of-the-art, multi-circuit switching devices. In April 1971 the company changed its name from Electronic Controls to T-Bar.

FACILITIES: The company occupies a 20,000 ft² building on approximately five acres on U.S. Route 7 in Wilton, Connecticut. T-Bar presently has 81 employees. The company

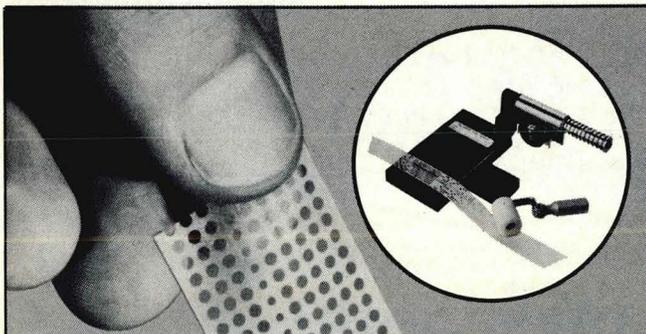
markets its products in the U.S. and abroad through two divisions, the Switching Components Division (SCD) and the Data Systems Division (DSD). SCD markets its products through 15 U.S. representative organizations and four foreign-based representatives, as well as through three U.S. distributor organizations. DSD products are sold by the company's seven sales engineers out of offices in New Hampshire, Illinois, Connecticut, and Pennsylvania. Other areas are covered from the home office.

PRODUCTS: The company designs and manufactures (1) switching equipment for use in such applications as monitoring, backup, reconfiguration, unattended remote station operations, and facilities control of multi-computer installations and (2) switches used in communications systems. The company's products are built on the patented T-Bar switch relay capable of switching from four to 144 circuits. T-Bar relays are also sold as separate components and are employed in original equipment manufacturers' switching systems in data communications and telecommunications applications. T-Bar switching devices are designed especially for communication line switching, which calls for compactness, high reliability, and low signal degradation.

CURRENT POSITION: The company has sold its products to more than 1500 customers, including Eastern Airlines, United Airlines, Avis, Standard Oil of Indiana, General Electric, McDonnell Douglas, Mellon Bank, National CSS, Western Union, WUI, and GTE Ultronics. In 1972 no single customer accounted for more than 5% of total revenues. From 1970 to 1972 T-Bar successfully completed a major shift in its market approach, from 80% government and government-related to 80% commercial. The company holds numerous patents, including one on its DATA-RITE Edge-to-Dome contact, introduced in 1971. Proprietary products now account for 95% of the company's revenues.

OUTLOOK: The company will continue to concentrate on sales of proprietary switching equipment to government-independent commercial organizations. The two factors T-Bar sees as most significant to increased sales and earnings are: the rapid growth of the data communications market, which some analysts predict will triple in a decade; and the encouraging acceptance of T-Bar switching equipment, as evidenced by a high proportion of repeat orders.

FINANCIAL SUMMARY: T-Bar stock was first sold publicly in April 1962 with an offering of 100,000 shares. Following the 5% stock dividend paid in April 1973 there were 379,517 shares outstanding. As of December 31, 1972, the company's current ratio was 2 to 1, and \$380,000 worth of long-term debt was outstanding. Backlog on July 1, 1973, was \$1,200,000, the largest in T-Bar's history.



Our tape patches are never out of character.

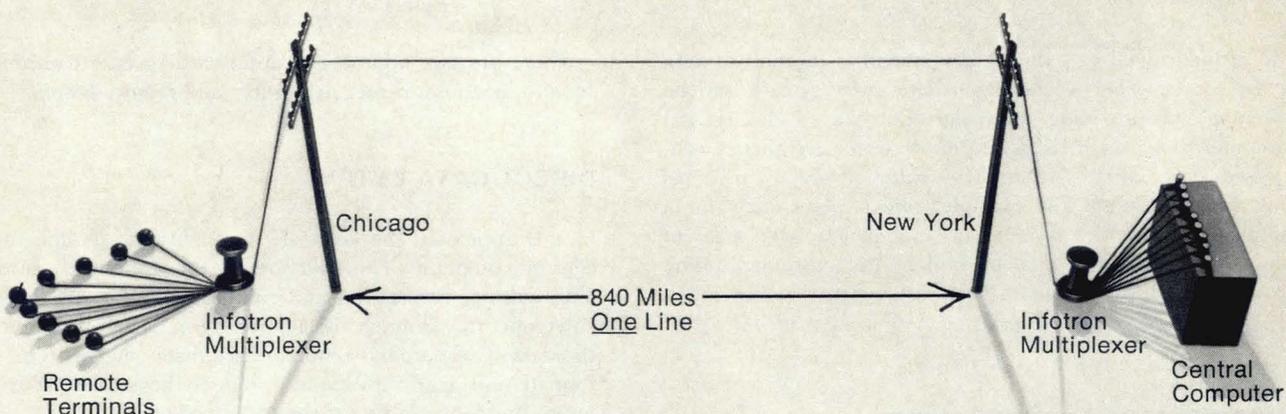
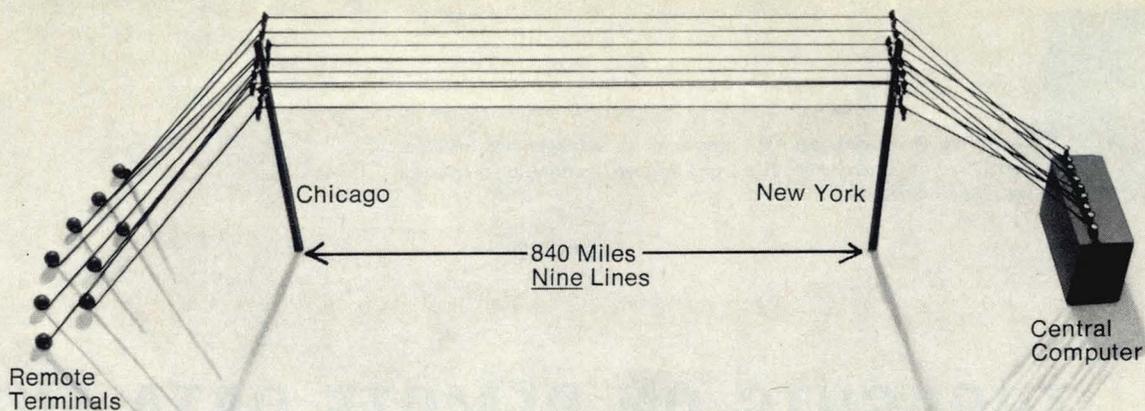
IDEAL tape patches have precision-aligned holes so you can patch all perforated tapes perfectly, without losing a character. What's more, they're longer than other patches, stick firmly (even to oiled tapes), and have an easier-to-remove backing.

For more information on IDEAL pressure-sensitive splicing patches (and IDEAL tape splicer), write us: **Donauld Inc., P.O. Box 104, Ridgewood, New Jersey 07451 (201) 444-6573.**

DONAUOLD Inc.
You can't splice it any finer.

Period	Revenues	Net Income (Loss)	Earnings (Loss) Per Share
F.Y. 1968	\$ 906,572	\$ 61,108	.17
F.Y. 1969	1,230,498	48,664	.14
F.Y. 1970	1,613,808	88,990	.25
F.Y. 1971	1,112,474	(24,499)	(.06)
F.Y. 1972	1,586,694	52,703	.14
9 mos. 9/30/73	1,744,700	81,906	.22

CIRCLE NO. 15 ON INQUIRY CARD



We'll give you 30 days to find out which data communications system costs less.

On the face of it, that may not seem like much of a challenge.

Just count the leased long lines and you're done: nine leased lines will always cost more than one.

In the actual example that we based our illustration on, they cost exactly \$5,410.06 a month more—even allowing for the lease costs of our equipment.

Time Division multiplexers: the efficient, least expensive way to fill a leased line with more data than Alexander Graham What's His Name ever dreamed of.

Which brings us back to our challenge: it's not a challenge. It's an offer.

A very straightforward offer: we'll come in, review your requirements, design a

system and propose the system to you.

If our proposal makes sense to you—order the system. *But*, make your order subject to cancellation during the first 30 days after we install.

Sound fair? Or better than fair? Drop us a line and we'll call to set up an appointment.

 **Infotron Systems**

Infotron Systems Corporation / 7300 N. Crescent Boulevard, Pennsauken, N.J. 08110 / (609) 665-3864

CIRCLE NO. 16 ON INQUIRY CARD



Lawrence A. Feidelman • president of Management Information Corp., of Cherry Hill, N.J., is a regular contributor to *Source Data Automation*.

THOUGHTS ON REMOTE DATA ENTRY

The ultimate goal of a data entry system is to capture data at the source. The decentralized data entry system has the advantage of providing more current data to the central computer, however, it is usually more expensive than a centralized data entry system. The *value* of data timeliness must be considered. For example, remote data entry for a merchandise ordering system can be shown to have a direct effect on customer service as well as the customer billing process — both of which can be translated into money.

There are two approaches to forwarding data captured at remote locations: **direct data entry** and **remote batch**.

DIRECT DATA ENTRY

In this approach, the keyboard terminals are on-line to the central computer. The software in the computer performs data editing, verification and validation, and leads the data entry operator through the input process. The availability of the data base permits complete legitimacy checks to be performed and can substantially reduce keystrokes. Furthermore, the data can be processed immediately.

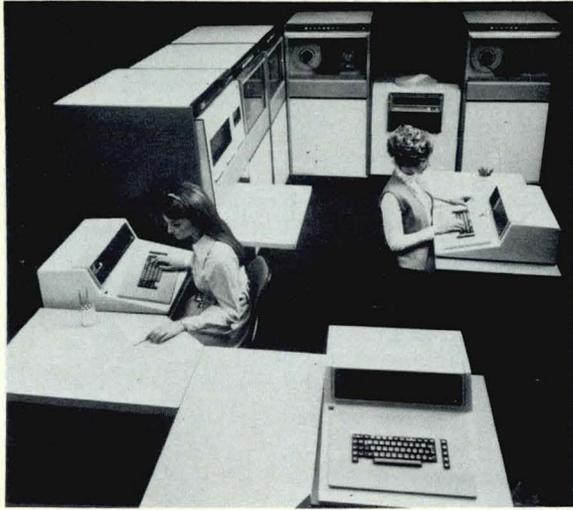
Most mainframe computer manufacturers offer on-line terminals and software (e.g., IBM's Data 360 and Video 370).

LARGEST POS CONFERENCE

The 15th Annual Electronic Data Processing Conference presented by the Information Systems Division of the National Retail Merchants Association will be held in Los Angeles, October 7-11. Among the more than 700 attendees will be over 125 experts from Sears, Penneys, Wards, Broadway Stores, Gimbels, and Hechts who will be participating in 68 sessions. The conference includes industry sessions conducted by AT&T, NCR, IBM, Pitney-Bowes, Singer, Monarch, American-Regitel, Dennison, Kimbell-Sweda, and a dozen other POS suppliers. The registration fee for NRMA members will be \$125 and, for non-members, \$175 for the complete four-day conference. Arrangements for attendance may be made through the Information Systems Division, NRMA, 100 West 31st St., N.Y., N.Y., 10001.



An excellent example of the new, multi-mode terminal systems for decentralized operations is Four-Phase Systems' Model IV/40 Remote Intelligent Terminal System. The IV/40 features a 72 Kbyte LSI processor with integrated cartridge disc drive; supports up to 16 CRTs and 16 printers for source data entry, remote batch processing, IBM 3270/2260 emulation, and custom network applications. Four-Phase was one of the first companies to appreciate the potential of intelligent terminals.



While not exactly a newcomer (over 2000 systems presently installed or on order), Mohawk Data Sciences' MDS/2400 Programmable Processor has been well-supported since its introduction in February, 1971. Various as a remote batch terminal, key-to-disc entry system and stand-alone processor, the MDS/2400 is now available with software to emulate an IBM 360/22 HASP remote workstation or an IBM 2698 at bisync rates up to 9600 bps.

In most cases, these packages are integrated into the total system such that the input data is checked and processed simultaneously. Disadvantages are that the direct data entry user may experience high communication cost, additional central computer software and hardware costs, and complete system blackout.

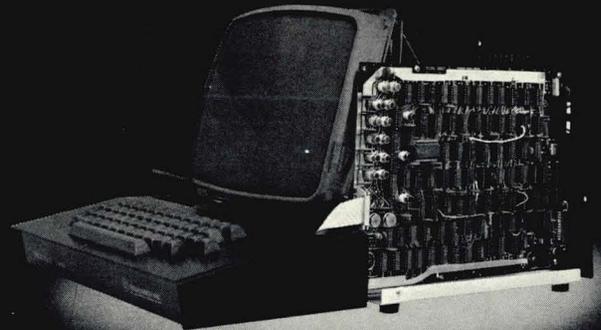
REMOTE BATCH

The remote batch approach involves collecting and (usually) performing some pre-processing of the data before it is sent to the computer. The keyboard device in this case may vary in the amount of verification and validation it performs on the data. Unsophisticated, low-cost keyboard-to-storage devices may require expensive manual verification later. More intelligent systems that allow editing during keying without interfering with the central processor usually justify their additional expense.

When remote data entry from the same location requires multiple stations, each station can communicate independently or they can be clustered under one controller. In these multiple terminal situations, the keyboard-to-disc terminal becomes an alternative. Recent product introductions such as General Computer Systems' GCS/2100, Sycor 340, Four-Phase Systems' IV/40, and GTE's IS/1514 are typical of the new keyboard-to-disc systems that can operate economically in a remote batch mode.

The remote batch approach reduces both the load on the central computer and communication costs. However, the use of "dumb" remote batch terminals can result in wasted program runs and thus may have just the opposite effect. It is true that even the most intelligent remote batch terminal or keyboard-to-disc system cannot do as thorough a job of editing as the central computer. But, especially where the data is complex, a little intelligence can go a long way towards reducing overall system cost. ▲

Here's the one
single reason why
the Teleray has
the highest
Uptime and the
lowest cost.



THE INSIDE STORY

All CRT's are silent. They all look about the same on the outside. **But only Teleray is truly different on the inside.** Its logic, memory, character generation, interface, the works, are on a *single* integrated circuit board.

Teleray's so dependable and so maintainable, users call it the *Uptime Terminal*. Not only is everything on one plug-in board, but every one of the 106 integrated circuit chips is a *plug-in*, too! Even with that extra feature, Teleray wins the price battle. Call (612) 941-3300 collect and ask for *Teleray*. This is a really different CRT... on the *inside* and on the price tag.



TELERAY
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No. 148

CIRCLE NO. 17 ON INQUIRY CARD

General Electric's answer to dual-output



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 informa-

tion 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**



BOHDAN O. SZUPROWICZ

EUROPE WOULD RATHER FIGHT THAN SWITCH

A study of prospects of the European computer industry to 1985

If you missed some of the rapid growth investment opportunities of the American computer industry, take another look at what's happening in Western Europe. Its total cumulative spending for EDP hardware and services, already a respectable \$15 billion, is expected to double by the end of 1975 and double again by 1980, hitting the magic \$100 billion mark sometime around 1985.

France, Germany, Holland, and the United Kingdom constitute a whopping 75% of the total overseas market, but enjoy a measly 9.5% share of the profits. Needless to say, they do not like that state of affairs. Hoping that some form of IBM breakup will take place about 1975, the major European computer manufacturers are forming alliances and jockeying for positions of strength to give them a chance to grab a larger market share in the future.

Recently a research group of multinational economists and business analysts in Paris completed a comprehensive proprietary study looking into the future prospects of the European computer industry all the way to 1985. The study was sponsored by a select array of top international banks in Switzerland, Germany, Holland, United Kingdom, France, Italy, Austria, Spain, Portugal, and even Canada, Japan, and the U.S. Its main finding was that by 1980 IBM's market share in Europe could be whittled down to as low as 40%. Although other U.S. companies would then be likely to grab as much as 35% of the market, indigenous Europeans would still be left with a comfortable if not overwhelming 25% of the total. That is a 250% increase over what they have today and, with total European shipments expected to reach \$10 billion a year in 1980, you can bet your secret fourth generation prototype they will fight all the way to grab the largest possible market share of their own backyard.

The study is extremely comprehensive and identifies areas of the greatest immediate potential for European manufacturers. Interestingly, it is almost unknown among U.S. computer industry people, although our European intelligence sources indicate that it is in the hands of that three lettered giant who understandably has a lot at stake scattered all the way from the reindeer herds of Lapland to the rock of Gibraltar. Areas where European manufacturers can exploit their own closeness and familiarity with user industries and can count on government support are particularly targeted. For example, the study points to the special-purpose computer submarket which constitutes 12.8% of the total and is already dominated by European manufacturers. European manufacturers are warned, however, that if an American computer is cheaper by 30% or more than a comparable Eu-

ropean product, even the local government will go for the obviously more productive import.

The European analysts favor Siemens and Philips as the strongest all-European computer manufacturers in the long run. Whether those two companies cooperate or not, their EDP sales are expected to develop at a faster clip than overall market growth.

By comparison, ICL of the U.K. and CII of France are regarded as "laggards" on the European scene. In an attempt to present a candid picture to their gnomish masters, the economists refer to the latter two as contaminated too deeply with the so called "engineering firm" image which is not conducive in this day and age to a lot of attention from the financial powers-that-be. The inference is that ICL and CII will have to fall back on government support.

Paradoxically, it is Siemens and Philips which are consistent and heavy losers within their data processing operations, while ICL and CII show perennial though impressive profits. Yet the analysts feel that the key to future profitability is in software and experience, both of which, according to them, accumulate faster at Siemens and Philips than the other companies. Thus Siemens and Philips are expected to break even on their EDP operations in the late Seventies, and from then on their rapidly increasing rental revenues will assure considerable profitability.

Another favorite of the analysts is West Germany's Nixdorf, whom they consider ready and able to sell any kind of system a small businessman wants. A group of European companies supplying the special-purpose computer market is also apparently on its way to better things fast. GEC, Marconi/Elliott, Ferranti, Saab, and Kienzle dominate 75% of that market.

The study estimates 80,000 minis and small business computers already installed in Europe with a total value of \$1.5 billion, or 10% of all digital machines installed. The small system market is growing at a steady 40% per annum rate. Nixdorf, of course, is the undisputed leader among the minisuppliers in Europe (Germany accounts for about a third of all the mini-installations), followed by Burroughs, Philips, Kienzle, NCR, and Olivetti.

The study also offers interesting and valuable insights into the industry structure of European computer manufacturers. European manufacturing costs amount to about 30% of equipment sales price (as opposed to 16% for IBM in Eu-

Bohdan Szuprowicz is founder and president of 21st Century Research, an investment and market research firm in North Bergen, New Jersey



Our Tape Cartridge. It won't stack up against the competition.

