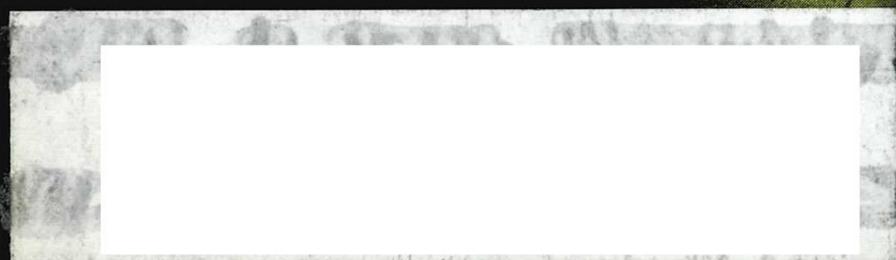


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The new Codex Bipler is just one new way Codex is changing the face of the communications world. And products are just the starting point - our people can integrate your whole communications system. In short, Codex offers total systems capabilities: concept, equipment and people.

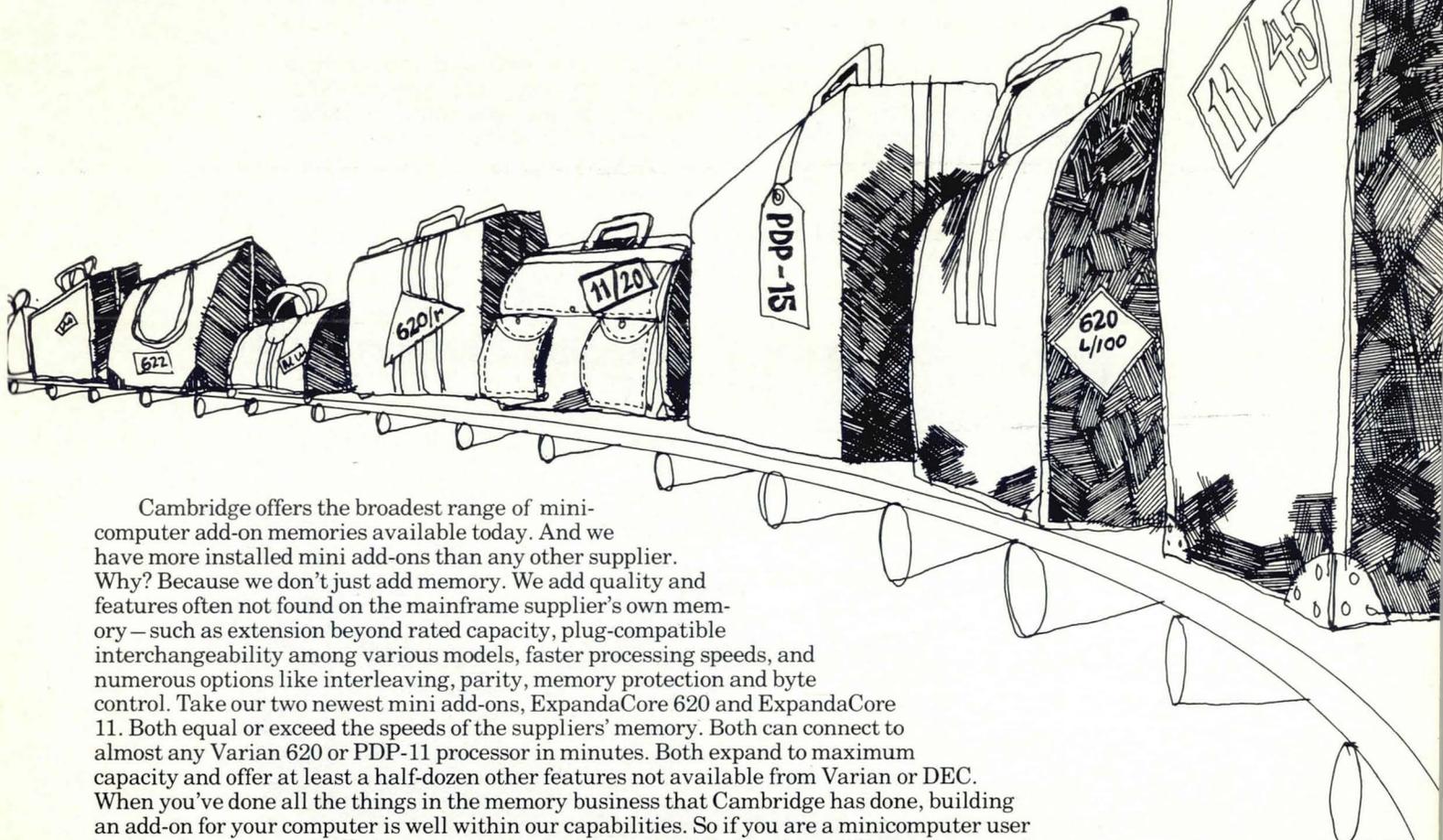
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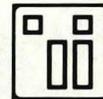
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CIRCLE NO. 3 ON INQUIRY CARD

56 PRODUCT PROFILE



PLUG-COMPATIBLES

Part I — Communications Equipment

This month's Profile, the first of a two-part series on plug-compatible hardware, explores data communications terminals and systems that act as replacements and enhancements for IBM and other mainframe manufacturer equipment. Included are equivalents to 2260/3270-type CRT terminals, 2780/3780-type batch-conversational and RJE terminals, and 270X/370X front-end communications processors. Next month's Profile will cover add-on memory, disc, tape, and line printer compatibles.

FEATURES

32 CRYSTAL-BALLING THE LOW-COST DATA RECORDING INDUSTRY

A market research firm predicts a bright future for cassette, cartridge, and floppy disc devices.

68 THE CASE OF THE MISSIONARY UNMASKER

"... it may well be doubted whether human ingenuity can construct an enigma . . . which human ingenuity may not . . . resolve."

70 THE NEW YORK TIMES INFORMATION BANK

A computerized clipping service that will reach back to the beginning of the century — and it won't turn yellow.

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A SUMMARY OF RECENT DATA COMMUNICATIONS PRODUCTS, SERVICES, AND EVENTS.