Because our datacord™ tape cartridge stores 76 megabits, has a 100,000 BPS transfer rate, and costs 70% less per megabit, we can match one against a whole stack of the competition's units.

type	bpi	bps	cap. M/bits	76 megabits #units	76 megabits total cost	cost/ megabit
datacord cartridge	1600	100K	76	1	\$ 19.95	\$.25
3M cartridge*	1600	48K	23	3	60.00	.87
Philips cassette*	1600	24K	5	15	120.00	1.60
floppy disc*	3100	250K	2.5	30	240.00	3.20

*Specifications are approximate

Our datacord cartridge isn't just another cassette. The case is a protective carrier only. It has no rotating parts to wear, so it is virtually impervious to damage from shock and dirt. The tape is unusually resistant too, because the system winds it under relatively high radial compressive force (although tension never exceeds 4 oz.), eliminating all air between layers.

The datacord tape memory system represents a significant advance in the state of the art.

Send for complete specifications on datacord systems. You'll see why we feel our system is in a class by itself.



datacord
Tape Memory Systems

rope). European manufacturers also must bear higher marketing costs, mainly, they feel, because of the necessity to sell harder in order to compensate for the IBM image. European makers are also regarded as relatively unsophisticated market planners by comparison with their American counterparts.

The main problem areas identified are those of personnel, product planning, equipment reliability, documentation, financing, and IBM compatibility — without which it is often impossible to operate. But the study's authors feel the European manufacturers are beginning to make rapid progress in all those areas.

The study also makes an attempt to define "saturation levels" for EDP use in Western Europe and concludes after some searching analyses that these will not be reached for some time to come. In essence this means that the industry will enjoy long term growth at relatively high rates, which is one of the best reasons for the Europeans to build up a viable computer industry of their own. With such huge markets ahead of them, they believe there are sufficient incentives to develop an indigenous industry which can perform better than the U.S. subsidiaries operating in Europe.

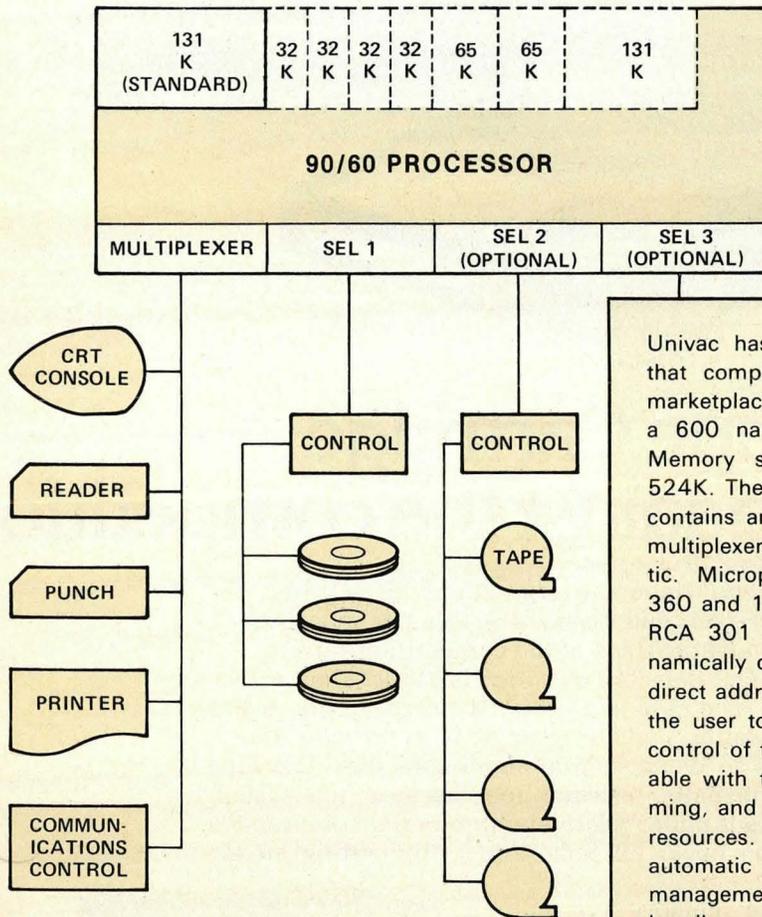
So if computers are your bag, keep in mind that there are more Europeans than Americans. Which is to say that even if European firms cannot match American computerization levels, their market may well end up larger.

For information regarding the availability of the study report mentioned in this column, write: **Mr. Derek Riley, EuroFinance, 9 Avenue Hoche, Paris VIII-e.** ▲

MEDIUM-SCALE SYSTEM

FEATURED PRODUCT

A TYPICAL UNIVAC 90/60 SYSTEM CONFIGURATION



Univac has introduced the 90/60, a disc-based system that competes with the 370/135 in the medium-scale marketplace. The 90/60 uses semiconductor memory with a 600 nanosec cycle time (full four-byte word access). Memory sizes are 131K, incrementally expandable to 524K. The CPU operates under microprogram control, and contains an interval timer, storage protect register stacks, multiplexer, a selector channel and floating-point arithmetic. Microprogramming can provide emulation for most 360 and 1400 series computers, as well as Series 70 and RCA 301 systems. Program starting address may be dynamically changed, allowing roll-in, roll-out capabilities. Indirect addressing is another feature of the 90/60, allowing the user to have entry to reentrant system routines under control of the supervisor. The OS-7 operating system available with the 90/60 provides 14 levels of multiprogramming, and multitasking — limited only by the availability of resources. Additional functions include communications, automatic job scheduling, resource management, and data management in real-time environs. The 90/60 system can handle up to 30 communications lines and up to 32 peripheral subsystems; each subsystem can support up to 16 peripheral devices. Five-year rental of a Univac 90/60 goes from \$12,000 to \$24,500, including maintenance. Purchase prices range from \$560,000 to \$1,150,000.

**For more information on the Univac 90/60,
Circle No. 104 on Inquiry Card**

Service-oriented industries need service-oriented terminals.

Are you looking for ways to improve your service? ... to better satisfy each customer so that he brings in another one? ... so your profits can grow?

Maybe RCA's POINT-OF-SERVICE terminal can help.

For example, if you're in the **hotel/motel business**, RCA's POINT-OF-SERVICE terminal can really speed up reservations and itineraries.

For **loan, rental or credit agencies**, the terminal is great for credit checking and forms printing.

Or, for a **parts or service desk**, the terminal can provide quick access to billing and inventory.

And, wherever **cash transactions** or **customer receipts** are issued, RCA's POINT-OF-SERVICE terminal can simplify the job.



A microprocessor tells the terminal what to do ... you tell the microprocessor what you want done. We'll place a program written specifically to your requirements right in the machine and configure the keyboard just for your operators. And you can change it later if you like, so don't worry about outgrowing your initial investment.

Result: a custom system *just for you* for little more than a ready-made price.

You get room for keyboard, printer, CRT display, and embossed card reader all in one terminal. Yet it's compact enough to fit almost any countertop. And it's so easy to use ... just turn it on and put it to work.

One way to get more customers is to satisfy the ones you've got. We'd like to help with our POINT-OF-SERVICE terminal. Call George Turner at (213) 894-8111 ... or write to RCA Custom Terminal Systems, 8500 Balboa Blvd., Van Nuys, California 91409.



RCA

CIRCLE NO. 20 ON INQUIRY CARD

MAXIMIZING COM SYSTEM EFFECTIVENESS

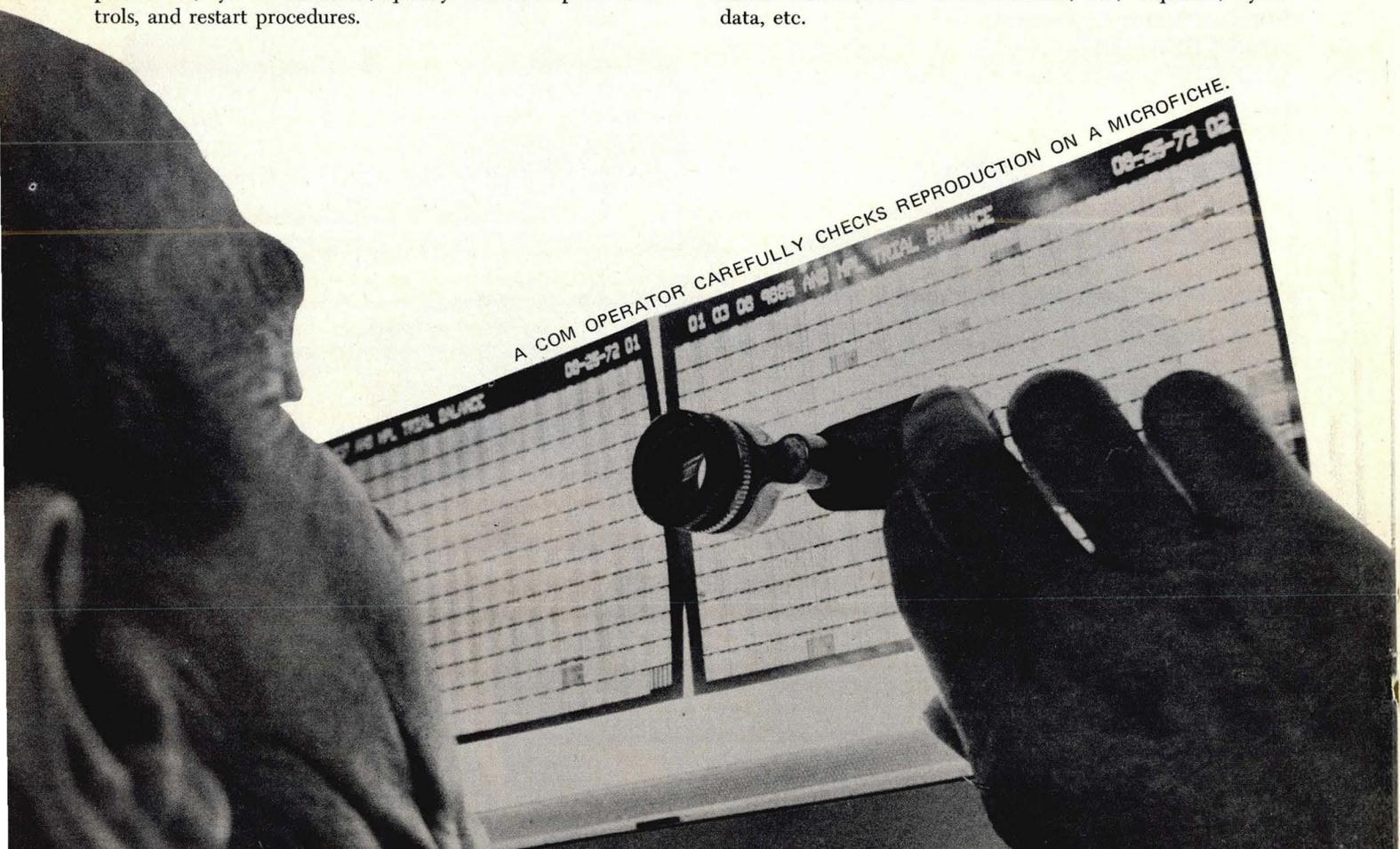
A few simple suggestions for getting the most from this complex and powerful information tool.

A computer output microfilm (COM) system requires precision equipment and careful handling. It combines four diverse technologies: electronic, mechanical, optical, and chemical. Therefore it must be viewed as a system, not as a computer peripheral like impact printers and CRTs. Also, because COM involves sensitive microfilm or microfiche, it is failure-prone. Microfilm and microfiche are sensitive media. Film might be improperly exposed or developed, fogged, scratched, or rendered useless in dozens of different ways. And failures can go unnoticed until the end of a production run, which may take several hours.

These pitfalls, however, can be avoided if one provides for adequate pre-production testing, effective operational procedures, system standards, quality and checkpoint controls, and restart procedures.

STANDARDIZING OPERATIONS

Since each time an operator must decide among alternatives increases the chance of error, one way to minimize errors is to standardize the size of microfilm or microfiche, thus avoiding the need to reset equipment for different dimensions. Formats also should be standardized. Standard record lengths, reduction ratios, camera control specifications, and form slides all reduce the number of operator decisions and thus diminish the chance of error. A standard microfiche title layout, for example, will aid the operator in distinguishing fields in the title area that pertain to such operational considerations as distribution, file, sequence, cycle data, etc.



A key form of standardization involves organizing the COM system around a basic logical unit. For microfilm, the logical unit is generally a reel or cartridge containing a standard length of film. If film lengths vary, the number of frames that can be put on the shortest reel or cartridge is chosen as the logical unit. For microfiche, the logical unit is usually a specified number of data pages per individual fiche.

The usefulness of the logical unit concept is best explained by example. A particular job has a reduction ratio of 42X, which permits 224 pages of data and index information per microfiche. We therefore limit the amount of data on each computer tape to 4480 pages (at 1600 bpi) regardless of the tape's capacity to carry more. This provides a simple relationship between the tape and a specific fiche. Thus if you need to refilm fiche 25 of a job where each computer tape was limited to 20 fiche per reel, you know it will be the fifth fiche on reel 2. In the case of microfilm, the data on the computer tape is limited to the frame capacity of the standard microfilm reel or cartridge (2000 to 4000 pages).

SCHEDULING WORK

COM depends on orderly scheduling of work to function with maximum efficiency. The crucial elements which must be considered in formulating a functional workload schedule are:

Report Due Time – Demands that COM reports be delivered before actually required can disrupt work flow. Consequently, determine if a report ordered for delivery by 10 the next morning will in fact be used at that time, not five hours later. Then schedule work accordingly. It is also important that COM users not wait until the last minute to put in their orders.

Delivery Time – Whenever a COM report is ordered, the operator should make an estimate of the probable delivery time and stick to the estimate. Users need this information to plan their work, while making estimates and sticking to them imposes a discipline on the COM operation that in the long run results in maximum efficiency.

Processing Priorities – COM report orders generally fall into three priority classes: "A" priority is given to reports whose on-time delivery is necessary to the orderly conduct of business; "B" priority reports may be late without serious disruption of business; and "C" priority reports are really incidental to the business and may be delivered whenever it is convenient. Priority assignments should be closely controlled to prevent buildup of an unmanageable backlog.

Input Availability – Departments and persons ordering COM reports can smooth work flow by adhering to deadlines and scheduling orders in batches. Firm procedures should be established and deviations permitted only in unusual circumstances.

PROGRAMMING TO REDUCE ERRORS

Errors and reruns can also be significantly minimized by employing programming aids to trigger operator-dependent functions. A key aid is the program halt command feature of some recorders which causes the recorder to stop and the program halt indicator to light up at specified intervals. This notifies the operator that he has a task to perform, e.g., change film advance leader, change the form slide, etc. Segmenting the output file with program halts during tape generation provides practical restart points when unacceptable errors require refilming.

Fiche advance commands, since they clearly identify the end of a logical fiche, can also be used to establish restart filming points. One of the most common – and least acceptable – operational error occurs when exposed microfiche becomes unsynchronized with the software format instructions on tape. This could result in the loss of every fiche from the point of error to the end of the job. However, programming an explicit fiche advance command on the last page of the fiche (usually the index page) will at some point cause the camera to initialize to the beginning of the next fiche. Typically, this occurs only one or two fiche later, so only one or two fiche are lost while the remainder of the run proceeds accurately. Without the fiche advance command, the entire job would have to be rerun.

MICROFICHE TITLING DESIGN

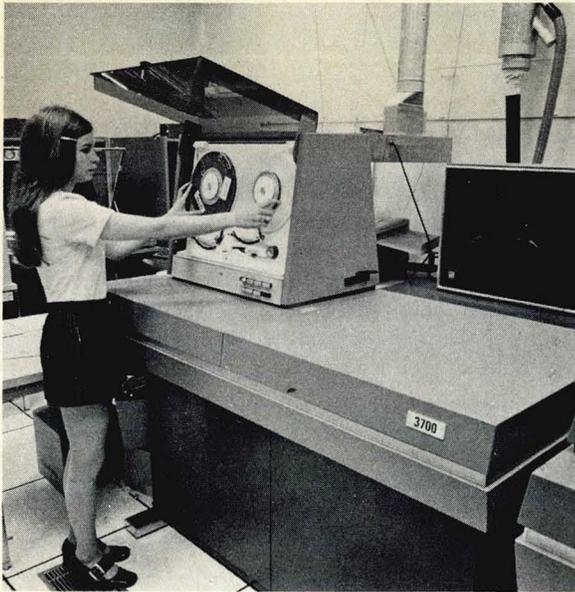
Microfiche titling design is oriented primarily toward indexing and end-user retrieval. However, effective use can be made of eye-readable titling information to improve COM operations.

The **titling row** should identify distribution points by region, branch, department name or number, and whatever other information might aid prompt delivery of fiche. If more than one duplicate is required at any location, this too should be displayed in the titling.

Report identification and **cycle data information** are useful when storing masters. Typically, original silver masters are retained at the operations center so additional duplicates can be made without having to recreate the report from scratch.

Sequence numbers should also appear in the titling area. The applications program produces fiche counts, and the COM recorder fiche counter verifies that all data has been filmed. This protects against loss of data during the film handling, duplication, and distribution phases of the operation. Finally, sequence numbers eliminate the need for random tape searching and film wastage when rerun operations are required.

Steve Egol is marketing support manager for Perdec's Business Systems Division. He was previously associated with Perdec's COM operations for approximately four years. Prior to then he served as a COM systems analyst with Datagraphix and as a COM systems engineer with RCA.



Operator mounting tape on a
Pertec Model 3700 COM recorder.

PRODUCTION AUDIT CONTROLS

As we have just noted, it is possible that some data may escape filming. Sequence numbers help prevent this from happening, but, to be safe, a full production audit control program is necessary.

As a minimum, a count of the number of data pages and total logical frames and fiche should be provided whenever a formatting run is completed. Including the following information also helps:

- description of starting and ending page numbers per reel,
- total number of fiche or actual frames per reel,
- number of reels of tape generated during the run,
- number of files per tape,
- number of 16mm reels to be produced,
- any deviation from standard run documentation.

Control information of this nature is used to verify that all data has been accounted for, permit more effective production scheduling, and simplify error recovery operations.

Job accounting routines might also be implemented for collection of production volume data, 16mm versus 105mm job mix, computer time expended, and other information used to gauge efficiency of the COM operation. The information might be dumped monthly for management to make comparisons against actual amounts spent for consumables, labor, etc., during the period and thereby identify trouble spots for corrective action. The collected data also provides a good information base against which to justify conversion to new applications, procure additional equipment, and assess actual costs vs. savings generated by the COM system. ▲

FEATURED PRODUCT

TEKTRONIX CALCULATORS

If a microcomputer in a box with a CRT is an intelligent terminal, and a microcomputer in a box with a scope is a complete diagnostic test center, what is a microcomputer in a box? The answer (need you ask?) is a programmable calculator. Tektronix decided to have a go at them after scoring considerable success with the former products. And judging from the result, the new product line should be at least as successful.

The Tek 21 and Tek 31 (shown) are both PROM-specified, i.e., read-only-memory is factory-programmed to perform functions defined by the user. The concept is not a new one, but the price/performance mix is. A Tek 21 with mag card reader, 10 registers, 128-keystroke memory and 25 user-defined overlays (each of eight user-defined f(x) keys = 16 keystrokes) goes for under \$1900. An optional thermal printer is \$450, memory can be increased 2x or 4x (i.e., up to 64 keystrokes can be stored per special function key) for \$250/mo. or \$400/mo., and math and stat packages are available. If that's not enough, \$2,850 will get you a Tek 31 with integral mag tape reader, 512-keystroke memory, and two user-defined overlays. Printer, memory expansion (to 256 registers and 8192 keystrokes) and software library op-



The Tek 31 — As good as it looks, but not as expensive.

tions are available for the Tek 31 as well. Both calculators come with a passle of support paraphernalia and are compatible with Tektronix' x-y plotter and graphic display terminals. ▲

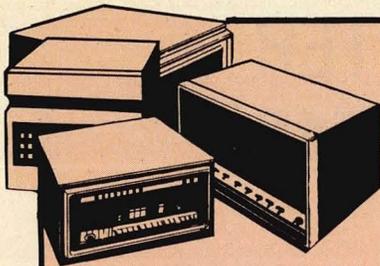
**For additional information,
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MINICOMPUTER SYSTEMS



*A
SPECIAL
SECTION
FEATURING*

- MINICOMPUTER NEWS
- MINIFEATURE
- MINICOMPUTER FORUM



minicomputer systems

A SPECIAL SECTION FEATURING THIS MONTH:

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MINICOMPUTER NEWS



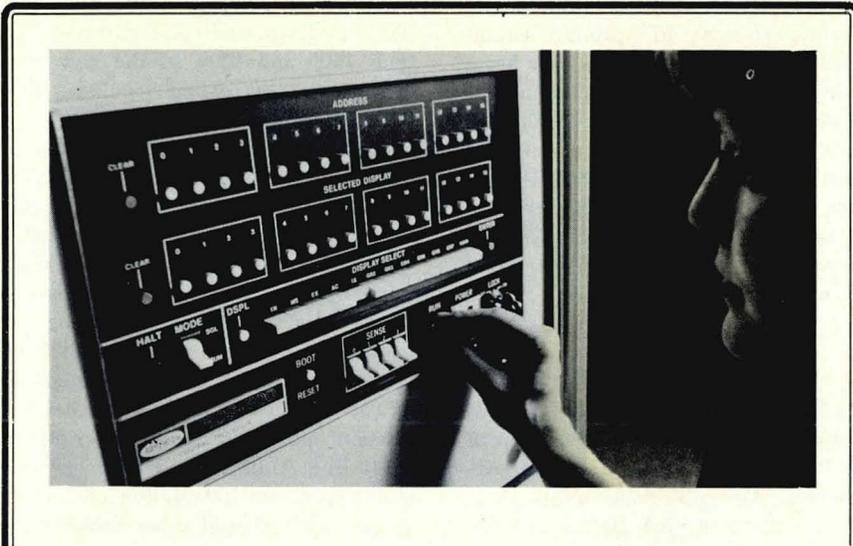
SPINOFF BENEFITS of the Skylab program are promised in non-photographic images such as this representation of a portion of the California coastline. Data generated by a multispectral earth scanner aboard Skylab is recorded on magnetic tape, hand-carried by astronauts back to earth, and processed by the Earth Resources Production Processing System — a minicomputer-based system developed by Philco-Ford. Among its other tasks, the Processing System produces microfilm printouts such as the one shown here. Originally produced in color, each 4" × 4" image is the product of one million bits of recorded data. The expensive pictures are expected to be useful in such areas as cartography, agriculture, forestry, geology, hydrology, and oceanology. Why don't they just transmit the data rather than hand-carry the tapes? According to Philco-Ford, transmission of the 337 billion bytes of earth resources data from Skylab would take two years on the systems used for Apollo moon missions.

PRICE CUTS — That's right, all you sufferers from devaluation, inflation, and stagflation — there *are* one or two things that are actually getting cheaper these days, and Hewlett-Packard and Digital Equipment want to prove it. As part of a general product repricing, H-P's data systems division has reduced prices of its computer memory products by as much as 60%, with an average price cut of 10% across the division's entire product line. A typical move from a 16K H-P mini to a 32K model will now cost \$5,000 instead of the previous \$10,000, according to the manufacturer. A 32K HP Series 2100A now costs \$17,750 while a 32K 2100S is now priced at \$18,750. Prices have also been lowered on microprogrammable accessories. For example, floating point now can be added to 2100 systems for only \$500, compared to \$2,500 previously. Other price drops: 10% on 2000E and 2000F timesharing systems and 2121 disc systems; 3000 virtual memory operating systems, formerly

\$205,000, now average \$185,000. H-P credits reductions in manufacturing costs for the happy development. But it's not *all* good news — H-P also announced that higher component and material costs have driven up the prices of "some HP peripheral products" — for example, 10% on the 7970 tape drive. Meanwhile, over at Digital, OEMs can now pick up 16K PDP-8/Ms in hundred lots for \$3,328 each. In addition to this 40% reduction, 8K models drop 25% to \$2,304 and 4K models decrease by 13% to the binary-buck price of \$2,048, both new prices effective only for lots of 100. DEC noted that its PDP-8 OEM business has more than doubled during the past year and explained that the new prices were primarily the result of increased manufacturing efficiencies and the expansion of production facilities. The company said it now employs more than 1000 people in its Taiwan core-stringing plant and has dedicated an entire Puerto Rican plant to PDP-8 production.

PACKAGES — General Automation has announced two hardware/software minicomputer systems: a disc-based and a real-time system. Designed for engineering/scientific computation or small batch operations, the DBOS-II consists of a GA SPC-16/65 processor with 16K of core memory, 5 to 20 megabytes of disc storage, a 600 lines/min printer, a 400 cards/min card reader, and a console typewriter — priced at \$39,500. Designed for medium-scale real-time applications with simultaneous program generation or

batch processing, the RTOS-II consists of an SPC-16/65 processor with 24K of core memory, 5 to 20 megabytes of disc storage, a 400 cards/min card reader, a 600 lines/min line printer, and a console typewriter — selling for \$46,950. Less line printer and card reader, \$29,950. Both systems offer a choice of three languages: FORTRAN IV (one-pass compiler), extended BASIC, or macro assembler. RTOS-II provides software protection in foreground and background and up to 64 levels of interrupt.



THE "SUPERMINI" — Little has been heard from Raytheon on their minicomputer line (remember the 704?) since production facilities trekked East from Santa Ana back in 1971. Products emanating from RDS Norwood have of late centered on intelligent/programmable CRT display terminals and systems for data entry and communications. Well, Raytheon's silence has ended with the announcement of the RDS-500 "Supermini" — another high performance processor in the guise of a mild-mannered, 16-bit, general-purpose minicomputer. Principle features of the RDS-500 include a dual-port 800 and/or 900 nanosecond main memory expandable to 64K; a high-speed CPU clock time of 100 nanosec; 16 vectored priority interrupts; eight general-purpose registers; FORTRAN IV, COBOL, and RPG compilers with a Sym III macro assembler; foreground/background multiprogramming; and a hoard of hardware, peripheral, and array processing options.

The new minicomputer will be marketed to end users or OEMS on a sale or rental basis. A typical 32K RDS-500 with console, eight-unit memory bus multiplexer, memory parity and multiprogramming protect, and high-speed arithmetic hardware is priced at \$14,000; the same configuration may be rented for \$475/month on a 3-year basis.

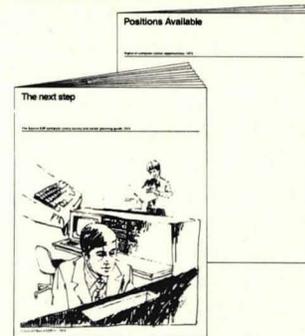
INTERFACES — Two new interfaces to connect measuring instruments and programmable calculators are on the market. **Data Graphics'** (San Antonio, Texas) DATOS 305 accepts parallel BCD or binary data; serializes, formats, and decodes it; and presents the result to a Hewlett-Packard, Monroe, Tektronix, or Wang programmable calculator. The DATOS 305 sells for \$1150. **Fluidyne Instrumentation's** (Oakland, Cal.) 7200 series "universal interface system" consists of a mainframe assembly and a selection of printed circuit cards for various capabilities including A/D conversion, 6-bit parallel BCD input, and 6-bit high-speed counting. Output is to a Wang 600, 700, or 2200 series



Fluidyne Instrumentation's 7200 series interface with Wang 600 series calculator.

calculator. Mainframe prices are from \$1,950 to \$2,450; most function cards sell for \$250.

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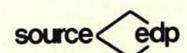
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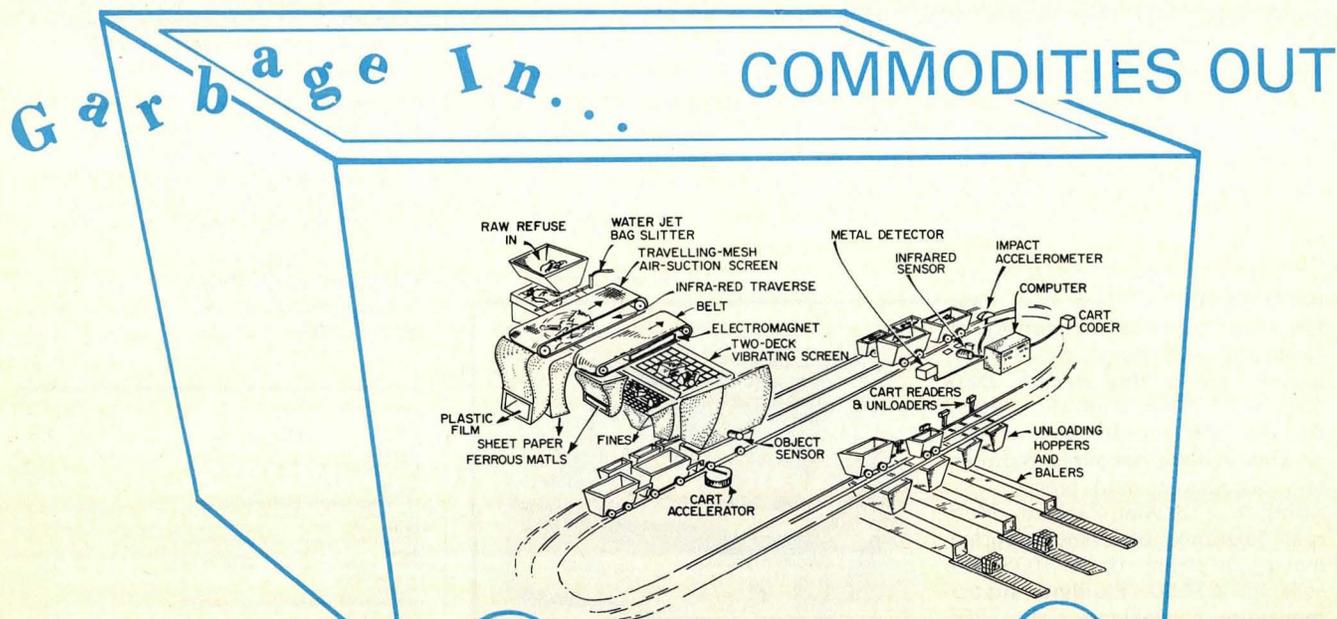
ALL POWER TO THE PEOPLE — Speaking before the recent Western Systems Conference of the Association for Systems Management in Los Angeles, Informatics executive vice president Frank Wagner called for more consideration of decentralized computing and offered a new law of computer use. Warning that where minicomputers are concerned it may be dangerous to follow blindly Grosch's First Law (throughput increases as the square of the price), Wagner held forth with "Wagner's First Principle of Decentralized Computing," namely: "If an organizational group *larger than 30* people requires computer assistance, it is better for the enterprise that these people have exclusive use of their own computer, provided that the computer, big enough to do the job properly, will be loaded to *over 10%* of its capacity."

MEMORY MODULE — Computer Automation has introduced a 16K core memory module for its recently announced "Naked Mini/LSI" and "Alpha/LSI" minicomputers. Mounted on a single 15" x 16" printed circuit board, the 16-bit memory module has a cycle time of 1.2 microseconds and is priced at \$2,750 in unit quantity, or about two-thirds the cost of two 8K modules, according to the manufacturer. An "Alpha/LSI" equipped with the new module is priced at \$3,990, as compared with \$1,990 for the standard 4K version.

MILESTONE — An ALPHA 16 now in use at a General Motors' plant is the 2000th mini sold by Computer Automation. The milestone mini, along with 22 other ALPHA 16s, is monitoring auto and truck bumper height to ensure conformance with federal safety standards. Computer Automation also pointed with pride recently to a new \$5 million unsecured credit line with Security Pacific Bank of California and Morgan Guaranty Bank of New York.

FROM QANTEL — Two systems recently introduced by this Hayward, Cal. manufacturer offer new operating software, drawer-mounted disc drives, a new CRT display unit, and new physical design and color schemes. Systems 1100 and 1200, as the new configurations are called, include 20K bytes of memory (4K for user, 16K for operating system), 3 million bytes of removable and 3 million bytes of fixed disc storage, a 960-character CRT display manufactured by Qantel, and a 60-100 lines/min buffered serial printer. The two systems differ in terminal capacity: the 1100 can be expanded to include one additional CRT or teleprinter; the 1200 can handle up to five additional terminals. Other expansion options include printers up to 1800 lines/min, up to 16K of user memory, up to 120 million characters of disc storage, and other peripherals. Both systems are supported by Qantel's new disc-resident operating system, Business Executive System for Time-sharing (BEST) and its programming language, Quantel Interactive Code (QIC). Prices for basic systems: 1100, \$29,500; 1200, \$30,900.

MINIFEATURE



A Computer Automation ALPHA 16 provided the high-speed decision-making power required in this trash-sorting system developed at the Massachusetts Institute of Technology. The serious but Rube Goldbergesque prototype uses a variety of electromechanical devices and sensors to shake down raw refuse into various re-

cyclable materials, ultimately conveying batches of like material into balers. The trash sorter has successfully separated refuse materials into five or six categories, and more are in the making, according to the system's designers at MIT. One project leader explained that the system wouldn't have been feasible without an in-

expensive minicomputer because sensor inputs had to be classified in one-tenth of a second. And if you're wondering if even MIT professors concede the inevitability of a "reject" bin for unclassifiable, unusable items, you're right. They do. Technology may shrink the size of dumps, but it will never make them obsolete.



A CHANCE TO SPEAK OUT!

A vital component of MODERN DATA's newly-established comprehensive minicomputer coverage is the n-way discussion of trends for the future, omens visible in the present, problems of growth, supply and compatibility, and the myriad other topics which are not alluded to in the manufacturers' literature, but are left to conference panel discussions during which the thinker-on-the-street has little time for considered reaction to the opinions of learned speakers. With this column, MODERN DATA establishes a medium for the considered opinions of our readers to be set down for all to see, criticize, and comment upon. Our desire is to present a variety of useful and considered thinking about various aspects of our business, and in sum to contribute to a better understanding of our problems and their possible solutions, and to improve somewhat our perception of the nature of the road ahead.

We call it the Minicomputer Forum, and are pleased to announce its birth here and now. We are looking for articles from you! — "letters to the industry" on subjects of pressing importance to users and manufacturers alike. Our requirements are only that your contributions be short (3 to 4 double-spaced pages), direct, and original.

Certainly there is no dearth of subject material. Many of the important and ever-changing aspects of the minicomputer business were discussed in our analysis (August, 1973) of the trends and omens visible at the first National Computer Conference. *The battle of mini-storage rages: Philips cassette vs 3M cartridge vs floppy disc: which will win, and does it matter?* Many peripherals manufacturers offer their products interfaced to the popular minis, not only the conventional peripherals but also the more exotic stuff such as data tablets, graphic terminals, and audio response. *But what of the software to run all these gadgets? From whence comes the expertise to put them all together and to make them perform some useful function? Will there ever be a universal interface? Is a minicomputer system with 16K of core and a full set of peripherals still considered a mini when it costs \$100,000?*

We also observed the potential seeds of the traumatic re-orientation of the minicomputer in the advent of real live LSI. *Is the mini really doomed? What about software and peripherals for the microprocessor? Will the microprocessor overcome its speed problems, or is it cheap enough that slowness is not a significant detriment? How will the minicomputer manufacturer react to meet this threat to their very livelihood? Is the future for the mini manufacturer in "stripped" or "fully-loaded" models?*

Other interesting questions also come to mind. *Can the peripheral equipment manufacturers continue to compete in the marketplace, or will they eventually be forced out by the mini mainframe manufacturers supplying their own peripherals in a bundled package? Is the minicomputer business beneath the scrutiny of the trust-busters? Is there a future for*

mini-software houses? Could a broad minicomputer users association exert useful muscle on behalf of its members?

MODERN DATA's 1973 minicomputer market survey also points to some interesting subjects. *Brand loyalty was found to be lower among minicomputer users than among large-system buyers: why so? Does this indicate that new stars could yet swiftly rise, and conversely that present giants could as swiftly plummet? Is there still room for new entrants to the present 38 manufacturers, or have we seen the last of Wall Street's most popular darlings?*

The Minicomputer Forum is not interested in considering "How to Select a Minicomputer," "How My On-Line Minicomputer Speeded Up My Brassiere Manufacturing By 27%," or "What's New in Micro-Tape Decks." Such subjects are admirably well covered elsewhere. We are here interested in the vital and unquantifiable issues of our industry, issues on which the future of our technology, our jobs, and our companies depend. The Forum is open, the gauntlet is thrown down. *Which among you will be first to pick it up?*

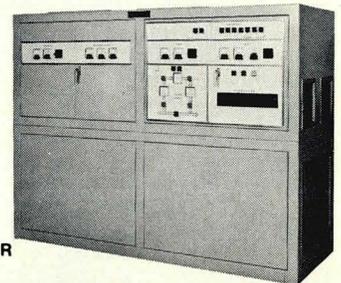
—D.M. Bowers, Chief Editorial Consultant

MODERN DATA welcomes opinions from readers for this column on any subject that would be of interest to manufacturers and/or users of minicomputers. Contributions should not exceed 4 double-spaced pages (approx. 600-800 words) in length, and should be addressed to: *Minicomputer Forum, MODERN DATA, 3 Lockland Ave., Framingham, Mass. 01701*

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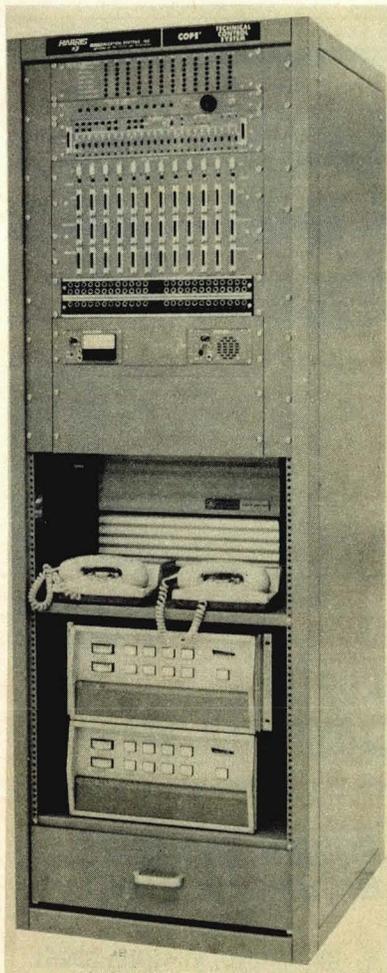


DATA COM NEWS

DATA COM NEWS

NETWORK CONTROL SYSTEM —

Harris Communication Systems (Dallas, Texas) has announced a management control system for large computer/communication networks. The COPE Technical Control System, as the new network controller is called, includes visual validation of proper functioning of circuit components; visual and audible failure warnings; switching of backup interfaces, modems, and lines; provision for test and diagnosis; and modular expansion.