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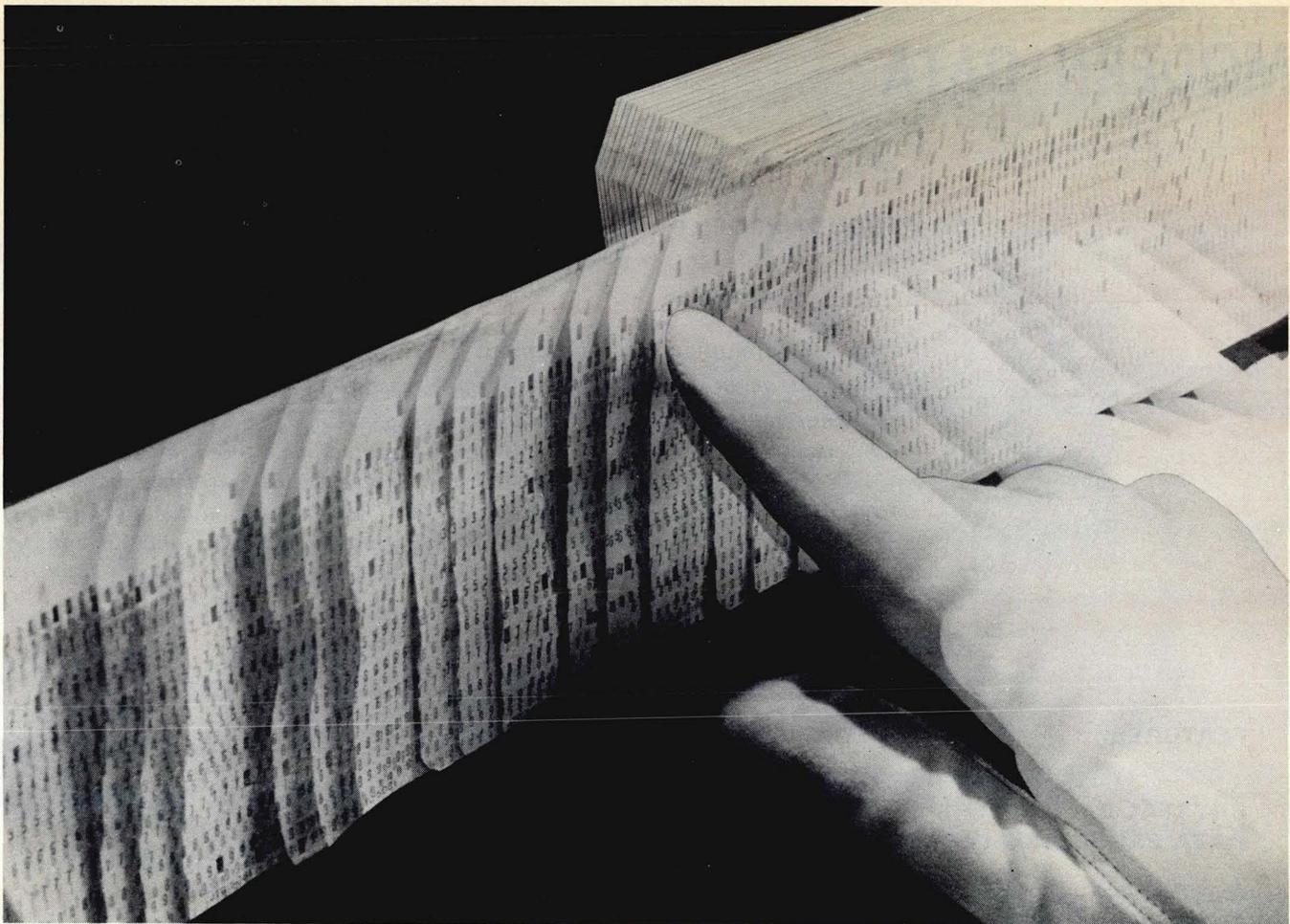
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SUBSCRIPTION AND READER INQUIRY CARD.....OPPOSITE PAGE 80



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

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

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

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

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

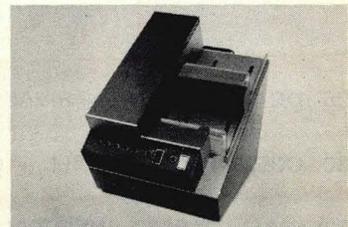
So while you get new freedom from the jam-ups caused by cards that stick together, cards that catch in the throat, cards that buckle and tear, you also get greater accuracy in data transfer. Our fiber-optics light-distribution system channels the light of a single bulb uniformly to all parts of the card.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

Though our finger picks cards with great precision,

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

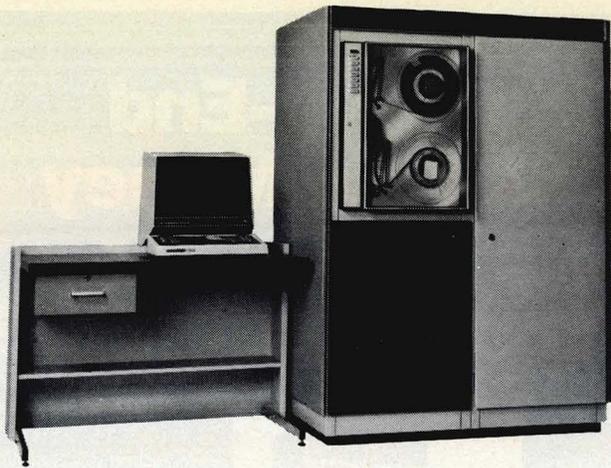
If three hundred cards a minute won't satisfy your CPU, then we have a reader that flicks through 600 a minute and an optical reader that can tell a pencil mark from a smudge without batting an eyelash. There's a vacuum finger on each of these machines.

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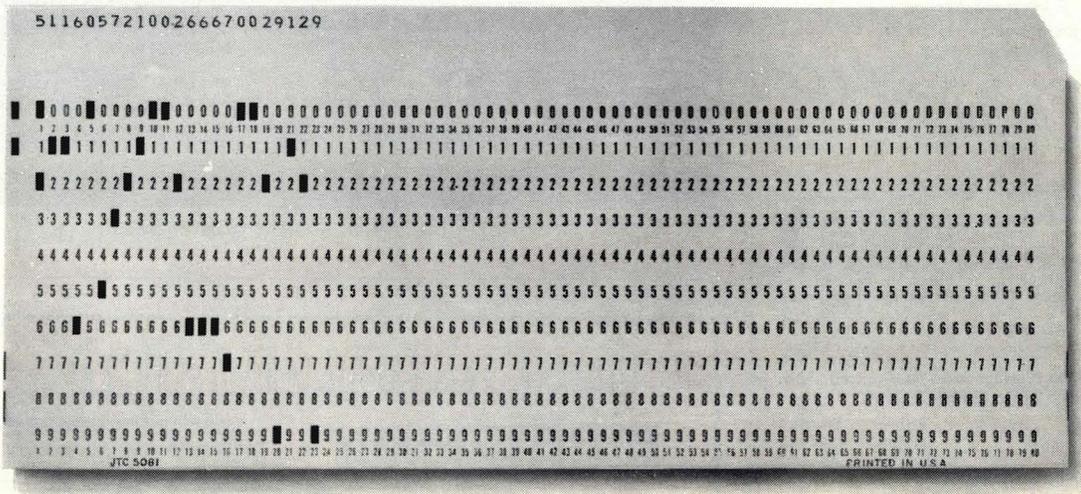


We're not about to predict the end of punchcards. But we would like to offer an alternative. A data entry system that is superior to punchcards in many ways and can be expanded in ways punch operations can't be.