CARRIER WAR — The initial skirmishes over AT&T's demand for a "moratorium" on further competition are becoming a major war of words. It started when AT&T board chairman John D. deButts called for a "moratorium on further experiments in economics" aimed at increasing competition in the telecommunications industry, predicting that new competition would result in "further" harm to the Bell System's facilities and millions of dollars of extra costs for the public. Not surprisingly, MCI Telecommunications Corp. has surpassed the other AT&T critics in vehemence: the specialized carrier has filed a formal petition with the FCC calling for the application of a "fairness doctrine" to what MCI calls AT&T's "current propaganda campaign" against further competition. MCI's petition claims that the AT&T resources being used for its current radio, television, and direct mail advertising on the issue are held "in trust" for the public in the same way that the airwaves are held in trust by licensed broadcasters. And so, MCI concludes, AT&T should include space and time in these ads for opponents to present their views on the matter. But it's not just rhetoric — MCI has also begun action in several federal district courts to obtain an order requiring AT&T to provide MCI with interconnection services on a non-discriminatory basis under the October 1973 FCC directive prohibiting discrimination. MCI charges that Bell System companies have refused in many instances to provide it with services they routinely make available to AT&T's Long Lines Department and the Western Union Telegraph Company. Meanwhile, the Computer Industry Association has entered the

fray, saying that "since AT&T is using the public's dollars to convince the consumer that monopoly is the answer, perhaps they should be required to make equal dollars available to tell the other side of the story." And ITT, whose proposed New York-Houston microwave system has been opposed by AT&T, has concluded that "AT&T feels threatened, rather than challenged, by competition."

Other recent legal events in this area: AT&T has appealed the FCC's decision allowing General Telephone and Electronics to enter the domestic communications satellite race. GTE has told the FCC that it only wants the satellite facilities to handle new traffic among its member telephone companies and does not intend to take traffic away from Long Lines. And AT&T attacked "competition for its own sake" on another front when it recently replied to comments made by the President's Office of Telecommunications Policy and the Department of Justice relating to the allocation of radio frequencies for mobile telephone service. Currently planning a high-capacity expansion of these services, AT&T said the two agencies' proposed restrictions on the expansion looked like "blatant encouragement of protectionism." Lastly, even the FCC is taking it on its legal chin: a U.S. Court of Appeals in New York has ruled that the commission lacks the authority to require AT&T to get FCC permission before filing a new tariff. Normal procedure is for the FCC to accept all applications for new rates, which automatically go into effect within 90 days unless the FCC rules against them. The "permission-to-file" procedure would have allowed the FCC to bypass the 90 day mandate.

REMOTE PROCESSOR — The latest addition to Burroughs' B700 small-scale computer series is the B771 System and Communications Processor, designed for both local data processing and communication with Burroughs B2700, B3700, B4700, B6700, and B7700 systems. Utilizing the same microprogrammed processor as the B700 computers, the new system has a 1-microsecond (per two bytes) cycle time and memory size from 16K to 49K bytes. Up to eight peripheral controls are connectable to the B771, and a variety of peripheral can be attached, including console typewriter, 300- and 600-cards/min readers, 45-cards/min punch, 90- to 750-lines/min printers, a magnetic tape cassette drive, a 4.6-million-byte disc cartridge, and a single-line communication control. Software support includes an RPG compiler and (on larger configurations) a segmented, disc-resident operating system. Purchase prices range from \$40,485 for a typical basic configuration to \$98,935 for a typical large configuration. Comparable monthly leases for these two systems would be \$1,023 and \$2,267.

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CIRCLE NO. 25 ON INQUIRY CARD
MODERN DATA/JANUARY 1974

CONTRACTS, ETC.: Private line carriers **MCI Communications Corp.** and **NCCC** have reached an agreement for a merger, pending the signing of a definitive contract and the approval of both companies' boards of directors and shareholders and (not to be forgotten) the FCC . . . Paine, Webber, Jackson & Curtis has signed a \$5 million, five-year agreement with **GTE Information Systems** under which GTE will develop a nationwide datacom network for the broker. The agreement includes the leasing of about 1,000 Videomaster and Stockmaster terminals currently in use by PWJ&C . . . **American Satellite Corp.** has made a \$1.5 million progress payment to Hughes Aircraft for the construction of ASC's three communications satellites. That's \$5 million down and \$20 million to go . . . **Standard Logic Systems, Inc.** (SLSI), a division of Standard Logic, has been awarded a \$1.3 million contract by the Commerce Dept. for additional development work on the Geostationary Operational Environmental Satellite (GOES) program, calling for delivery of 19 receiving/transmitting systems to be used to carry visible and infrared photographs and other data to U.S. weather stations via telephone lines.

NORTH TO ALASKA! — The Alaskan oil pipeline from Prudhoe Bay to the Pacific is not the only new Alaskan connection in the offing: as a culmination of their May 1973 agreement, RCA Alaska Communications and Western Union Telegraph Company recently opened Mailgram Service and Teleprinter Computer Services (TCS) between our northernmost state and the lower 49. Under the new FCC-authorized hookup, RCA Alascom telex customers and the general public can send and receive WUTCO Mailgrams to and from all states. Other new capabilities: Alaska telex customers are offered southbound store-and-forward service for their telex-to-telex, telex-to-TWX, and telex-to-telegram communications similar to that available to WUTCO's teleprinter subscribers in the rest of the U.S. WUTCO's telex and TWX subscribers can send public messages to Alaska, and via connection with WUTCO's enormous computer complex at Middletown, Va., Alaska telex subscribers can send multiple address messages.

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CIRCLE NO. 26 ON INQUIRY CARD

MAINTENANCE PACT — Astrocom of Minnetonka, Minn., and Data 100 of Edina, Minn., have entered into a maintenance agreement whereby Data 100 will maintain Astrocom's data sets on a nationwide basis. According to a joint announcement, the agreement will allow Astrocom to offer four-hour maintenance service on its equipment through the use of Data 100's customer engineering staff in over 50 major cities within the continental U.S.

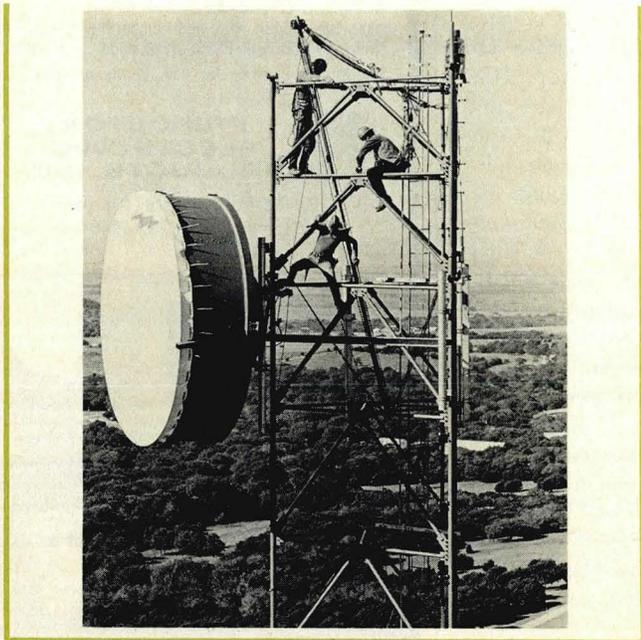
GOING ONLINE, FAST — It's true: ask any banker who's been through it and you'll probably hear a horror story. Hooking up a speedy new online banking system is not so speedy. Well, TRW Data Systems thinks it has the solution in its System 5000, introduced at the Bank Administration Institute's recent national convention in San Francisco. According to TRW, a basic System 5000 can integrate offline dispensing/total teller machines into a full online telecommunications system

ELECTRONIC EAR — A new, patented electronic device providing continuous identification of communications channel usage has been developed by Atlantic Research Corp., of Alexandria, Va. The new device is called the Modulation Mode Identifier (MMI-2) — or the "Electronic Ear" because of its ability to distinguish between voice, data, and no-signal conditions on a communication line. Its uses include the selection of the proper test and measurement equipment in automatic test systems and the allocating of communications costs by traffic type as well as line usage. One obvious application would be in WATS/dial-up/dedicated line cost studies.

in 90 to 120 days. Depending on the bank's size, the cost of the transition is \$100,000 to \$200,000; TRW emphasizes that more than 70 percent of U.S. banks would be at the low end of that price range. In turnkey configurations, the System 5000 is designed for upgrading to a complete electronic funds transfer system (EFTS) capability, or to a merchant authorization system, or to interface with a multiple-user card authorization network or other communications system.

LOCAL PHONE CO. MAKES GOOD — Rochester (N.Y.) Telephone Corp., the not-so-big phone company with the very big customer (Xerox), recently stepped up to big-phone-company technology when it installed an all-digital transmission system to serve two Xerox locations 11 miles apart. The phone company's line-gobbling subscriber was sending about 500 megabits of data per day between its downtown Rochester headquarters and Webster, N.Y., manufacturing plant when it began looking into several alternatives to conventional transmission methods, including a private microwave system. But Rochester Tel was able to keep it all in the family when it came up with a 1.544-megabit, all-digital transmission system. Utilizing Vicom SM-T voice/data terminals and T-1 lines, the computer-to-computer network provides five duplex synchronous channels and is currently handling 4800- and 9600-bits/sec serial data rates; strapping options offer rates from 1200 to 48,000 bits/sec. Vicom terminals at each end of the 11-mile connection multiplex all channels into a 1.544-megabit bipolar pulse stream and back. According to Continental Telephone subsidiary Vicom, two selling points for Rochester Tel's digital transmission system were the elimination of ten \$4,000 modems and an error rate of 0.1 ppm as compared with 10 ppm previously.

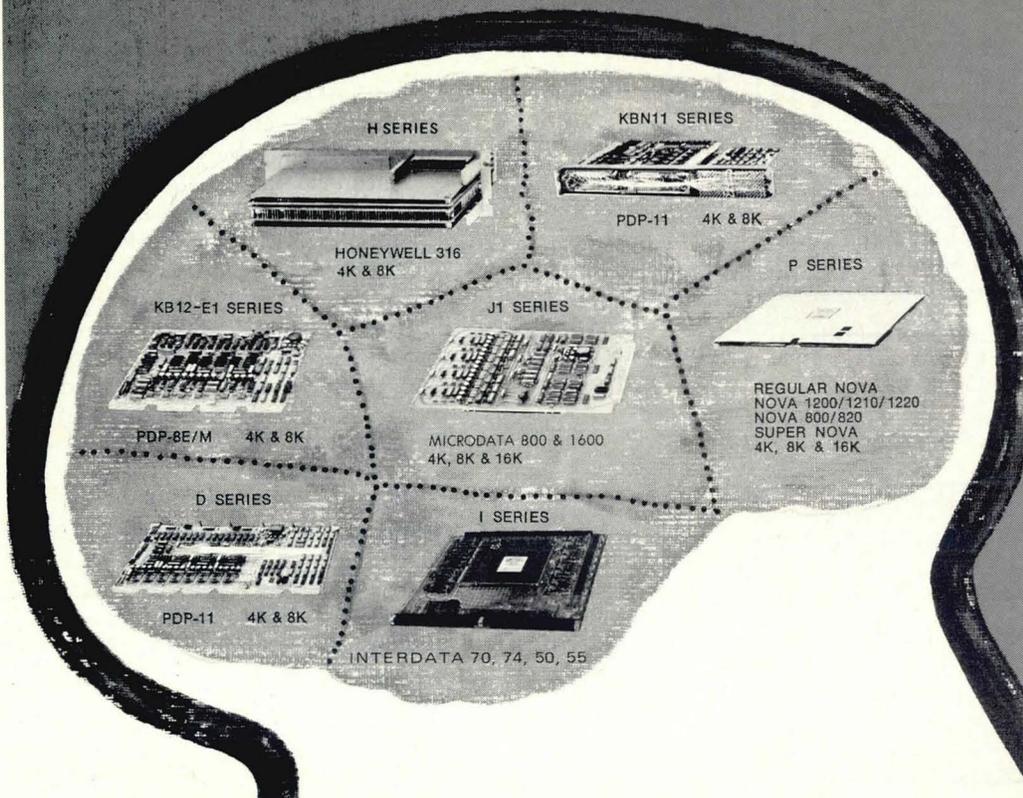
MICROWAVE ANTENNA is installed on a 330-foot repeater tower in Cedar Hill, Texas, as part of Datran's all-digital network. Since construction began last April, seventeen such towers have been completed along the network's Dallas-Chicago segment, scheduled for completion by mid-1974.



DEDICATED NETWORKS: American Express recently began operation on its A-Com voice and data communications network. Linking 17,000 telephones at division and subsidiary offices in 66 U.S. and Canadian cities, and 10 major computer facilities, the A-Com network includes data transmission speeds equivalent to 125 typed pages per minute, according to American Express. Under development since 1969, the network was planned and constructed under a joint effort of American Express and AT&T, with consultation by Price Waterhouse & Co. Future plans call for the routing of incoming calls through the network and overseas extension . . . The Associated Press has announced plans for a computerized general news transmission system operating at 1050 words/min, as opposed to the present 66 words/min teleprinter-oriented system. (Sports news, financial data, and textual copy have been going at 1050 for several years.) Beginning on an experimental basis, the service will be used by a few member newspapers which will use various methods of handling the incoming news. The *Detroit News*, for example, will store it on its computers, edit it on CRT terminals, and send it in to the composing rooms — eliminating TTY transmission. Others will simply receive on high-speed printers and proceed as before. The AP said it is watching AT&T's progress with its digital network, which the AP expects to put to good use as its 1050 words/min news service is expanded.

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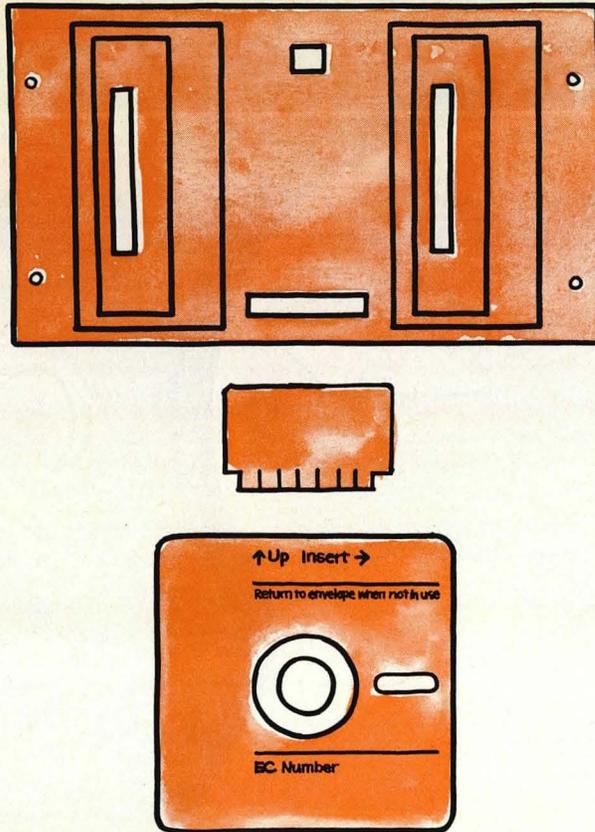
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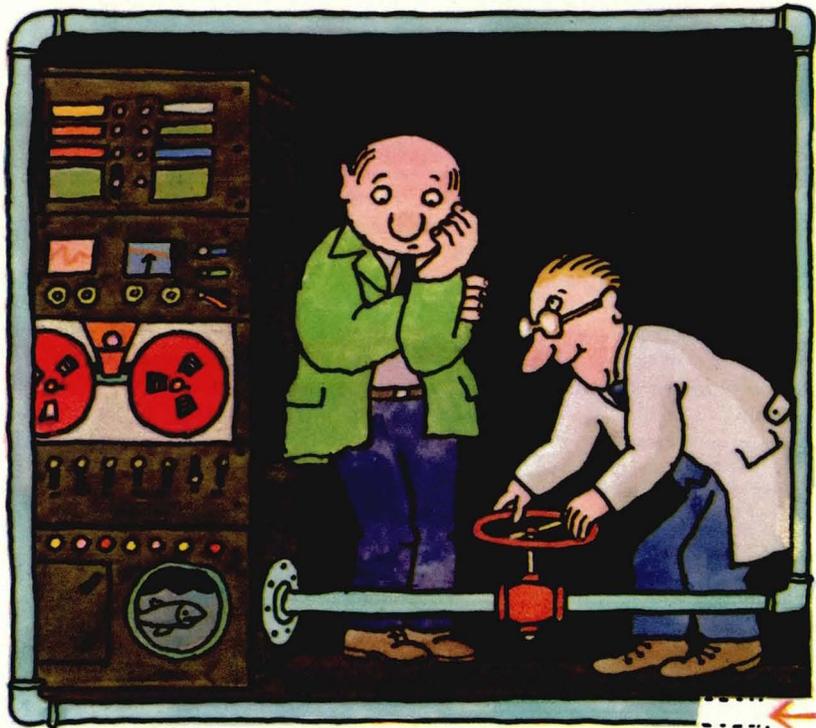
TIMESHARING DOWN UNDER — General Electric's Mark III Information Services have picked up a fourth continent. In announcing the commencement of commercial operation in Australia, GE's Information Services Division suggested that the "significant number" of U.S.-based multinational companies who are now using MARK III and who have operations in Australia would be prime candidates for the extended service, but that Australian companies will not be overlooked either. Initially, local service will be available in Sydney and Melbourne. Transmission is via the Pacific Intelstat satellite between earth stations at Moree, Australia, and Jamesburg, Cal. Land lines will be used between Jamesburg and GE's "computer Supercenter" in Cleveland. Local management of the Australian service is by Honeywell Pty., Limited, Information Systems Division.