We're talking about our new IS/1511 key-to-disk data entry system. For data entry it's superior to punchcards because it offers substantial error reduction. There are a total of four warning devices. And errors are so much easier to find and correct on a big screen than on a little punchcard. The IS/1511 data entry station is designed to make the operator as comfortably efficient as possible. Which results in increased operator speed. Naturally, the IS/1511 eliminates cards and card handling. It also makes for greater throughput and better formatting on input and output.

But the IS/1511 isn't just *better* than punchcards. It's

A punchcard is only a punchcard,



different. Its controller is a small computer with a big capacity. So when you want the IS/1511 to take on a new task, you just have it reprogrammed.

And it offers modular expandability thanks to a communications port that permits data transmission at speeds from 1200 to 9600 baud. So you can move data directly from a remote terminal to the central processor. Or to another terminal linked into a data communications system. That means your IS/1511 can become a shared processor, a remote batch processor, a distributed data base manager, a distributed processing system, or a whole data communications system. Which makes it a lot more than a punchcard operation can ever be.

It's nice to know the IS/1511 is so versatile. It's even nicer to know that it's backed up by a service organization that has 96 locations all across the country. No matter

where you are, you're not very far from help if you need it.

The IS/1511 can be almost anything you want it to be. And GTE Information Systems can provide you with almost anything you want when it comes to data communications equipment: modems, multiplexers, video and typewriter terminals, front-ends, even programming.

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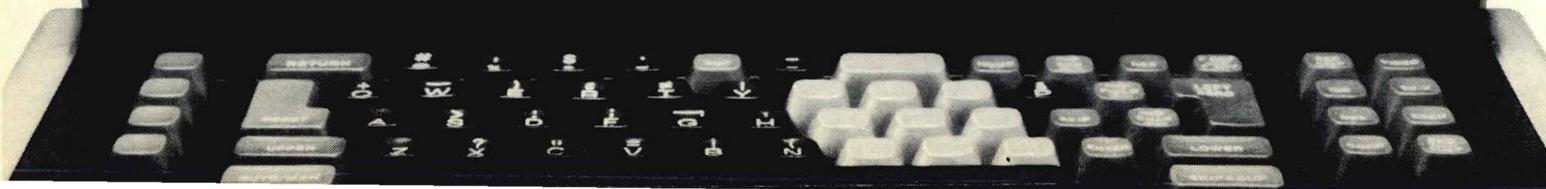
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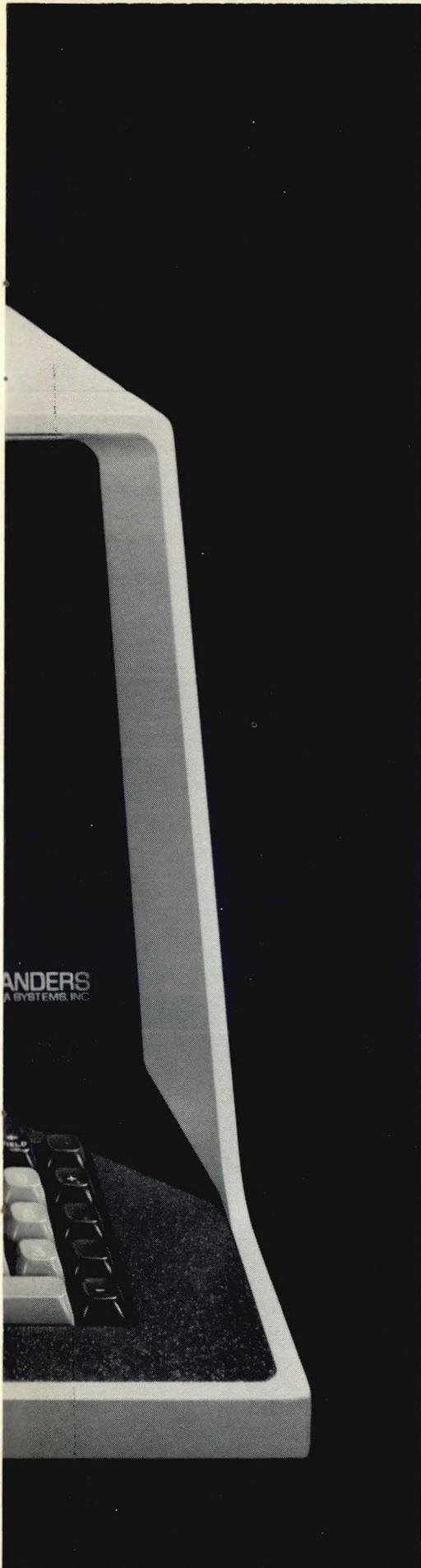
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Meet the intelligent answer to the 3270.

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Sanders' 8170 Intelligent Terminal System.

Its intelligence supports all the standard, remote IBM-3270 terminal controls and provides all the remote 3270 functional capabilities with the extra bonus of local printer control and local, programmable data validation features. And Sanders' 8170 system will cost you less money than the 3270.

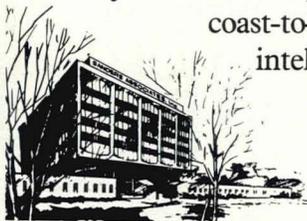
Sanders has unequalled terminal industry experience. The 8170 system is another addition to a long-established intelligent terminal line and other terminal systems products that go back to the beginnings of business terminal systems. Sanders intelligent terminals are production proven and user proven.

If you're thinking 3270, look into the lower-priced, more-versatile 8170 system. Reliable products, experience, software support and a coast-to-coast maintenance network make Sanders the

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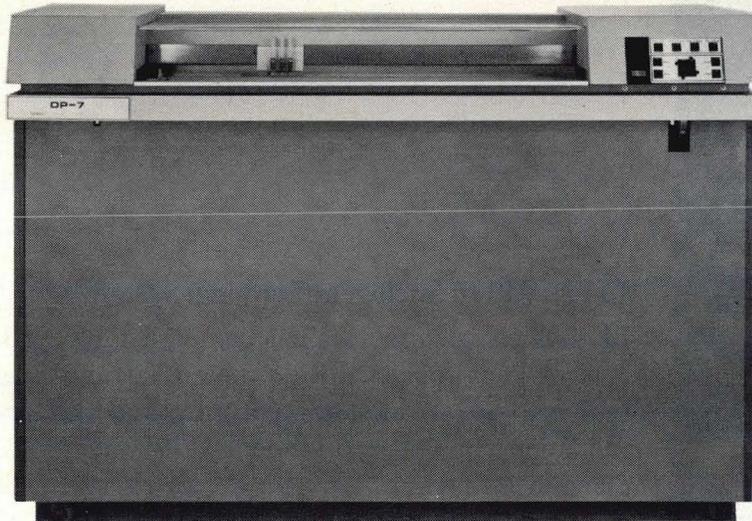
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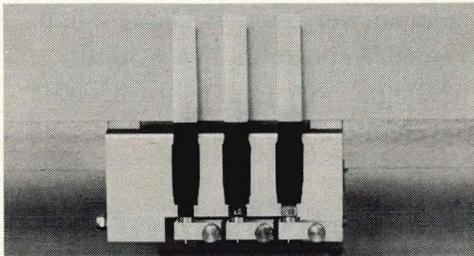


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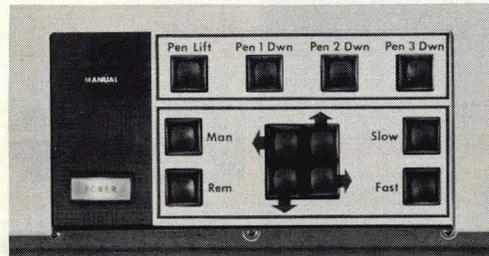
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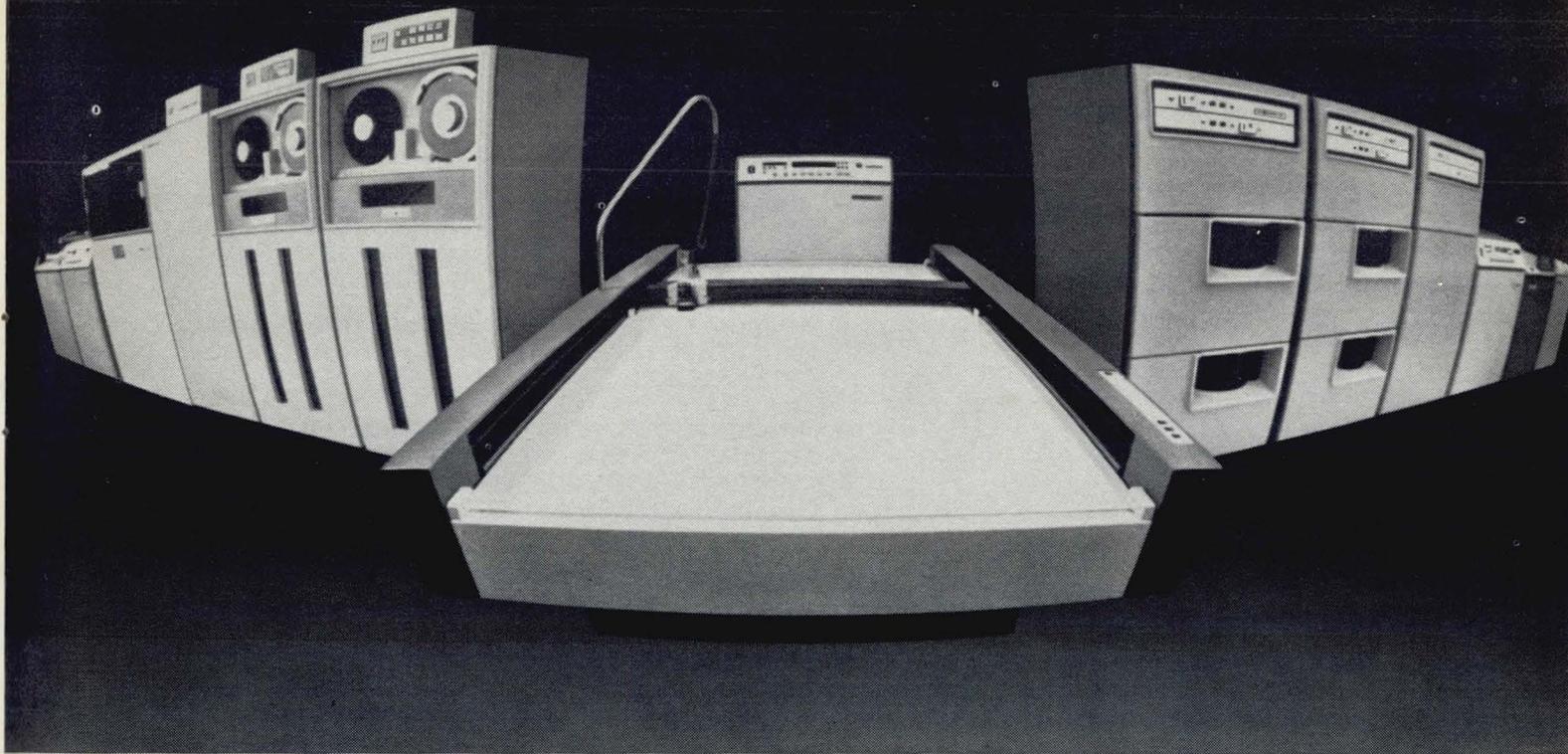
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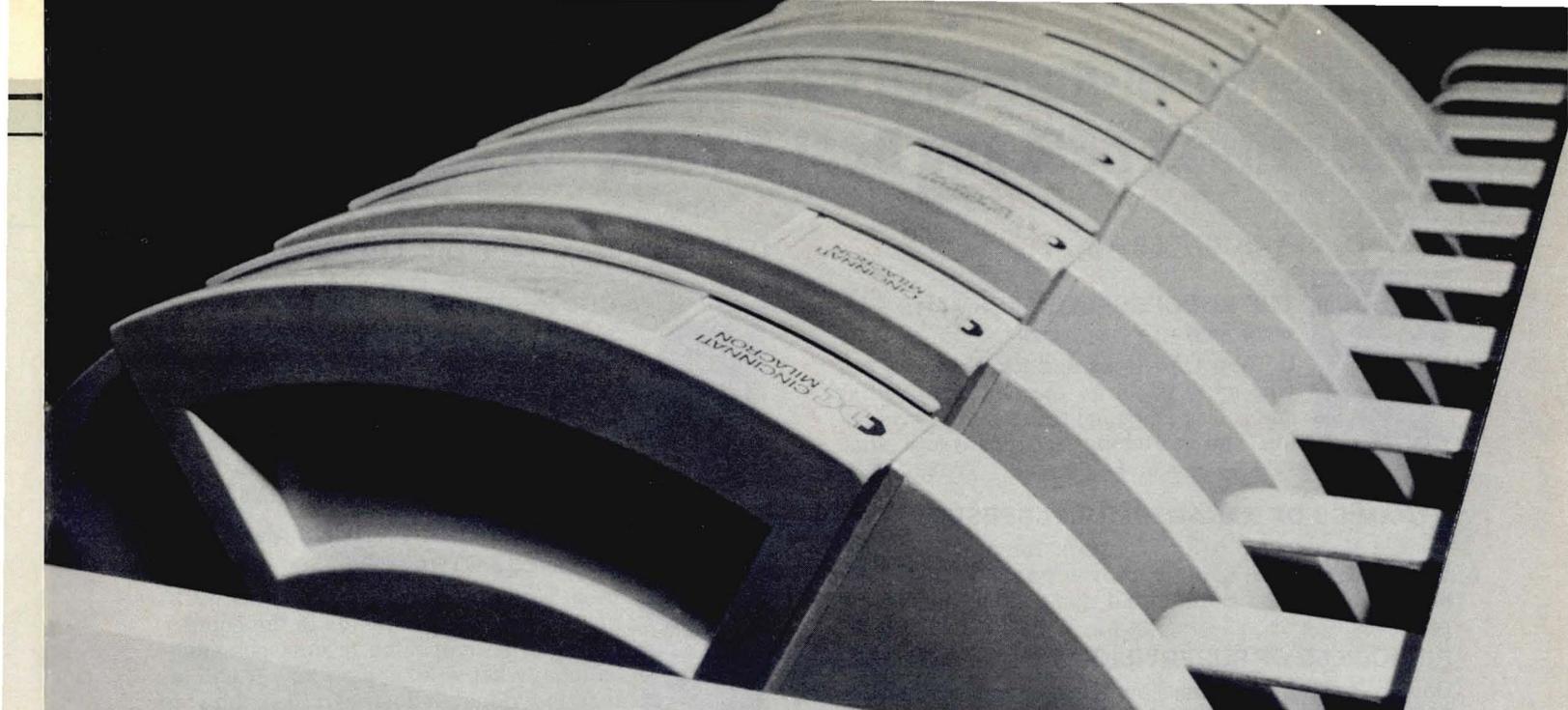
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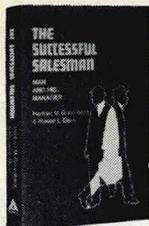
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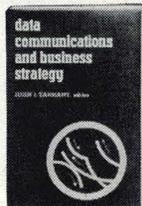
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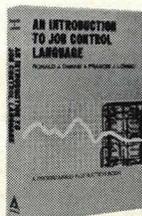