CARRIER BRIEFS: **Southern Pacific Communications Co.** has received FCC approval to offer specialized interstate private-line services to customers as a common carrier. The OK applies to the leasing of circuits on the existing microwave facilities of Southern Pacific Transportation Co., another subsidiary of Southern Pacific Co., and is temporary, pending completion of SPCC's own facilities along the Arizona-California route, scheduled for April 1974 . . . Bolt Beranek and Newman subsidiary **Telenet Communications Corp.** recently filed an application with the FCC for authority to establish and operate a nationwide data communications network as a value-added common carrier. The packet-switching network is expected to serve 18 U.S. cities by year-end 1975 and 62 by year-end 1977 . . . Specialized microwave common carrier **United Video** of Tulsa, Okla., was selected by the FCC to deliver television programming for the three major networks to stations in Florida on a \$5.8 million route from Jacksonville to Miami. The winner of the contested proceeding will replace AT&T as the carrier serving stations in the two cities and along the route between them.

DP DIALOG

Notes and observations from IBM which may prove of interest to data processing professionals.

DP DIALOG appears regularly in these pages. As its name suggests, we hope DP DIALOG will be a two-way medium for DP professionals. We'd like to hear from you. Just write: Editor, DP DIALOG, IBM Data Processing Division, White Plains, N.Y. 10604.



After Talks of Gremlins, They Flooded the CPU.

Recently, we asked to hear from you about your unusual, even humorous experiences in data processing. Reiner E. Baer, one of our readers in Huntsville, Alabama sent in the following story. Please write us if you have a story to tell.

Way back in the dark ages of com-

puters with tubes, say 1956 or 1957, our computer developed some hard-to-identify intermittent hardware problems. After considerable searching, headscratching and talks of gremlins, it occurred to one maintenance engineer that the intermittent bugs happened most frequently during periods of dry

weather. Without understanding the complete relationship between humidity and error-free computer operation, we determined that higher humidity levels inside the computer did alleviate the problem.

We then ran a copper tube from the water system into the bottom of the CPU. Afterwards, whenever the computer stopped because of a malfunction, the first thing the operator or maintenance engineer did was *not* to try to isolate and identify the problem, but to turn on the water tap and flood the bottom of the CPU.

The consternation of existing dignitaries at this apparently irrational behavior was priceless and led to much suppressed hilarity. Just try to imagine the computer with this marvelous console and dozens of lights and switches (they just don't make operator consoles impressive enough any more) humming along and suddenly stopping. Everybody leans forward to see the chief operator flip switches, read lights, get printouts, dial the scope, select the proper cycle time, step forward in memory (what a magician a good operator could be in those days) and then call to his assistant to turn on the water—all of which was done in front of everyone present.

Unfortunately, the periodic flooding of the CPU created such a hothouse atmosphere that the contacts behind the boards or chassis began to separate. Eventually, the chassis had to be pulled out so all the contacts could be polished and goldplated. But while it lasted, we had great fun confounding visiting brass by giving the impression that this computer truly ran on water. **IBM**



The Synagogue of Khirbet Shema Restored

About 90 miles north of Jerusalem lies the village of Khirbet Shema, which until recently was buried under layers of soil. The village was destroyed sometime around 417 A.D., probably by an earthquake which struck the upper Galilee about that time. Among the ruins is an ancient synagogue, which is now being restored with the help of an IBM computer. Co-heading the team of archeologists is Dr. James F. Strange, who teaches biblical archeology at the University of South Florida.

According to Dr. Strange, the ruins of the synagogue show it to be unique, both for the area and time of construction, estimated to have been around the fourth century A.D. "There were several factors which led us to believe the building was quite unlike any other synagogue in that part of Palestine," he says. "The foundation walls were nearly two feet thick and an entrance staircase had stairs ten feet wide. There also were a pair of massive door posts cut from solid rock, eight roof-support columns almost two feet thick and a number of underground chambers."

Preliminary research on selecting a site began several years ago but the actual excavation at Khirbet Shema was started in 1970. The team's main interest was to excavate the synagogue in its context, uncovering adjacent buildings and surrounding parts of the village. By the end of the first summer's work they had recovered the plan of most of the village, an area of more than six acres. Restoration began in 1971 and

continued during the summer of 1972.

The team, which has included up to 80 people along with three architects, first drew tentative plans of the original building and prepared detailed calculations, measurements and instruction for actual reconstruction of pedestals, columns, capitals and doorposts. The final piece of the puzzle lies in finding the type of roof which covered the structure.

To date no remnants of the roof

have been found at the site, nor have any other positive clues appeared. So Dr. Strange has turned to the computer for an answer. With most of the dimensions of the building known, it was then possible to make engineering calculations to determine the missing structural parameters. The data will allow the researchers to compare various roof styles and explore alternative designs.

Dr. Strange says: "From this data, we will be able to predict what the entire building probably looked like. Using the computer to produce isometric and perspective drawings, we can literally reconstruct the building."

The computer is also playing a major role in determining the social and economic makeup of the village. Over 4,000 artifacts have been found in the excavations, including coins, glass, plaster, ceramic stone, bone, jewelry and some organic materials.

At first each artifact was listed manually. Later all the information was punched on cards and stored in the computer. "Using statistical analysis and comparing data from other excavated sites in the area, the computer is helping us to determine patterns in the cultural composition of Khirbet Shema," says Dr. Strange.

"But even more important," he continues, "it enables us to handle the tedious task of gathering and analyzing data that would otherwise have taken years to explore manually. Never before have we had a better chance to study Palestinian archeology so thoroughly." **IBM**

Mystery of Nefertiti

Last October the Public Broadcasting Service aired "The Mystery of Nefertiti" through a grant from IBM. The program gave an account of the work of an American Egyptologist, Ray Winfield Smith, in the ruins of Thebes. Here he was able, with the help of a computer, to solve the puzzle of 35,000 decorated blocks, thought to be the remains of a single temple built by the Pharaoh Akhenaten and his queen, Nefertiti.

After classifying the 35,000 blocks, the computer showed it to be a staggering complex of temples and buildings, stretching across the desert for over a mile—thus correcting an important episode in Egyptian history.

A Name, Not a Number

When the League Life Insurance Company in Detroit sent a mailing advertising a new insurance policy to its 340,000 customers, almost 40% of them responded. Processing this huge influx of mail would have taken many insurance companies months, but League Life handled the enormous increase within weeks. The reason was the data processing capabilities of Group Systems, Inc., the data processing arm of both the League Life and League General Insurance Companies (the League Insurance Group), which furnish life and automobile insurance in the state of Michigan.

Group Systems recently enhanced

these capabilities with a newly installed program product from IBM called the Alpha Search Inquiry System, which allows employees at the League Insurance Group to give an immediate response to customer inquiries. Thomas Verdonk, vice president and general manager of Group Systems says: "With Alpha Search we can gain instantaneous access to our customer files. No time is wasted. Files are never misfiled. And steps are greatly minimized."

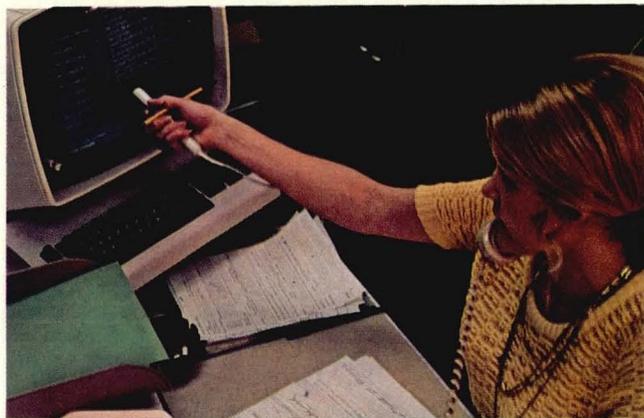
He recalls: "Before Alpha Search was installed, it would sometimes take as long as a half hour to complete a search for a customer file. Now it takes a matter of seconds."

What this means for the League Insurance Group is not only greater cost savings, but also more customer satisfaction. "It means a lot to a customer to be able to give you his name, and not a number, and get fast and efficient service," says Verdonk.

The Alpha Search Inquiry System is actually a set of five programs, which operate under several of IBM's DB/DC systems. It creates, maintains, reorganizes and displays a file containing customer names and associated record numbers. A phonetic encoding technique, which is built into the system, reduces the problems of sound-alike and misspelled names. Secondary identifiers, such as one's social security number, birthdate or zip code, are used to reduce the number of common names displayed on a screen.

Alpha Search is especially useful for insurance companies, utilities, banks or any business requiring ready access to records on the basis of name only. At Group Systems, Verdonk says: "I don't know how we could have handled the increased number of inquiries without Alpha Search. While for some time we have had our customer files on the computer, we have not been able to access them by name. Alpha Search has given us that capability."

IBM



Phyllis Shaw answers an inquiry from one of the League Insurance Group's 500,000 customers.

Sidelines

Breeding a better Bess...

This world-record-holding Holstein, Gladell Governess Bess, produced a total of more than 18 tons of milk last year. That amounts to roughly 74,000 eight-ounce glasses. She and nearly a quarter of a million other cows are part of the Pennsylvania State University dairy herd management program, which uses an IBM computer. The herd-managed cows now produce on the average of 12,960 pounds of milk a year, as compared to 6,500 pounds

averaged by cows not in the program 15 years ago.

The System/370 in State College, Pennsylvania refines the process of selective breeding, especially for the small dairy farmer whose survival depends on a large volume of milk production. The computer simply reports on milk productivity of each cow. It also calculates culling and feeding guides for the entire herd. The data is updated monthly and processed against each cow's previous record. It then is possible to note trends and compare performances. It also enables specialists to choose the proper month for the cow to be bred, to see whether the cow's weight is affecting productivity and how heredity is likely to affect any given animal.

Supermarket Checkout...

Supermarket customers will be able to enjoy faster checkout service at their local supermarkets, thanks to the new IBM 3660 Supermarket System. Under the new system, packages at the checkout counter can be simply moved across a scanning beam and placed directly into bags. The scanner reads an identi-

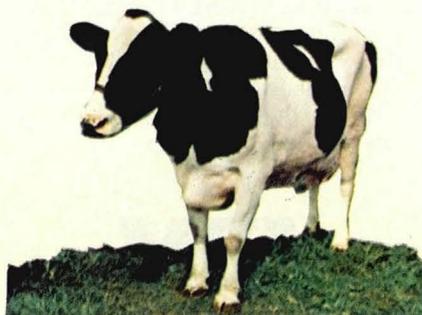


fying code printed on each product. The code used is the grocery industry's newly-adopted Universal Product Code, which is expected to appear on nearly all prepackaged foods by the end of 1975.

Each customer receives an itemized sales slip. Taxes and totals are computed for each customer transaction, as is the change due the customer. Meanwhile, the checkout clerk has on hand item and price information, which is displayed and printed automatically.

The system, when linked to an IBM System/370, has many more store control applications, including inventory control and ordering, personnel scheduling and sales analyses.

IBM

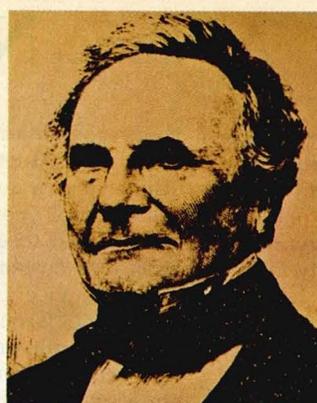




Blaise Pascal



Gottfried Leibniz



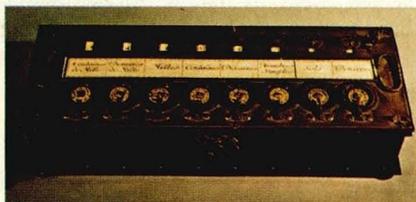
Charles Babbage



Herman Hollerith

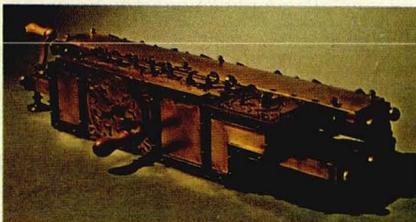
From Abacus to Computer

Most of us think of the computer as being the unique product of twentieth century technology. Yet many of the elements which are inherent in today's computers are centuries old. The abacus, developed about 3,000 years ago, was the first digital counting machine. Since then, many other "machines and engines" were developed—all of which led to the ultimate development of the modern electronic computer. Here are just a few:



The Arithmetic Machine—1642

In the seventeenth century Blaise Pascal developed the first true calculating machine, using a technique which still is used in modern computers. A leading mathematician and philosopher in France, Pascal conceived his arithmetic machine in 1642 when he was only 19. The machine was operated by dialing a series of wheels bearing the numbers 0 to 9 around their circumferences.



The Calculating Machine—1694

Just over fifty years later Gottfried Leibniz, also a renowned mathemati-

cian and philosopher, devised a crude machine to mechanize the calculation of mathematical tables. His calculating machine was the first machine to multiply and divide directly. More complex than Pascal's arithmetic machine, it was designed to mechanize the calculation of trigonometric and astronomical tables.



The Difference Engine—1822

This was the first of several difference engines built in the nineteenth century. Developed by Charles Babbage, a British mathematician, it accumulated differences to produce tables for navigation, astronomy and even insurance. It was capable of generating tables to a 20-place accuracy. Out of his work on the difference engine, Babbage came up with the first idea for a computer, a machine which could handle any sort of mathematical computation automatically. His "analytical engine", although never built, included all those essential parts of a computer:

a stored program, an arithmetic unit and a section for data entry and output.



The Census Machine—1890

Dr. Herman Hollerith, a statistician from Buffalo, N.Y., solved a problem of major importance for the U.S. Census Bureau when he designed his electric tabulating machine in the 1880's. The problem was this: at the rate the population was growing, the eleventh census in 1890 would be obsolete before it was tabulated. Hollerith's machine solved the problem by being able to tabulate the massive amount of data electrically. The machine consisted of three parts: a tabulator which used a clock-like counting device (shown), a sorter box with compartments which were electrically connected to counters in the tabulator, and a pantographic punch, one of the first devices used to punch data onto cards.

The year 1890 marks the date the first major statistical machine was built and put into large-scale use. It was this invention of Hollerith's that launched the information-handling revolution. Afterward, many others followed who also made significant contributions leading to the development of the computer in the 1940's.

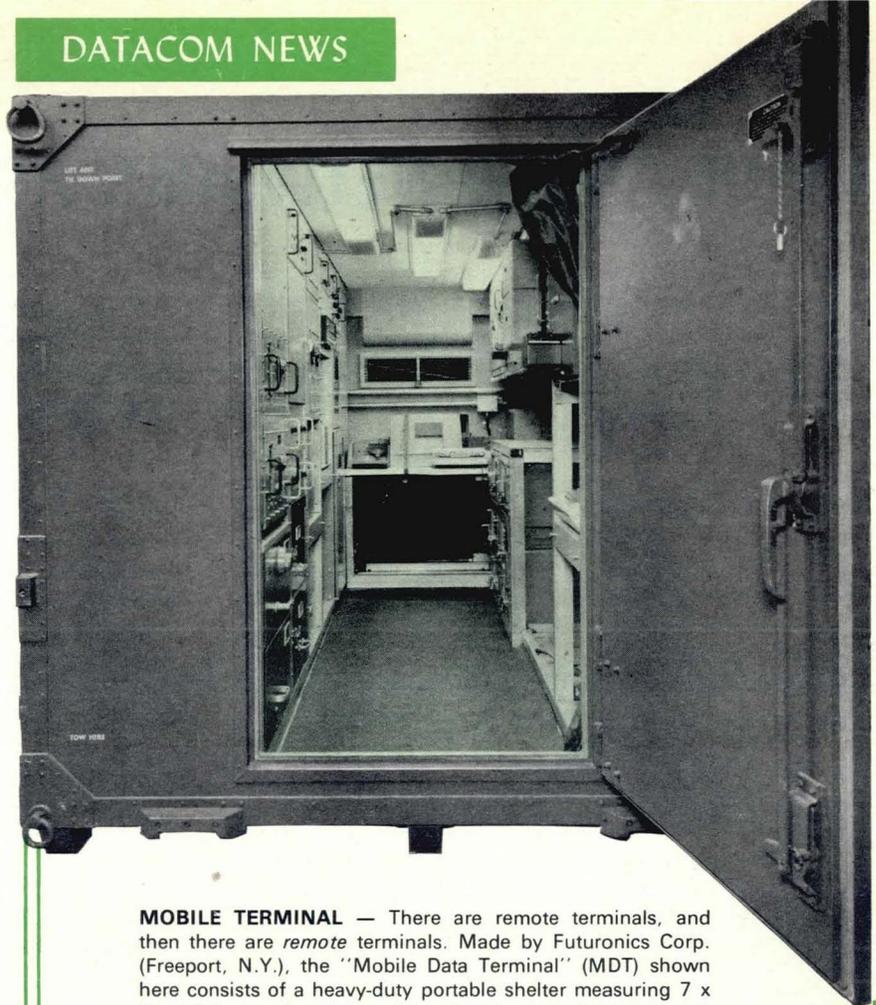
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REMOTE CONCENTRATOR — The T-COMM 7 front-end processor, which has been covered before in these pages, is now available for remote concentrator applications, according to manufacturer Periphonics Corp. of Bohemia, N.Y. Formerly available as a message switcher only, the T-COMM 7 has been installed at more than fifty locations in the U.S. and Mexico, according to Periphonics.

SOFTWARE — Sanders Data Systems has introduced a software package that allows a Sanders 810 programmable terminal processor to operate with the Bell System's Business Information System Communications (BISCOM) equipment. TEL-1, as the new software package is called, allows the printing of service orders and directory changes on up to four printers connected to an 810. The package is now in operation at the Chesapeake and Potomac Telephone Company and at Bell Telephone Labs.

OPTICAL FIBERS — AT&T's doing it, and ITT doesn't want to be left behind. The Electro-Optical Products Division of International Telephone and Telegraph has announced it is establishing a 4000-square-foot laboratory dedicated solely to optical fiber R&D. Calling glass optical fibers "the communication medium of the future," ITT cited predictions that by the year 2000 the world will have 1 billion telephone subscribers, more than five times the present number. The company said it appears that only optical fibers can economically provide the capacity required to handle such a demand.