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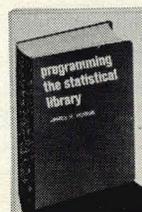
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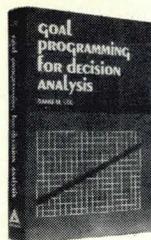
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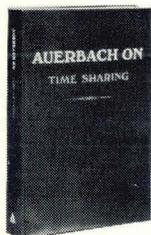
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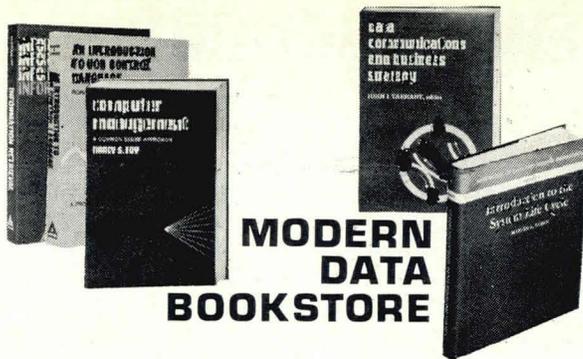
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MODERN DATA BOOKSTORE

BOOK REVIEWS

INFORMATION SYSTEMS TECHNOLOGY IN STATE GOVERNMENT, 1973 EDITION. Approximately 150 pages including appendices. Available for \$7.50 from: *NASIS Secretary, Council of State Governments, Iron Works Pike, Lexington, Ky. 40505*

This status report on state information systems activities results from a 1972 survey conducted by the National Association for State Information Systems. This was NASIS' third such survey and the first to include data from all fifty states. The report contains observations on coordination and control, computer inventory, personnel, training, difficulties experienced in EDP management, formalized plans and documentation, state-local information systems relationships, applications and funding. Extensive tables list the hardware (including terminals) and software used by each state agency and educational institution for each application. In short, the report is an essential marketing tool for any EDP manufacturing or service firm with an interest in the government sector. And for those directly involved in government EDP planning, it is just plain essential. — A.R.K.

A STUDENT'S GUIDE TO FLOWCHARTING by Thomas F. McInerney and Andre J. Vallee. 136 pages. Prentice-Hall, Inc., Englewood Cliffs, N.J. \$9.95.

This little book is a mite too basic even for a programmed text. Add to this that one-third of each page is used for the frame answers and one-fourth of the remainder is used for unnecessary repetition and borders, and you have a very little (and expensive) book indeed. On the plus side, the material is unusually comprehensive and clear distinctions are made between the various levels of flowcharts. Also, the information density as well as the authors' sense of humor get better toward the end.

If one puts aside the questions of whether: 1) a complete book on flowcharting is really necessary (sufficient information is contained in any good programming text or in guides available from manufacturers), 2) the programmed approach is desirable, and 3) the book's price is unusually high, *A Student's Guide to Flowcharting* is about as good a book on the subject as might be expected. — A.R.K.

NEWS ROUNDUP

SOFTWARE PARLAY

Early this year International Computer Programs published a list of 60 proprietary software products which had exceeded a million dollars in sales. In July, Datapro Research Corp. published a list of 17 packages selected by survey respondents as providing "outstanding performance." The following eight programs appeared on *both* of those lists: **Amigos** (Comress, Inc.), **Dump/Restore/Copy** (Westinghouse Tele-Computer Systems Corp.), **DUO 360/370** (renamed **UCC TWO**, University Computing Co.), **Grasp** (Software Design, Inc.), **The Librarian** (Applied Data Research, Inc.), **Panvalet** (Pansophic Systems, Inc.), **Score** (Programming Methods, Inc.), and **Total** (Cincom Systems, Inc.).

TOGETHER AGAIN

J. Presper Eckert and John W. Mauchly, co-inventors of ENIAC, the world's first all-electronic digital computer, are together again at Sperry Univac. Dr. Mauchly recently accepted a consulting position with Univac, where Dr. Eckert is vice president.

The pair collaborated in the Forties to develop ENIAC at the University of Pennsylvania for Army Ordnance. In 1947, they founded the Eckert-Mauchly Computer Corp., which was acquired by Remington Rand (now Sperry Rand) in 1950. Mauchly resigned in 1959 to form Mauchly Associates.

SUMMER SPECIALS

Mid-summer is not usually a time for making major product-line announcements, but this year a number of mainframe manufacturers have done just that. A sampling of highlights:

IBM

System/3, Model 15 — the third and largest capacity (up to 131 Kbytes of main memory; 91.7 megabytes of disc) model in the S/3 series, and the first in the series to be multiprogrammable.

An approximately 2X increase in "real" storage capacity for the S/370 Models 115, 125, and 135.

Double-capacity 3330/3333 disc storage subsystems. (From 100 megabytes to 200 megabytes per 3336 disc pack.)

BURROUGHS

The B1728, a new top-of-the-line model in the B1700 series with more than twice the memory capacity of the next-largest B1726 model.