FINANCIAL SERVICES: Tymshare (Cupertino, Cal.) has expanded its TYMNET timesharing network data base to include New York, American, and over-the-counter stock exchange prices, as well as the Value Line Analytical Data Base and the National Bureau of Economic Research (NBER) indices. Tymshare users now have access to such information on individual corporations as earnings per share, cash flow, dividends, capital spending and book value, shares outstanding and net worth (Value Line data base), and to the NBER data base of basic economic information since 1946 . . . The New York Stock Exchange has announced that all its odd-lot transactions are now fully automated. The work is done by a computer/communication system that links the Exchange, 20-odd member firms who account for about 65% of all odd-lot orders, and member



MOBILE TERMINAL — There are remote terminals, and then there are *remote* terminals. Made by Futronics Corp. (Freeport, N.Y.), the "Mobile Data Terminal" (MDT) shown here consists of a heavy-duty portable shelter measuring 7 x 7 x 12 feet and a wide variety of equipment shock-mounted to withstand 10 G's of force during transportation by truck, boat, airplane, or helicopter (or UFO?). Built around a Data General Nova 1200 minicomputer, the MDT can include just about any combination of analog and digital monitoring and sensing equipment, magnetic tape and disc storage units, CRT displays, printers, plotters, facsimile copiers, and teleprinters. The MDT operates in full-duplex mode at speeds up to 9600 baud and can be interfaced to high-frequency radio transmitters/receivers and satellite communication facilities. Futronics states that the unit can be used as a data acquisition system, communication control center or, in an expanded configuration, as a store-and-forward switcher. Not surprisingly, the manufacturer expects the MDT to appeal mainly to military agencies and oil and mining companies. See you in the outback.

firm Carlisle & DeCoppet, which executes about 99% of all odd-lot trades. Incoming orders from the online members enter the Exchange's computer and are forwarded to Carlisle & DeCoppet, along with round-lot price quotes from the Exchange's Market Data System. Carlisle & DeCoppet's computer stores and executes all orders, reports back to the firms which placed the orders, and generates the paperwork necessary for clearance and settlement. Firms not yet connected to the Exchange's computer telephone their orders to Carlisle & DeCoppet, which then enters the orders locally . . . The 16-bit communications processor and 22 x 16 dot matrix CRT terminal used in Quotron Systems' (Los Angeles, Cal.) Financial Information System network are now offered for sale off-the-shelf. No need to subscribe to purchase them.

VALUE-ADDED NETWORKS APPROVED

In late November, the FCC granted the application of Packet Communications, Inc. (PCI) to establish and operate a packet switching data communications network. Thus PCI becomes the first applicant and grantee of an authorized value-added network (VAN).

We suggested last January that 1973 might see the introduction of VANs, and we discussed the ensuing PCI application in our April Clinic. In the discussion of PCI, we wistfully restated our argument that VANs should not be regulated but, as expected, the Commission has not declined the offered right of regulation. It does appear, however, that it will be a soft regulation with a liberal policy for authorizing other applicants.

We also suggested that the public interest would be served by granting approvals to PCI and other responsible applicants while an inquiry proceeded on the resale prohibitions. And that, we are pleased to note, seems to be the case. The Commission said there was a variety of issues to be resolved with respect to the terms and conditions of VAN proposals, including shared use and re-sale of facilities, and that it planned to institute a proceeding on these matters in the near future.

In a separate but related action, the FCC granted an AT&T request for relief under certain of the Commission's rules for filing tariff charges. The requested relief would open the door for AT&T to proceed with their intended liberalization of the resale restrictions "to accommodate entities such as PCI." This seems anomalous since if entities such as PCI are common carriers, the re-sale prohibition is already moot. More likely it is simply a poor choice of words (Freudian?). From other current information in respect to the case it appears as though the liberalization is intended for those entities offering a preponderance of data processing in their composite computer-communications service. Such entities would not be common carriers under current Commission policy, and would therefore depend on the liberalized restrictions for their communication authority.

In any event, we are happy with small favors, and extremely pleased to see VANs blessed with an open entry policy, and PCI certified to proceed. Indications are that PCI will establish service by the first quarter of 1975.

TELENET COMMUNICATIONS CORPORATION

Equally ecstatic over the VAN decision is Telenet Communications Corporation, a formal applicant for certification as a VAN. Like PCI, Telenet is heavily staffed with former ARPA people. The company was organized and is majority owned by Bolt, Beranek and Newman, Inc., (BBN) who engineered, implemented, and operate the ARPA network under contract to ARPA. Notably, the president of Telenet is Dr. Larry Roberts, who is generally viewed as the originator and midwife of the ARPA network while he was director of ARPA's Information Processing Techniques office.

His management team includes some key ARPA and BBN people, as well as industry recognized authorities, analysts and authors Stuart Mathison and Philip Walker (*Computers and Telecommunications: Issues in Public Policy*, Prentice Hall, 1970).

Telenet looks for FCC approval early in 1974, and an initial 18 city network in service by the end of 1975. The system will incorporate the wideband packet switching, dynamic alternate routing, and general terminal interface independence associated with the ARPA network, and will also incorporate the network hardware BBN developed and builds for ARPA. ▲

THE DATA BASE SERVICES MARKET

New 130-page Frost & Sullivan report states that the data-base market will grow to \$1.1 billion by 1978, and \$1.7 billion by 1983. Annual sales now exceed \$700 million.

The analysis includes a forecast of the nature, size, opportunities and problems in fourteen market segments through 1983.

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Communications Clinic
c/o Berglund Associates, Inc.
Church Road & Roland Avenue
Moorestown, New Jersey 08057

IMPROVING ON THE ELVES

Der elves in der Black Forest building ezcellent karz, but throw in a little American know-how and you make

them great. Case in point: Dwight Mitchell, an American racing driver, ran into traction and handling diffi-

culties after equipping his production-class Porsche 914 with special racing tires. Enter Hewlett-Packard, which suggested that their Model 5451 Fourier Analyzer System could isolate the problem. H-P quickly traced the quirkiness to a suspension vibration resonant with the car's natural frequency. Although a slight structural modification was all that was necessary, this was prohibited by the racing association rules governing production-class cars. Back to H-P, which ran the problem through their analyzer again. This time they came up with the idea of installing a roll cage (permitted) at the precise node point on the car's longitudinal members that would defeat resonance. Result: a next-race win for Mitchell and a new market for Hewlett-Packard, which now offers automobile dynamic analyses as a regular service. ▲



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LINE & SERIAL-RO PRINTERS

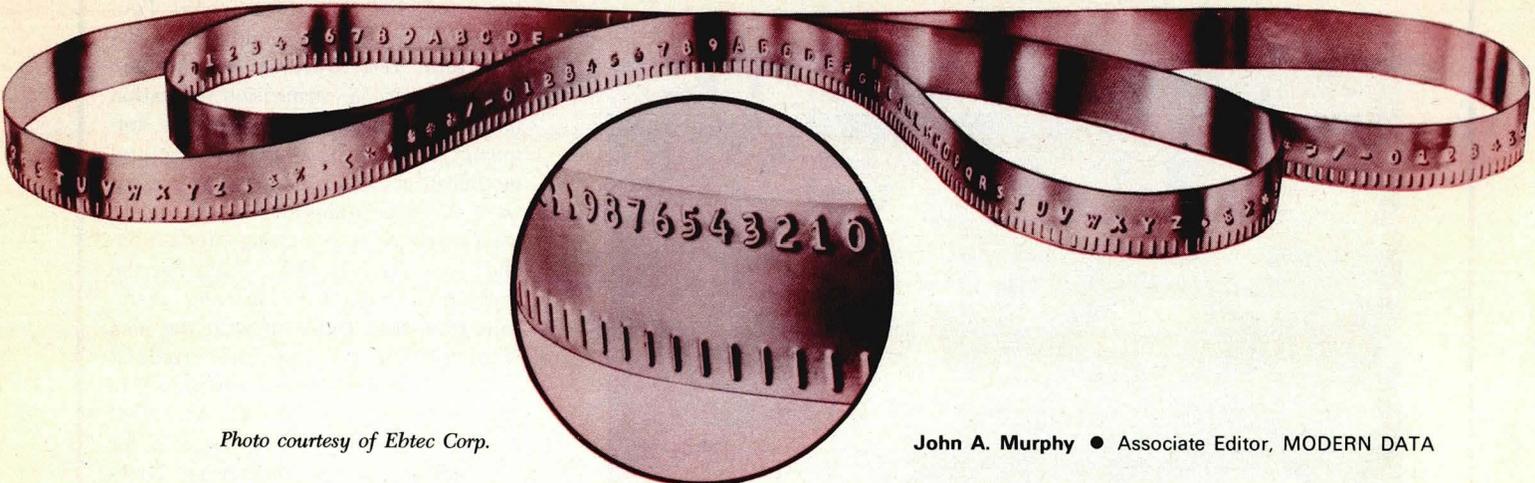


Photo courtesy of Ebtec Corp.

John A. Murphy • Associate Editor, MODERN DATA

Printers remain the prime man-system interface in data communications and processing. CRT display, voice response and other interactive terminals have preempted portions of the inquiry/response market; COM has also made inroads in areas where high speed, high volume output and microfilm storage-retrieval is needed. But printers still predominate as the means for producing permanent, human-readable hardcopy output.

This Product Update briefly reviews what's new on the printer scene, and tabulates the main features of line and serial-receive only (RO) printers now on the market.

LOW-TO-MEDIUM SPEED PRINTERS (speeds to 240 cps/100 LPM)

Until Centronics came along with their Model 101, printers in this speed* range consisted of TWX or telecommunications RO teleprinters with 10 to 30 cps print rates. Printers with a continuum of low-to-medium speeds are now available for data communications and intelligent terminal applications. Latest entries include the Trivex 700 and the Litton/ABS 120. The 700 printer employs a seven pin printhead with bidirectional left-to-right, right-to-left (no carriage return) printing to output 7x9 dot matrix characters at a 100 cps or 36 LPM rate. The ABS 120, another impact matrix printer, uses a 5x7 matrix printhead to print the entire character, and operates at 120 cps.

*Print rate or speed is related to the number of printable characters and the total print positions (columns) per line. A 64-character/132-column "standard" is used in this Update. Approximations have been made to equate printers with "non-standard" character/column features with 64 char/132 col units in the tabulations.

MEDIUM SPEED PRINTERS (300 cps/125 LPM to 900 cps/500 LPM)

The highest concentration of printer makes, models and types are found in the medium speed range. Appealing to communications, remote batch, key-to-disc and small-to-medium computer systems users, most of the action in the printer game has been centered in this area — thirty-one of the seventy-odd printer models marketed rated between 100 to 500 LPM.

Latest additions at the 100 to 200 LPM end of the medium speed spectrum come from Tally, Potter Instrument, Teletype and Centronics. Tally's new offering is available with two speed ratings — the 2100, rated at 125 LPM and producing 7x8 dot matrix characters, and the 200 LPM Model 2200, a 5x7 matrix impact printer. Both employ an indexing 132-point print comb and hammer mechanism, producing characters in a manner similar to line-at-a-time, non-impact, electrostatic printer/plotters. Potter's LP6150, another 5x7 impact matrix unit, uses a 12-hammer spiraling platen assembly to generate 180 LPM. A higher speed version, the LP6350, produces 420 LPM via the same mechanism.

Centronics, king of the acupuncture printer makers, has introduced yet another medium speed model — the 122. This printer outputs at 600 cps/200 LPM and, like their older 102A, splits the printing tasks between two print-heads. Each head traverses only one half of the page (66 columns), and prints bidirectionally to eliminate carriage returns.

A high degree of excitement from potential users (and apprehension from competitive display and printer makers) has greeted the introduction of Teletype's Dataspeed 40. The printer portion of this CRT-printer communications terminal is available on a stand-alone RO or OEM basis, and will

provide stiff competition to existing medium speed printer makes. The 40RO printer at present is only available in an 80-column page, friction feed configuration. Printout is at 314 LPM for a 64-character set, or 222 LPM for 96-characters from a solid-character belt impact mechanism. A pin feed model will be offered during the last half of this year, and a 132-column version will be available in the first half of 1975.

Control Data, Data Printer, Iomec, Pertec and Potter have all announced new printers for the 300 to 500 LPM area. CDC's 9322 drum printer is available in four different configurations having speeds of 150 to 400 LPM. The C/T printer, introduced by Data Printer, operates at 300 LPM and uses a replaceable chain/train that departs from drum mechanisms found on their other models. Pertec and Iomec, expanding their tape and disc peripheral product lines, have announced replaceable embossed belt impact printers. The Pertec P7330 comes with a switch and/or program selectable print rate of 300 or 160 LPM. Iomec's Model 352 produces 350 LPM for a 64-character set. The Potter LP6350, mentioned previously, operates at 924 cps or 420 LPM.

LINE/SERIAL-RO PRINTERS

COMPANY & MODEL	PRINTER TYPE	PRINTOUT	FEATURES	PRICE	INO. NO.
EXTEL Series AF	impact - 5x7 matrix	15 cps/64 char/80 col	RO teleprinter TTY or RS232C interface	\$ 1,200	120
FACIT-ADDO 4553	impact - 5x7 matrix	15 cps/64 char/80 col	RO teleprinter less power supply parallel or RS232C interface	\$ 795	121
TELETYPE 37 RO	impact - solid char	15 cps/94 char/80 col	RO teleprinter TTY interface	\$ 2,200	122
CONTROL DATA 92416 RO	impact - solid char	30 cps/64 char/132 col	RO teleprinter pin feed parallel interface	\$ 3,100	123
92417 RO 92427 RO	non-impact - 5x7 matrix thermal printhead	30 cps/92 char/80 col	RO teleprinter serial or parallel interface	\$ 1,910	124
DIABLO HyType	impact - solid char replaceable wheel	30 cps/96 char/132 col	printer less power supply pin feed bidirectional feed & printing dot plotting split platen	\$ 2,350	125
GENERAL ELECTRIC TermiNet 300 RO	impact - solid char print belt	30 cps/94 char/118 col (75 or 80 col avail)	RO teleprinter pin feed split platen RS232C interface	—	126
LITTON/ABS 30 RO	impact - solid char print wheel	30 cps/47 char/192 col	pin feed split platen bidirectional tab vertical format programming cut form handler	\$ 2,698	127
NCR TPP	non-impact - 5x7 matrix thermal printhead	30 cps/96 char/80 col	serial or parallel interface power supply opt	—	128
SINGER/ITP RO-30-2	impact - 5x7 matrix	30 cps/64 char/132 col (96 char & 80 col avail)	RO teleprinter pin feed parallel, TTY or RS232C interface	—	129
TEXAS INSTRUMENT RO 700 Series	non-impact - 5x7 matrix thermal printhead	30 cps/94 char/80 col	RO teleprinter parallel, TTY or RS232C interface	\$ 2,160	130
BALTICA Series 60	impact - solid char replaceable printdisc	50 cps/100 char/132 col (60 cps maximum)	bidirectional feed & printing parallel interface	\$ 1,600	131
PRINTER TECHNOLOGY Printec 100 A	impact - solid char split helix printdrum	70 cps 26 LPM/96 char/132 col 44 LPM/96 char/72 col	2 or 8 channel VFU parallel, RS232C or minicomputer-compatible interface pin feed line buffer	\$ 2,800	132

PRODUCT UPDATE
LINE/SERIAL-RO PRINTERS Cont'd

COMPANY & MODEL	PRINTER TYPE	PRINTOUT	FEATURES	PRICE	INO. NO.
CENTRONICS 306	impact - 5x7 matrix (9x7 matrix opt)	100 cps 60 LPM/64 char/80 col	pin feed VFU parallel, RS232C or minicomputer-compatible interface line buffer	\$ 1,995	133
500	impact - 5x7 matrix (9x7 matrix opt)	100 cps 40 LPM/64 char/132 col	same as 306	\$ 2,600	134
PRINTER TECHNOLOGY Printec 100	impact - solid char split helix printdrum	100 cps 35 LPM/64 char/132 col 55 LPM/64 char/72 col	8 channel VFU parallel, RS232C or minicomputer-compatible interface pin feed line buffer	—	135
TRIVEX 700	impact - 9x7 matrix	100 cps 36 LPM/64 char/132 col	2 or 8 channel VFU parallel interface pin feed line buffer	\$ 2,600	136
GENERAL ELECTRIC TermiNet 1200 RO	impact - solid char print belt	120 cps/94 char/80 col (120 col avail)	RO teleprinter pin feed split platen RS232C interface	—	137
LITTON/ABS 120	impact - 5x7 matrix	120 cps/96 char/132 col	pin feed parallel or RS232C interface	\$ 2,822	138
MEMOREX 1250	impact - solid char replaceable print cart	120 cps/64 char/120 col	RO teleprinter VFU pin feed RS232C interface	\$ 4,025 \$115/mo	139
CENTRONICS 101 101 A	impact - 5x7 matrix (9x7 101 A)	165 cps 60 LPM/64 char/132 col	pin feed VFU parallel, RS232C or minicomputer-compatible interface line buffer	\$ 3,935 (101) \$ 4,130 (101 A)	140
DATA INTERFACE DI-240	non-impact - 10x12 matrix magnetic belt	240 cps/96 char/80 col	parallel or RS232C interface	—	141
SCOPE DATA Series 200	non-impact - 7x9 matrix electroresistive	240 cps/96 char/80 col	parallel or RS232C interface	—	142
CENTRONICS 102 A	impact - 9x7 matrix	330 cps 125 LPM/64 char/132 col	pin feed VFU parallel, RS232C or minicomputer interface line buffer	\$ 4,635	143
TALLY 2100	impact - 7x8 matrix line comb mechanism	125 LPM/64 char/132 col	pin feed 8 channel VFU parallel or minicomputer-compatible interface line buffer	\$ 3,800	144
POTTER LP 3000	impact - 5x7 matrix scanner mechanism	300 cps 135 LPM/64 char/132 col	pin feed 2, 8 or 12 channel VFU parallel, RS232C or minicomputer-compatible interface line buffer plotting capability	—	145
LP 6150	impact - 5x7 matrix scanner mechanism	396 cps 180 LPM/64 char/132 col	same as LP 3000	\$ 2,450 (1000-unit)	146
TELETYPE 40 RO	impact - solid char char belt	314 LPM/64 char/80 col 220 LPM/96 char/80 col	RO teleprinter TTY or RS232C interface 1000 char buffer (opt) pin feed	\$ 2,655	147

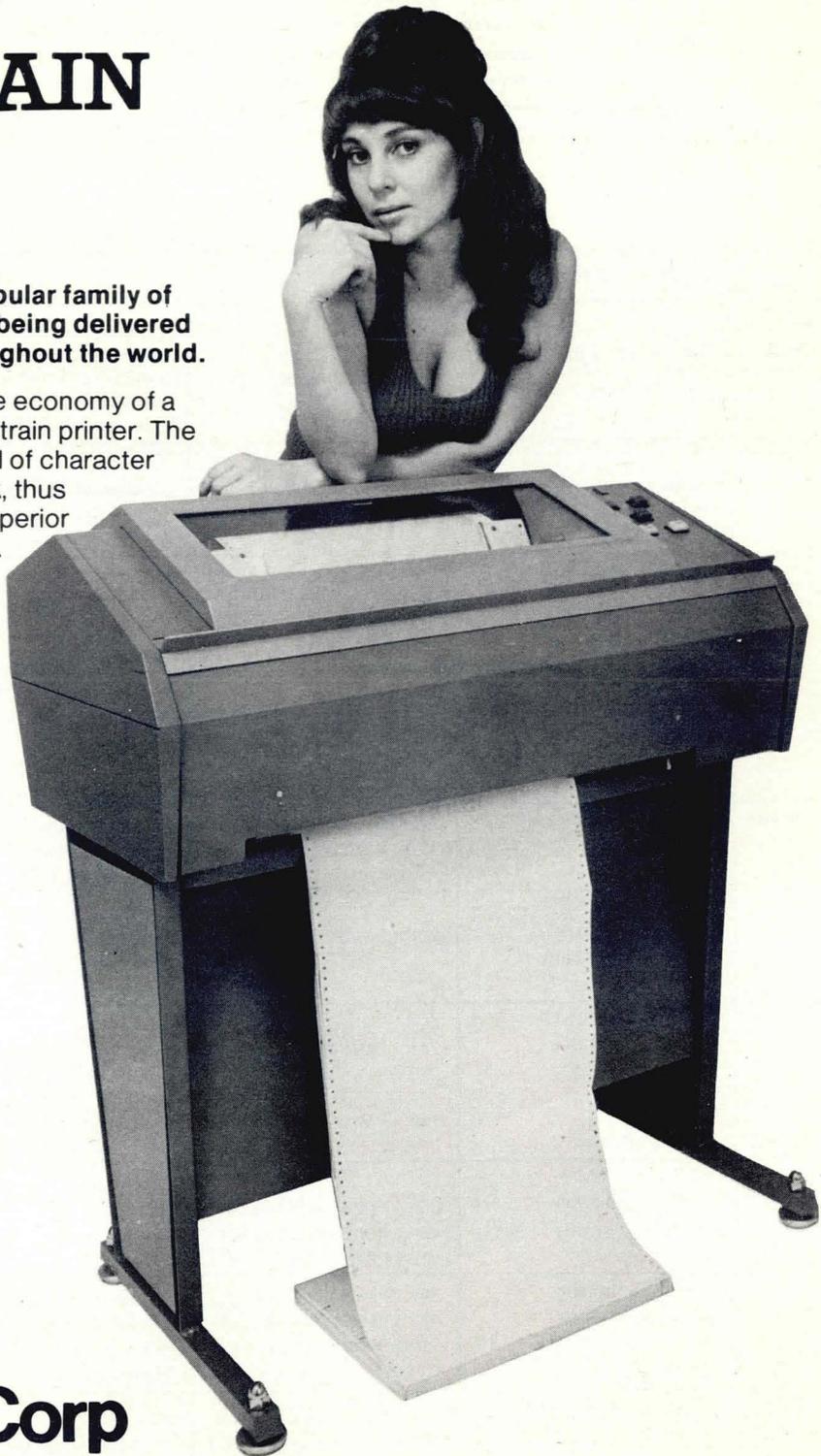
See our new CHAIN/TRAIN line printer

It's the newest addition to our popular family of medium-speed line printers now being delivered to satisfied OEM customers throughout the world.