CONTROL DATA

System 17, a series of g-p mini-systems fully supported with peripherals and application packages, and with purchase prices starting under \$14,000.

WELL, THERE GOES THE NEIGHBORHOOD

Digital Equipment Corp. has agreed to purchase the uncompleted manufacturing and office site in Marlboro, Mass., vacated by RCA when it terminated its commercial computer division. DEC "intends to use the property as an extension of its existing facilities," but has not yet revealed for what purpose. The new plant is adjacent to the headquarters of arch-competitor Data General Corp. and only a short distance from the offices of MODERN DATA.

MEMOREX-SINGER TALKS END

The financial lifeline that the Singer Co. held out to Memorex has been withdrawn. The cash-starved peripherals, *nee*-mainframe manufacturer was unable to conclude an agreement with Singer that would have supplied it with \$15-million — an amount which, together with some dollar juggling and debt conversion, would have given it a new hold on life. While there's still a chance that another equity source might be found, it is more likely that Memorex will be unable to meet current financial obligations. In July, Memorex stock was suspended from trading by the NYSE (delisting is imminent), and Bank of America, Memorex' largest creditor (over \$125-million invested), confirmed it would not supply additional funds beyond some short-term operating expenses. The Santa Clara firm faces approximately \$50-million principal amount of debt due this year and potential writeoffs of up to \$85-million. On Dec. 31, Memorex had a stated net worth of \$32.2-million. To its credit, however, the firm announced that all its rented MRX mainframes could be returned without penalty, and that it would fulfill all obligations for MRX systems remaining in use.

BITS & BYTES

Sider and Associates, a software firm located in Canoga Park, Cal., has a very effective way to locate any bugs that might still remain in a newly-released package. The firm offers \$10.00 to any programmer who informs it of a bug "of any kind" in one of its products.

A tool for viewing signals recorded on magnetic tape has been made available by 3M Company. The Plastiform magnetic viewer is a 1-7/8-inch-diameter, clear acrylic disc filled with ferrous oxide particles in solution. When the disc is placed on a magnetic tape the particles align themselves in the direction of the field.

The State of California maintains a databank of missing bicycles as well as missing cars. Last year more than 142,000 bicycles were reported lost or stolen in the state.

National Cash Register now offers 3- and 5-year extended term rental contracts on NCR Century 50 systems based on less than 100 hours of usage. The arrangement was designed to appeal particularly to first-time computer users.

Attention former RCA Computer Division employees! Ed Cunningham, P.O. Box 844, Palatine, Ill. 60067, is compiling an "Alumni Locator." If you don't qualify for disaster relief, you may at least get the chance to march in a parade.

Which company gives you the software and systems support to see the job through?

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CIRCLE NO. 13 ON INQUIRY CARD

INTERNATIONAL NEWS

EUROCOMPUTER FIRM SHAPING UP SLOWLY

While the British ICL company is expected to go it alone for the near future — its marketing tieup with Nixdorf being considered a negligible development effective only in the UK with the British Nixdorf marketing subsidiary — the collaboration of Siemens of Germany, CII of France, and Philips of Holland is slowly but surely moving towards some practical results. The three companies are expected to form a jointly-owned firm which will buy computers from each of the parents and market the equipment under a new "Eurocomputer" logo. It is also expected that the new firm will allow other European manufacturers to join it at a later date. This ought to give ICL some added feeling of security in case its present efforts to make it on its own do not produce the required results.

ICL GETS CONTINUING GOVERNMENT SUPPORT

It is now becoming apparent that when Burroughs talked about acquiring a controlling interest in ICL a year ago, it had been asked to take a stake in ICL in order to help ICL launch its new small business systems. ICL needed about \$250-million for the whole program over a period of five years, and the deal with Burroughs would have remedied an acute shortage of cash and marketing savvy. But when Burroughs insisted on more than 50% of the action, the British Government vetoed the deal and put up an initial \$35-million itself. Now an additional \$50-million is expected to be made available to ICL by the government, which may indicate that Great Britain will continue to make a bid to retain a respectable share of the worldwide computer market for some time to come.

NCR JOINS MULTINATIONAL DATA

National Cash Register has joined with Control Data, International Computers Ltd. of Great Britain, and Compagnie Internationale pour l'Informatique of France as an equal partner in Multinational Data S.A. Multinational Data is the Belgian-based joint study company which was formed in May, 1971, to develop common EDP standards aimed at facilitating the development of internationally compatible products.

POOR WESTERN SHOWING AT LEIPZIG FAIR

East European comments now beginning to appear in the trade and professional press indicate that many Western computer manufacturers were missed during the Leipzig Trade Fair this spring. Particularly noticeable was the lack of Western exhibitors showing medium and large general-purpose computers. Those manufacturers who did participate limited their exhibits to small specialized systems designed mostly for process control applications. Other exhibitors from the West showed single units of peripheral equipment or data collection devices.

QUICKLY AROUND THE WORLD

THAILAND — The U.S. Dept. of Commerce will sponsor an exhibit of automated industrial and office equipment in Bangkok, November 26-30. For information, contact DoC's Washington office (202/967-5546) and ask for details on "Techspo '73."

JAPAN — Matsushita Electric Trading Co., Ltd. announced an agreement with Applied Digital Data Systems Inc. of Hauppauge, N.Y., for the distribution of ADDS products in Japan. The two-year agreement covers the entire ADDS product line of desktop, portable, and rack-mountable video display terminals.

What Hath Babbage Wrought

RECEIVES STORY FROM THE ARABIAN NUTS

A recent letter warned me of the "paperwork trap." After some explanation it went on to say that "Our job as Word Processing Consultants, specializing in economical handling of paperwork and clerical productivity, is to help you select the best equipment . . . , design procedures for greatest efficiency, and insure the best dollar value. . . . We are confident we can answer your questions about word processing productivity, . . . even if you're not sure what your questions should be."

I know the question. I've heard of ethnic appeals, but, since I'm not of Arabic descent, why was the letter sent to "El Shanok"!

Submitted by:
Larry Shanok
Joppa, Md.

GI-GO MACHINE

(With apologies to Shakespeare)

Bubble, bubble, toil and trouble,
Punch the cards and sort them double!
Print the former, dump the latter;
(Never mind the subject matter.)

Data isn't verified?

Courage! Don't be terrified.

Make the printout twice as long;

They'll accept it, right or wrong.

Data historical:

Trash analytical.

Language rhetorical:

Garbage political.

Round the big computer go,

Every second costs us dough!

Anne Bacon Soulé
Los Angeles, Cal.

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



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CIRCLE NO. 14 ON INQUIRY CARD

ORDERS AND INSTALLATIONS

Orange County, Cal., announced it has become the first county in the nation to engage an outside firm to supply all of its data processing needs. County supervisors awarded Computer Sciences Corp. a seven-year, \$26-million contract to manage the county's data processing center and develop new applications. CSC's bid was 30 percent less than the projected \$37.8-million cost of maintaining county management of its center over the seven-year period.

Using a combination of microwave and telephone data transmission, a nationwide on-line computer network is being installed for the Korea Exchange Bank by National Cash Register. The network, which is the first of its kind in Korea, will link NCR "42" data terminals located in 16 branch banks with an NCR Century 200 at the bank's headquarters in Seoul.

Daconics (Sunnyvale, Cal.) has received an award from the Dept. of Commerce to provide an additional 36 minicomputer systems for use at National Weather Service stations. The award brings the total to 98 systems currently ordered with an option for 16 additional systems for use by the U.S. Air Force. Contract value now exceeds \$1.7-million.

The U.S. Naval Weapons Center, China Lake, Cal., has placed an order with Electronic Associates, Inc. for \$1.4-million worth of analog and digital computer systems. The EAI computers are expected to be used in developing AGILE, a new air-to-air defensive missile.

J.W. Mays, Inc. has selected Singer Business Machines to supply a retail information system to its seven department stores in the Greater New York region. The \$2.75-million purchase contract calls for delivery of 800 MDTs electronic point-of-sale terminals and eight System Ten computers over an 18-month period.

Data Systems Analysts, Inc. (Pennsauken, N.J.) has been awarded a \$400,000 contract by Philco-Ford to provide technical and software support in the design of an Electronic Voice System for use by the Federal Aviation Administration in air traffic control.

The Environmental Protection Agency has awarded a five-year, \$4.8-million hardware, software, and maintenance contract to Sperry Univac for a Univac 1110 system to be installed at EPA's computer facility in Research Triangle Park, N.C.

After three years of experience with electronic editing in New York, Washington, and Chicago, United Press International is extending the process to all 100 of its domestic news bureaus. The wire service has placed a \$2,831,400 order with Harris-Intertype for 50 video display terminals and 200 video typewriters to be installed across the country next year.

Brendle's Inc., a leading North Carolina retail firm, is converting its four stores to electronic point-of-sale equipment supplied by NCR. The \$400,000 system will include NCR 280 retail data terminals, data wands, data collectors, a merchandise tag printer, and an NCR Century 101 computer.

PRC Information Sciences, a Planning Research Corporation company, has been awarded a \$1.3-million, three-year contract for continued development of computer software for automated message processing and distribution systems of the U.S. Navy.

Burroughs Corp. has received an order from Computer Management Group Ltd. in Great Britain for five systems valued at \$4.3-million. CMG, the largest independent computer service organization in Europe, ordered two B4700s, two B1700s, and one B2700.

The Bell System's Dataphone 4800 Service for private-line networks is designed to transmit data at 4800 b.p.s.—economically.

First, the charge for the service itself is low.

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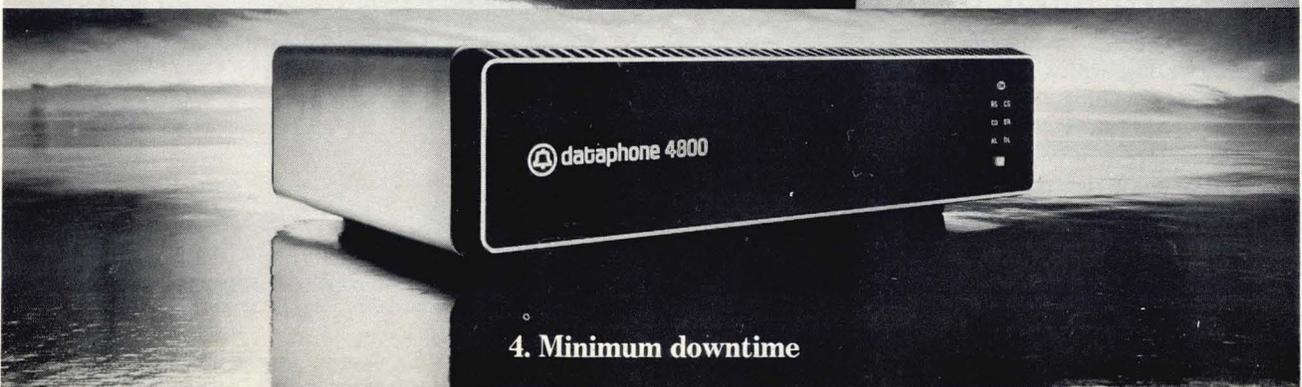
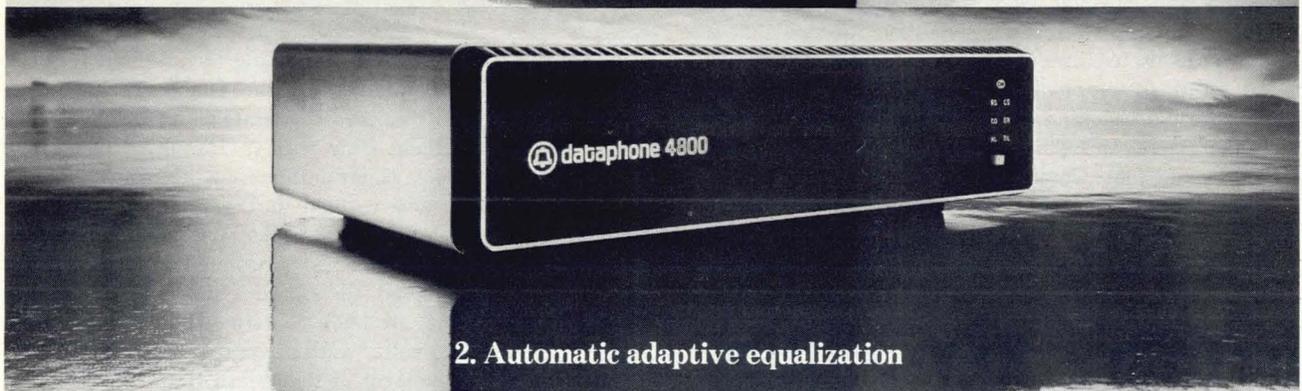
Fourth, in addition to our local maintenance forces, the Bell System's Data Technical Support Team stands behind all our Dataphone service. The Team's collective expertise analyzes and corrects malfunctions quickly, and minimizes your cost of downtime.

At AT&T and your Bell Company, we know you want good data service at moderate cost.

We hear you.



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D C DATASCAN

Alan Drattell, Washington Editor

MODEL: Scientists at the University of Wisconsin have built a computer model of a lake basin ecosystem that helps environmentalists predict what happens when the delicate balance of nature is upset. The model will be used to study several lakes, including New York's Lake George and Lake Skadar in Yugoslavia. Its usefulness has been checked by comparing its predictions with data obtained from Wisconsin's Lake Wingra basin, hence the project has become known as the Lake Wingra Model. It is funded by the National Science Foundation.