This 300 LPM Model features the economy of a chain printer with the precision of a train printer. The unique CHAIN/TRAIN is composed of character links which ride on a mono-rail track, thus insuring unsurpassed alignment, superior print quality and solid dependability.

A no-nonsense printer, it has one hammer per column. There is no shuttling of paper or hammers and no sharing of electronics. As a result, this heavy-duty unit will completely satisfy your most demanding requirements.

Contact Frank Schaller for complete details.



Data Printer Corp

201 Vassar Street, Cambridge, MA 02139 (617) 492-7484

CIRCLE NO. 30 ON INQUIRY CARD

HIGH SPEED PRINTERS (600 to 2000 LPM)

Replaceable chain/train impact models with rates in the 1000 LPM range have been introduced during the past year by Control Data, Data Products and Potter.

The 2550 "Charaband" printer, manufactured by Data Products, allows the operator to change individual characters as well as the entire print chain/train. Thus worn character slugs may be replaced or special characters mounted with a minimum of effort. The reversible Charaband train also carries two complete character sets, reducing the number of chains required per printer installation.

Potter's new LP6403 line printer reduces paper overhead costs as well as supplying 48-character set output at 1260 to 1550 LPM. A lower size type font is used in the 432-character print train, allowing 15% more lines of printout per page and a reduction in forms dimensions.

The cost of high speed impact line printers has limited their application with small systems or minicomputers. With the belief that the users of such systems deserve equal speed capabilities, manufacturers of non-impact printer/plotters have introduced lower cost, 1000 LPM versions of their wares. Gould's 5000 Series, a 1200 LPM configuration of their ultra speed 4800, and Varian's Statos 31 Series are the latest entries in the low cost, high speed printer market.

LINE/SERIAL-RO PRINTERS Cont'd					
COMPANY & MODEL	PRINTER TYPE	PRINTOUT	FEATURES	PRICE	INO. NO.
CENTRONICS 122	impact - 5x7 matrix	600 cps 200 LPM/64 char/132 col	pin feed VFU parallel, RS232C or minicomputer-compatible interface line buffer	\$ 4,985	148
CONTROL DATA 9322-II	impact - solid char drum mechanism	200 LPM/64 char/132 col 150 LPM/96 char/132 col	pin feed 12 channel VFU 15 ips slew line buffer	\$ 6,100	149
DATA PRINTER 236	impact - solid char drum mechanism	200 LPM/64 char/132 col 300 LPM/64 char/96 col 600 LPM/64 char/48 col	pin feed 8 channel VFU 27½ ips slew line buffer	\$ 8,275	150
IOMEC Digitronics 200	impact - solid char replaceable belt	200 LPM/64 char/132 col 250 LPM/48 char/132 col 530 LPM/16 char/132 col	pin feed 8 channel VFC 10 ips slew line buffer parallel or minicomputer-compatible interface	\$ 7,350	151
LITTON/Datalog 1100	non-impact - 5x7 matrix electrostatic	200 LPM/64 char/128 col 120 LPM/64 char/128 col	parallel & minicomputer-compatible interface two-line buffer plotting capability	\$ 7,130	152
TALLY 2200	impact - 5x7 matrix line comb mechanism	200 LPM/64 char/132 col	pin feed 8 channel VFU parallel or minicomputer-compatible interface line buffer	\$ 4,000	153
ODEC 1400 & 2400	impact - solid char char belt	215 LPM/64 char/132 col 245 LPM/48 char/132 col 155 LPM/96 char/132 col	pin feed 2 channel VFU parallel, RS232B or minicomputer-compatible interface line buffer 8 1/3 ips slew	\$ 7,300	154
DATA PRODUCTS 2310 2910	impact - solid char drum mechanism	356 LPM/64 char/80 col 460 LPM/64 char/20 col 1100 LPM/64 char/20 col	pin feed 20 char buffer 13 ips slew	\$ 7,700	155
2410	impact - solid char drum mechanism	245 LPM/64 char/132 col 460 LPM/64 char/72 col 1100 LPM/64 char/24 col	pin feed 8 or 12 channel VFU 13 ips slew 24 char buffer	\$11,000	156
2420	impact - solid char drum mechanism	245 LPM/64 char/132 col 460 LPM/64 char/72 col 1120 LPM/64 char/24 col	pin feed 8 or 12 channel VFU 20 ips slew line buffer	\$12,000	157
VOGUE 880 E	impact - solid char drum mechanism	400 LPM/64 char/80 col	pin feed parallel or minicomputer-compatible interface line buffer	\$ 7,000	158

LINE/SERIAL-RO PRINTERS Cont'd

COMPANY & MODEL	PRINTER TYPE	PRINTOUT	FEATURES	PRICE	INO. NO.
CONTROL DATA 9322-III	impact - solid char drum mechanism	300 LPM/64 char/132 col	pin feed 12 channel VFU 15 ips slew line buffer	\$ 7,000	159
DATA PRINTER C/T Series	impact - solid char replaceable chain	300 LPM/64 char/132 col 400 LPM/48 char/132 col 200 LPM/96 char/132 col	pin feed 12 channel VFU 15 ips slew line buffer	\$ 7,100	160
306	impact - solid char drum mechanism	300 LPM/64 char/132 col	pin feed 8 channel VFU 27½ ips slew line buffer	\$ 8,875	161
DATA PRODUCTS 2230	impact - solid char drum mechanism	300 LPM/64 char/136 col 240 LPM/96 char/136 col	pin feed 12 channel VFU 20 ips slew line buffer	\$ 6,100	162
MOHAWK DATA SCIENCES 4330	impact - solid char replaceable chain	300 LPM/64 char/136 col 210 LPM/96 char/136 col 380 LPM/48 char/136 col	pin feed 12 channel VFU 17 ips slew line buffer	\$ 8,780	163
4335	impact - solid char replaceable chain	300 LPM/64 char/136 col 210 LPM/96 char/136 col 380 LPM/48 char/136 col	same as 4330	\$11,950	164
PERTEC P7330	impact - solid char replaceable belt	300 LPM/64 char/132 col 210 LPM/96 char/132 col 385 LPM/48 char/132 col	pin feed 12 channel VFU 20 ips slew line buffer 300/160 LPM switch or programmable speed	\$ 3,990 (100-unit)	165
POTTER LP3300	impact - 5x7 matrix scanner mechanism	660 cps 300 LPM/64 char/132 col	pin feed 4 or 12 channel VFU 8½ ips slew line buffer parallel or minicomputer interface	—	166
DATA PRINTER F-80-C	impact - solid char drum mechanism	600 LPM/64 char/80 col	pin feed 8 channel VFU 27½ ips slew line buffer	\$ 7,665	167
VERSATEC LP-860	non-impact - 5x7 matrix electrostatic	600 LPM/64 char/80 col 600 LPM/96 char/80 col	line buffer parallel or minicomputer-compatible interface plotting capability	\$ 4,300	168
IOMEC Digitronics 352	impact - solid char replaceable belt	350 LPM/64 char/132 col 268 LPM/96 char/132 col 420 LPM/48 char/132 col	pin feed 12 channel VFU 10 ips slew line buffer parallel or minicomputer-compatible interface	\$ 9,450	169
VERSATEC LP-1616	non-impact - 16x16 matrix electrostatic	300 LPM/96 char/100 col	line buffer parallel or minicomputer-compatible interface plotting capability	\$ 6,900	170
CONTROL DATA 9322-IV	impact - solid char drum mechanism	400 LPM/64 char/132 col	pin feed 12 channel VFU 15 ips slew line buffer	\$ 7,300	171
POTTER LP6350	impact - 5x7 matrix scanner mechanism	924 cps 420 LPM/64 char/132 col	pin feed 12 channel VFU line buffer parallel, RS232C or minicomputer-compatible interface plotting capability	\$ 3,465 (1000-unit)	172
VERSATEC LP 1150	non-impact - 7x9 matrix electrostatic	500 LPM/64 char/132 col 500 LPM/96 char/132 col	line buffer parallel or minicomputer-compatible interface plotting capability	\$ 4,900	173

PRODUCT UPDATE

ULTRA SPEED PRINTERS (3000 LPM and above)

The ultra speed range is exclusively the domain of the non-impact printer. Joining Gould and Litton/Datalog at these heights are new models from ElectroPrint and Uppster that approach COM recorder speeds while providing full-sized hardcopy output.

The ElectroPrint EP-100 line printer employs a novel technique to generate 7x11 matrix characters on plain paper surfaces. A linear, sieve-like screen of electrostatically charged holes controls the passage of ion beams into a cloud of ink particles. Those particles hit by ions are then propelled onto the paper to form the dot matrix character pattern. The EP-100 outputs an upper/lower set of 96-characters at 8000 LPM, and the printer has been run at speeds as high as 12000 LPM. Graphics mode operation for dot plotting is also available.

Matrix character output is the usual fare of non-impact printers. Uppster has changed the menu with their Model II, a non-impact printer that produces solid characters on plain paper. An indexing optical character mask is used to form characters on a print drum a page-at-a-time. The drum then electrostatically transfers the entire page onto

the paper in a manner analogous to a Xerox copier. The Model II operates at a 9000+ LPM rate for character sets of up to 175-characters, and can produce up to 99 copies from its page memory under operator or program control. Other features include interchangeable character sets and 132-column output on reduced forms size (8½ by 11 inch paper).

THE TABLE

Table 1 reviews the major characteristics and features of line and serial-RO printers marketed to the OEMer or general end-user. Printers supplied by mainframers only for their own systems (like the IBM 1403 or 3211, or the Xerox 1200) are not tabulated. Interactive send-receive keyboard printer terminals are also omitted, and will be covered in April's Product Update.

Bold horizontal lines within the Table delineate printers with similar speeds for ease of comparison in a specific cps or LPM, character set and columns-per-line range. The groupings also allow rough speed comparisons for serial (cps) versus line (LPM), or 80-column versus 132-column printers. Printout speed approximations are made solely on print rate with considerations of line skip or slew speeds (also important in determining throughput) excluded.

Various printer types (non-impact, impact matrix, and impact solid character) are grouped together to preserve speed continuity within the Table. The reader should note that non-impact types will not supply multi-copy printout in one pass, but are silent and can operate as plotters as well as

LINE/SERIAL-RO PRINTERS Cont'd

COMPANY & MODEL	PRINTER TYPE	PRINTOUT	FEATURES	PRICE	INO. NO.
DATA PRINTER F-132-C V-132-C	impact - solid char drum mechanism	600 LPM/64 char/132 col	pin feed 8 channel VFU 27½ ips slew line buffer	\$ 8,690	174
MOHAWK DATA SCIENCES 4340 4345	impact - solid char replaceable chain	600 LPM/64 char/132 col 420 LPM/96 char/132 col 760 LPM/48 char/132 col	pin feed 8 channel VFU 17 ips slew line buffer	\$11,250	175
SCM Kleinschmidt 7360	impact - solid char drum mechanism	600 LPM/64 char/136 col	pin feed 12 channel VFU line buffer	\$ 9,500	176
VOGUE 400 C	impact - solid char drum mechanism	600 LPM/64 char/132 col	pin feed 8 channel VFU line buffer	\$ 9,800	177
CONTROL DATA 9352-I	impact - solid char drum mechanism	670 LPM/64 char/132 col	pin feed 12 channel VFU line buffer 20 ips slew	\$12,000	178
DATA PRODUCTS 2440	impact - solid char drum mechanism	700 LPM/64 char/132 col 1800 LPM/36 char/72 col	pin feed 8 channel VFU line buffer 35 ips slew	\$14,900	179
VARIAN statos 3182	non-impact - 5x7 matrix electrostatic	1320 LPM/64 char/80 col	line buffer parallel or minicomputer-compatible interface plotting capability	\$ 8,050	180

LINE/SERIAL-RO PRINTERS Cont'd

COMPANY & MODEL	PRINTER TYPE	PRINTOUT	FEATURES	PRICE	INO. NO.
CONTROL DATA 9372-I	impact - solid char replaceable chain	1200 LPM/48 char/132 col 1500 LPM/24 char/132 col	pin feed 4 channel VFU line buffer 70 ips slew	\$28,000	181
MOHAWK DATA SCIENCES 5321	impact - solid char drum mechanism	1000 LPM/64 char/132 col 1250 LPM/48 char/132 col 625 LPM/96 char/132 col	pin feed 12 channel VFU line buffer 75 ips slew	\$20,640	182
POTTER LP6403	impact - solid char replaceable chain	1500 LPM/48 char/132 col	pin feed 12 channel VFU line buffer 75 ips slew reduced print font & forms size	—	183
LP3500	impact - solid char replaceable chain	1020 LPM/64 char/132 col 1500 LPM/48 char/132 col	pin feed 12 channel VFU line buffer 75 ips slew	—	184
CONTROL DATA 9372-II	impact - solid char replaceable chain	1600 LPM/48 char/132 col 2250 LPM/24 char/132 col	pin feed 12 channel VFU line buffer 70 ips slew	\$31,000	185
DATA PRODUCTS 2550	impact - solid char replaceable chain	1220 LPM/64 char/132 col 1550 LPM/45 char/132 col 1950 LPM/16 char/132 col	pin feed 12 channel VFU line buffer 50 ips slew	\$24,000	186
2470	impact - solid char drum mechanism	1250 LPM/64 char/132 col 1800 LPM/36 char/132 col	pin feed 8 channel VFU line buffer 35 ips slew	\$18,900	187
VARIAN Statos 3110/13	non-impact - 7x11 matrix electrostatic	1000 LPM/120 char/132 col	line buffer parallel or minicomputer-compatible interface plotting capability	\$ 8,250	188
CONTROL DATA 9372-III	impact - solid char replaceable chain	2000 LPM/48 char/132 col 3000 LPM/24 char/132 col	pin feed 12 channel VFU line buffer 90 ips slew	\$34,000	189
GOULD 5000	non-impact - 7x9 matrix electrostatic	1200 LPM/64 char/132 col 1200 LPM/96 char/132 col	line buffer parallel or minicomputer-compatible interface plotting capability	\$ 7,600	190
LITTON/Datalog MC 3000	non-impact - 5x7 matrix electrolytic	3000 LPM/64 char/80 col	—	—	191
GOULD 4800	non-impact - 5x7 matrix electrostatic	3000 LPM/64 char/132 col 3000 LPM/96 char/132 col	line buffer parallel or minicomputer-compatible interface plotting capability	\$10,900	192
LITTON/Datalog MC 8800	non-impact - solid char CRT/fibre optic	6000 LPM/64 char/88 col	—	—	193
ELECTROPRINT EP-100	non-impact - 7x11 matrix electrostatic	8000 LPM/96 char/136 col	dual line buffers 12 channel VFU 50 ips slew plotting capability	—	194
UPPSTER II	non-impact - solid char electrostatic drum	9000 LPM/96 char/160 col 9000 LPM/175 char/160 col	full page buffer page duplication under program control reduced print & forms size	\$30,000	195

printers; and that dot matrix characters produced by non-impact or impact units may not be acceptable for OCR/MCR applications or for aesthetic reasons.

The "Features" column in the Table lists only the more common bells-and-whistles printer attachments. Others might be available from the manufacturer. Pricing is given in approximate terms — one manufacturer might base a

quotation on a bare-bones printer while another cites costs for a fully equipped printer-controller unit. All of the extras listed in the "Features" column are therefore not necessarily covered by the prices quoted. Interested readers can obtain detailed price and performance information by referencing the number listed in the last column of the Table, and then using the Reader Inquiry Card. ▲

NEW PRODUCTS

MINI-TO-KEYPUNCH INTERFACE

The CP-100 interface allows punched card output using existing mini-computers and keypunches without hardware modification. The programmed I/O bus interface enables the mini to drive card punch interposers using opto-isolators. Users mount the interface in any vacant mini slot, connect the cables, and load driver software to output on punched cards. The CP-100 interface is priced at \$1,975. *Computer Equip. Corp., Rockville, Md.*

Circle No. 263 on Inquiry Card

MAG TAPE TRANSPORTS

The new MDS/Bucode OEM tape transport features a 75 to 125 ips tape speed with automatic tape threading and optional cartridge loading. Termed the Model 4010, the high-speed transport can come with format options of 200/556/800 bpi, 7-track NRZI; 800 bpi NRZI or 1600 bpi PE, 9-track; or dual-density 800/1600 bpi. An offline test capability is incorporated into the 4010, and OEM prices start at \$6,000. *Mohawk Data Sciences, Utica, N.Y.*

Circle No. 255 on Inquiry Card



FIXED DISC DRIVE

Wangco's new Series-N disc drive family provides the OEMer a choice of capacities and transfer rates. Using a single, fixed 2315/5440-like disc with a special voice-coil positioner, members of the Series-N family provide a track-to-track access time of 15 millisecond, and an average access time of 70 millisecond. Model 2212 of the line features a track density of 200 tpi, a 50 megabit capacity, and a transfer rate of 2500 KB/sec at 2400 RPM. The Series-N 1211 has a capacity of 25 megabits at 100 tpi, and a 1562 KB/sec transfer at 1500 RPM. The Model 1212 has the same capacity as a 1211, but a disc rotation speed of 2400 RPM allows a 2500 KB/sec transfer. Prices of drives in the Series-N line start at \$1,800 in OEM quantity with power supply included. *Wangco Inc., Los Angeles, Cal.*

Circle No. 251 on Inquiry Card



GRAPHICS DISPLAY SYSTEM

The graphics system employs hardware curve generation and scan conversion for 1029-line resolution curvilinear display. The system consists of a Conographic-12 full graphics CRT display terminal with 96-ASCII character gen-

eration capabilities, and a Model 639 scan conversion memory that eliminates the need for direct view storage tubes. The memory allows video display capability in high-ambient light conditions, and selective erasure facilities. Software to convert existing applications packages to routines acceptable on the Conographic system are also included. Options involve hardware for rotation and reflection, variable intensity, image windowing, separate object and picture scaling, and dot-dash lines. A variety of peripherals and computer/communications interfaces are also available. Prices start at \$12,700. *Hughes/Industrial Products Div., Oceanside, Cal.*

Circle No. 254 on Inquiry Card

CRT DISPLAY TERMINALS

Directly interchangeable with their Series 200 display hardware, Ann Arbor's new Design III CRT terminal can operate at speeds up to 9600 baud, and display a 64- or 96-character set in 40-line by 80-character formats. The Design III is available with serial or parallel interfacing in sixteen standard RO, KSR, and ASR models. Character or cursor addressable loading and burst loading types are also available. The CRT terminals are delivered plug-compatible with user equipment, and come with a built-in MOS register for storage of a full screen of data. A remote video port which supports up to ten EIA standard 525-line video monitors is also included for daisy-chained si-



multaneous local or remote viewing. Single-unit prices for a Design III begin at \$990. *Ann Arbor Terminals, Ann Arbor, Mich.*

Circle No. 252 on Inquiry Card

3M CARTRIDGE TERMINAL

The TCT 300 Tape Cartridge Terminal includes such features as character insertion, error checking and retransmission, and 16-character search capability. The terminal can operate in either local or remote mode, and can transmit at speeds of from 110 to 2400 baud. Though the transport appears as an incremental recorder to the user, the unit employs a dual 256-character buffer to obtain maximum storage density. Total formatted storage on the 3M tape cartridge is 280 Kchar. The TCT 300 is plug-compatible with most keyboard teleprinters via a standard RS-232 interface. The unit can be used in store-and-forward, paper tape replacement, program loading, and other applications where local terminal storage is required. Single-unit price ranges from \$1,780 to \$3,000. *Three Phoenix Company, Phoenix, Ariz.*

Circle No. 260 on Inquiry Card



KEY-TO-DISC DATA ENTRY SYSTEMS

The 2250/2 is the newest addition to Scan Data's 2200 Series of OCR and key data entry systems. The shared processor system employs a 16-bit CPU with up to 65K of memory which supports up to 32 ScanPlex II CRT display data entry stations. A full complement of disc, mag tape, and printer peripherals are also available. The portable key stations display 12 lines of 40 characters, and come with typewriter, standard keypunch, or keypunch/adding machine keyboard configurations. Programming of the system is accomplished by simple parameter entries and Cobol procedure statements. Software facilities allow local and remote key station users to search, update, and process data files. Data editing and validation on the 2250/2 can be applied at the field, record, and batch levels, and can be made immediately upon field entry or later. A set of almost 40 procedure language verbs provide the programmer a high degree of flexibility in implementing data processing and file management procedures on the system. The 2250/2 may also be expanded to a full mixed-media data entry system with the addition of a multifont OCR reader. Cost of an eight-station system is \$1,985/mo on a three-year lease, maintenance included. *Scan Data Corp., Norristown, Pa.*

Circle No. 250 on Inquiry Card

LED TERMINAL

Compatible with most minicomputers, the Model 735 Interactive Data Entry Terminal is available in 8-, 12-, or 16-LED (Light Emitting Diode) display configurations with a 16-key keyboard. The buffered terminal allows operator verification of data before transmission. Other features include four backlighted function indicators (four additional computer-activated indicators are also available), parallel or serial interfacing, and a multi-terminal multiplexer. *Interface Technology, St. Louis, Mo.*

Circle No. 258 on Inquiry Card

370/145 MAIN MEMORY

Latest entry in the IBM-compatible replacement/enhancement memory arena, CMI's 370/Stor 145 can expand to two megabytes the main memories of both IBM 370/145 computer models. An advanced protection system is incorporated into the 370/Stor 145s. The protection technique automatically corrects all single-bit errors, detects more complicated ones, and isolates major memory failures in a manner that permits the CPU to continue processing at almost full operating speed. The CMI add-on also acts as a back-up to IBM main memory, ensuring continued operation during failures in resident IBM memory. The 370/Stor 145 is completely transparent, interconnecting to a Model 145 CPU and accommodating all IBM hardware, software, and maintenance operations without alteration. Memory pricing — on both a direct purchase or lease basis — averages 60% to 90% of IBM-equivalent list costs. *Cambridge Memories Inc., Concord, Mass.*

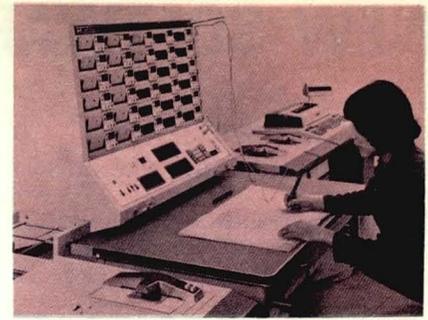
Circle No. 261 on Inquiry Card



DATA LINE MONITORS

The Series 400 Data Line Monitor displays all ASCII line information flowing between two separate EDP devices. The data may be displayed on a video monitor or on an ordinary TV set in either a 40-character by 16-line or an 80 by 16 format. When in a line mode, all data on the line is displayed, including the alphanumeric equivalents of normally transparent control signals. The 400 may also be switched to operate as a read-only terminal with control code display suppressed. Receive and/or transmit data may be displayed, individually or in combination. Both parity and framing errors are detected, and indicator lights report Data Set Ready, Terminal Ready, Carrier Detect, Clear-To-Send, and Request-To-Send status. Switch-selectable rates of 110, 150, 300, 600, 1200, and 2400 baud are standard as well as page and roll mode switches. Prices for 400 Series units start at \$1,420. *Digi-Log Systems, Horsham, Pa.*

Circle No. 256 on Inquiry Card



BUILDING/CONSTRUCTION DATA ENTRY & PROCESSING

The Hycom/Sharp Data-Tracer simplifies the process of data entry from architectural drawings, reducing the time required for cost estimations on construction work. Hand-held pen or stylus tracer devices allow input from drawings of up to 23 by 33 inches, with edge punched cards employed for the input of information on components or materials into a 30-component information selector console. Data gathering is simplified and standardized, the collected information immediately available for cost estimations by a companion billing computer. *Hycom, Santa Ana, Cal.*

Circle No. 253 on Inquiry Card

PDP-11 DRUM PLOTTER

Offered with PDP-11 plotting subroutines in addition to interface hardware, the System 3600/11 drum plotter handles 34-inch wide paper with a roll length of 120 feet. Features include plot speeds of 4.5 to 6.2 ips with a 2.5 mil accuracy, and a four-pen assembly. Plots are generated from incremental subroutines which employ a 6-bit output command to produce vectors in X and Y, and control pen up/down movement. The price of a 3600/11 is \$15,900. *Zeta Research, Lafayette, Cal.*

Circle No. 268 on Inquiry Card

SIGMA-1403 PRINTER

The Spur S1403/Sigma controller allows Sigma series computer users to employ IBM 1403 line printers with their systems. The controller comes complete with a stand-alone enclosure containing all logic, memories, and power supplies, and with mating connectors, operating instructions, and other documentation. The unit requires an XDS 7900 subcontroller (supplied by the user) which is installed in the controller enclosure by Spur. *Spur Products, Santa Monica, Cal.*

Circle No. 266 on Inquiry Card

NEW SOFTWARE & SERVICES

SURVEY EVALUATION PACKAGE

The package, called Survey Evaluation Technique (SET/II), handles statistical survey data and produces a range of customized reports and formats. SET/II consists of a generalized survey analysis program that can generate crosstabulated reports on a matrix of unlimited columns and rows; and a free-standing editing program that contains syntax and relational testing, recording, multipunch editing, arithmetic and batch features. A hole-count subsystem is also included for the simplified verification of the statistical data. All components of the package are written in BAL, and will run under OS or DOS on 360/370 systems with 65K. The survey analysis subsystem leases for \$9,000 the first year and \$900 thereafter; the editing subsystem goes for \$2,800 the first year and \$280 thereafter. Hole-count verification is available on a one-time price of \$500. *ADL Systems, Inc., Cambridge, Mass.*

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JCL PACKAGE

Docu-Gen is a JCL generator and documentation package written in ANS Cobol for IBM OS environments. A JCL generator transmittal form allows the creation of error free JCL which conforms to installation standards and maintains procedure libraries. Formatted reports on all pertinent file information for each job are provided through a documentation listing. The listing serves as a reference for the entire shop and is an aid in any maintenance work required. Each programmer who submits data thru JCL Docu-Gen receives a report verifying that the update was successful and listing the updated procedure. The package also provides facilities for generating job description reports showing all necessary file information for job setup and run operations. A system flowchart and tape labels can also be produced. The JCL Docu-Gen package is priced at \$1,000. *Compumail, Los Angeles, Cal.*

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NOVA RDOS/LINC PACKAGE

The package supports CO's Linc Tape direct access mass memory under Data General RDOS Rev. 2. Up to 59 different RDOS files may be the output to a single reel of Linc tape, and five file directories are maintained per reel. All file attributes and names are reflected in the directory. The tape contains up to 336 Kbytes in blocks of 512, with a transfer rate of 8400 bytes/sec. The system software is supplied free of charge to new Nova/Linc Tape system buyers, and at \$25 for current users. *Computer Operations, Beltsville, Md.*

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SYSTEM/370 SIMULATOR

The Simulator allows an IBM System/360 to execute programs originally written for the 370. Full simulation is provided for CLCL, CLM, ICM, MVCL, SRP, and STCM; STCK is simulated as a non-functioning clock. The simulator receives control from the hardware on program interruptions by a PSW switch. Operation and specification exceptions are interrogated to determine if they are caused by S/370 instructions or byte alignment. If so, the requested instruction is performed and control returned via hardware LPSW. If the program check reflects other conditions, control is given transparently to the resident OS Program Check Interrupt Handler. The simulator is incorporated into the user's OS or DOS by means of a single link edit. One-time non-exclusive, non-transferable license fee for the System/370 simulator is \$750. No liability is assumed, except that the simulator may be returned within 30 days if it fails to perform as specified. *MHT Services, Jersey City, N.J.*

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VS PACKAGE

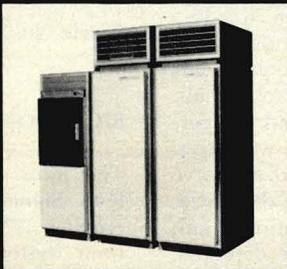
Grasp/VS is designed as an alternative to DOS/VS. The package runs in virtual storage, not real, and requires less than one-half the core of Power, IBM's spooling package. Buffer allocation via an algorithm reduces paging to a statistical minimum, and the real core saved by replacing Power with Grasp/VS results in an immediate improvement in performance, more core available in the page pool. Other features include Job Accounting routines which allow internal or external billing, and provide reports which monitor paging activity and system capacity. *Software Design, Inc., Burlingame, Cal.*

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NEW LITERATURE

TAPE TRANSPORTS & SYSTEMS

A short form catalog gives the basic details on Digi-Data's family of mag tape transports, formatters, tape couplers, and minicomputer-compatible interfaces. *Digi-Data, Bladensburg, Md.*

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REPORT MEDIA

How forms media can be used to enhance printout, making it more readable, more economical and aesthetically more impressive, is the subject of a new brochure. *Moore Business Forms, Niagra Falls, N.Y.*

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COMPUTER GRAPHICS

A "quick-flip" booklet illustrates graphics generated by computers using the GSC orthographic software system. *GraphAmeric Systems, Chicago, Ill.*

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PRINTER/PLOTTERS

Pictures with or without words, or words w/wo pictures, are possible with Versatec's family of Matrix plotters and printer/plotters, described in a 12-page brochure. Specs, software, computer-compatible controllers, and off-line print/plot units are all covered, along with plotting samples and a discussion on how the Matrix works. *Versatec, Cupertino, Cal.*

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OEM CORE MEMORY

Searching for ready-to-use core memory subsystems for your absent-minded processor? Request a copy of a new brochure on the Sentinel Series of memories. These modular subsystems offer full cycle access times of 650 to 750 nanosec, 18 to 72 bit word sizes, and 4K to 256K capacities at prices below the 1¢ per bit level. *Lockheed Electronics/Data Products Div., Los Angeles, Cal.*

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FACILITIES MANAGEMENT

Send for Software International's booklet on computer facilities management before your corporate ship-of-state founders on 4th-generation shoals. Their capabilities and experience in EDP installation management and application implementation are briefly outlined. *Software International Corp., Andover, Mass.*

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MEGAMINI

Learn what has a 32-bit word size, up to sixteen million bytes of directly addressable memory, and a price starting at under \$10K by reading a new bulletin on the Interdata Model 7/32 processor. *Interdata, Oceanport, N.J.*

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SEISMIC ANALYSIS SYSTEM

Just in time for the energy crisis, this booklet details the features of SEL's Seismic Data Processing Systems for the black gold prospector. *Systems Engineering Labs, Ft Lauderdale, Fla.*

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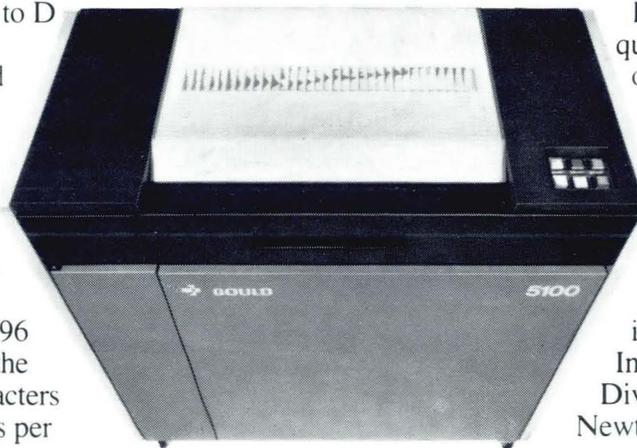
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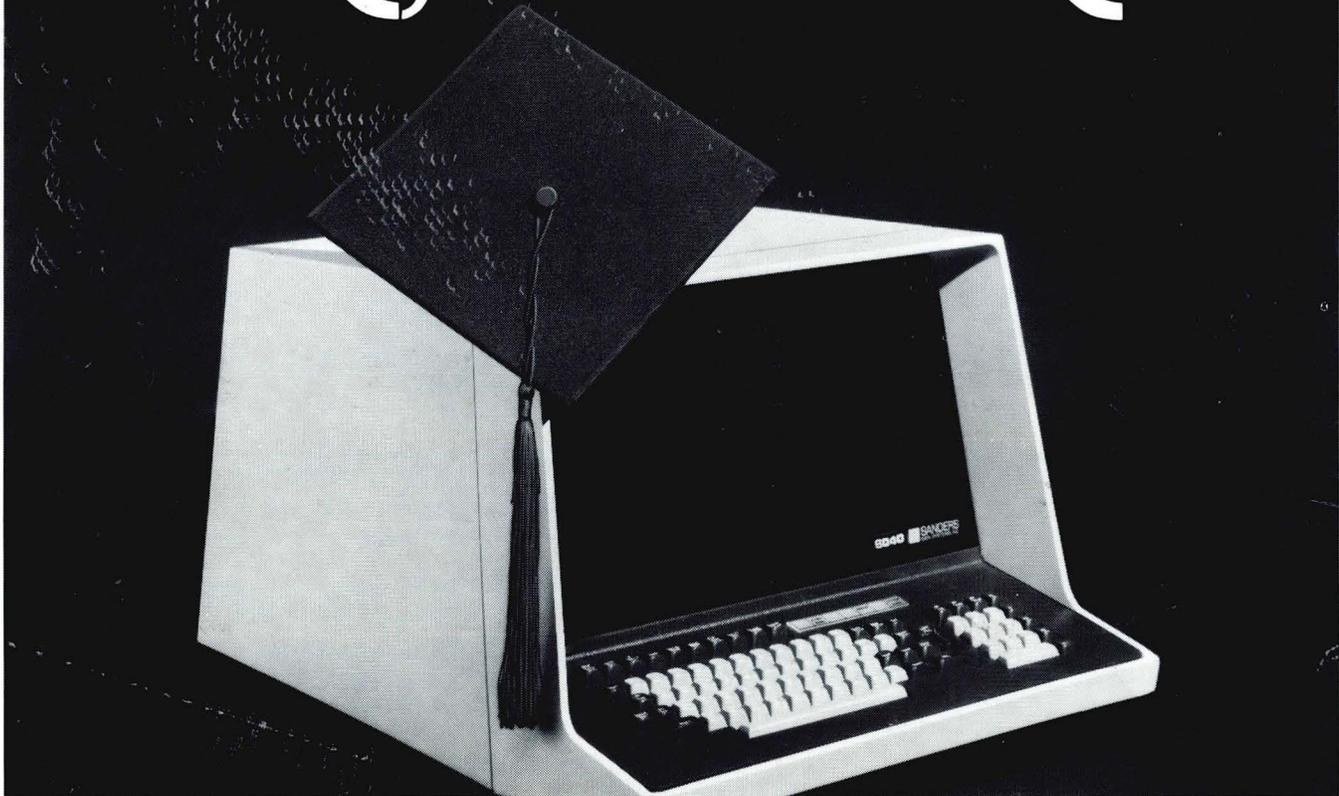
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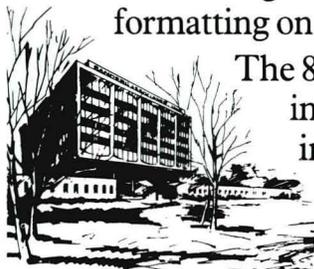
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