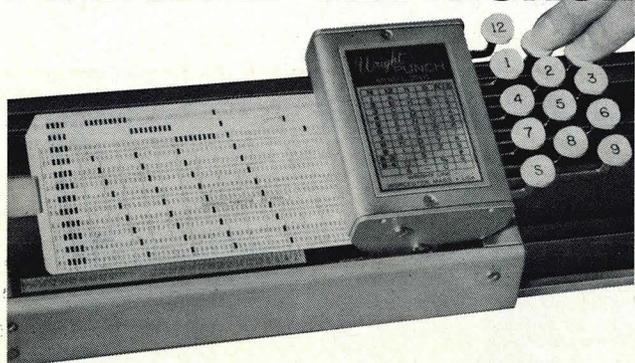
SENATE INFORMATION SYSTEM: A system of communication terminals is being pilot-tested in the Senate to determine the practicality of supplementing the Congressional Record with a running summary account of the day's events while the Senate is in session. The expected benefit is to allow Senators who must be away from the Senate Floor to keep informed simply by reading summaries printed out at 15-minute intervals by terminals in their offices. Thirty-two EDT 300 terminals supplied by Western Union Data Services comprise the system: 22 have been located in the Senate; 6 in the House; and 4 in the Capitol. The test is being conducted by the Joint Committee on Congressional Operations under the chairmanship of Senator Lee Metcalf of Montana.

FEDERAL CATALOG PROGRAM: The General Accounting Office has found that some government organizations are not participating fully in the Federal catalog program established in 1949 to correct the proliferation in the Fed of inventory identification systems. Some groups, GAO found, are failing to use Federal stock numbers (FSNs) in favor of their own systems. In addition, GAO found that there are about 200,000 unnecessary FSNs in the Federal catalog (at an estimated file cost of about \$25.00 each), and perhaps another 100,000 which could also be identified and eliminated if additional catalog data were obtained. The watchdog agency suggested that the Secretary of Defense and the Administrator of general services find out which organizations are not using FSNs and take "coordinated action to delete unnecessary FSNs from the catalog." DoD has already initiated a computer program to identify all manufacturers' part numbers that refer to more than one FSN.

ULTIMATE DATA BANK: According to Sen. Sam J. Ervin, Jr., (D-N.C.), it's maintained by the Office of Emergency Preparedness. Ervin disclosed the existence of the bank during a lecture at Miami University in Hamilton, Ohio. The bank, which contains secret information accessible only to the White House, came to light during a survey of the Fed to determine how many data banks contained information about private citizens. Ervin's Subcommittee on Constitutional Rights conducted the survey, and OEP's response brought to light that its bank contains data on some 5,000 individuals and that only "authorized specialists in the Personnel Operations element of the White House staff" utilize it and keep it current.

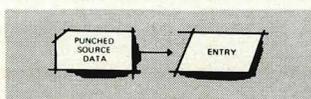
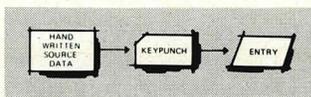
PUBLIC SERVICES: Thanks to a \$4-million-plus grant from the National Science Foundation, Public Technology Inc. (PTI) will seek to establish and test an experimental system designed to accelerate the application of new technology to public services at the local government level. The system will involve a network of 27 cities and counties which will be used as test sites to learn how better technological ties can be created between municipal governments and local industries, universities, Federal laboratories, and non-profit research institutions. PTI, a non-profit group created by local government associations and headquartered in Washington, D.C., has called the project the Urban Technology System.

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CIRCLE NO. 15 ON INQUIRY CARD

IN BRIEF

The World Bank has made a third loan — this one \$32.5-million — for the expansion and improvement of telecommunications services in the East African countries of Kenya, Tanzania, and Uganda.

Personnel changes at the General Services Administration: Dwight Ink becomes deputy administrator; H.S. Trimmer to associate administrator for Federal management policy; M. Shy Meeker succeeds Trimmer as commissioner of automated data and telecommunications service; and Ronald E. Zechman to deputy associate administrator for Federal management policy.

PRIVACY AND POLICY

A Government advisory committee completes its report on "Records, Computers, and the Rights of Citizens"

Alan Drattel, Washington Editor

Two years ago, two noted government officials held a discussion during hearings being held by the Senate Subcommittee on Constitutional Rights to probe "Federal Data Banks, Computers, and the Bill of Rights." Out of the talks between Subcommittee Chairman Sen. Sam J. Ervin Jr. (D-N.C.) and the then Secretary of Health, Education, and Welfare Elliot Richardson came a 24-member HEW Advisory Committee on Automated Personal Data Systems. The members of the committee were drawn from law, government, and computer sciences as well as the general public. It was headed by Willis H. Ware of the Rand Corp.

In July, after a year's meetings and study, the committee published its report, "Records, Computers, and the Rights of Citizens." A key contribution of that report, according to Richardson, who is now Attorney General, "is its insistence that the challenges raised by computer-based personal data record keeping should be examined broadly as important issues of social policy rather than as narrowly conceived questions of record-keeping technique and imaginative system design."

Essentially, the report calls for restraints on the operation of computer data banks containing information about individual Americans. At the same time, it recommends curbs on the use of the Social Security number (SSN) as a universal personal identifier.

WHY NOW?

Privacy problems are not new, the committee said. They existed when we had manual record-keeping systems. But the computer poses a greater threat. Three reasons were cited.

- Computers permit an organization to enlarge its data processing capacity substantially.
- Access to personal data within a single organization and across boundaries that separate organizational entities are greatly facilitated.
- A new class of record keepers is created. Their functions are technical and their contact with the original suppliers and ultimate users of personal data are often remote.

When the committee was formed, there was a growing national concern that automated personal data systems presented a serious potential for harm, including infringement of basic liberties. The committee was therefore asked to analyze and make recommendations about "harmful consequences that may result from using automated personal data systems, safeguards that might protect against potentially harmful consequences, measures that might afford redress for any harmful consequences, and policy and practice relating to the issuance and use of social security numbers."

RECOMMENDATIONS

In its July 1973 report, the committee recommended the following:

(1) *Federal legislation guaranteeing individuals the right to find out what information is being maintained about them in computerized systems, and to obtain a copy of it on demand.*

(2) *That the legislation also allow a person to contest the accuracy, pertinence, and timeliness of any such information.*

(3) *That record-keeping organizations be required to inform individuals on request of all uses made of this information.*

In connection with the SSN, the committee recommended:

1 *Congressional action giving each individual the right to refuse to disclose his or her social security number to any person or organization not specifically authorized by a Federal statute to collect and use the number.*

2 *That organizations with authority to use the number be prohibited from disclosing it to organizations that lack such authority.*

The report also recommends the enactment of a Federal "Code of Fair Information Practice" that would rest on five basic principles that the committee says would be given legal effect as "safeguard requirements" for automated personal data systems. These principles are:

That there must be no personal data record-keeping systems whose existence is secret.

That there must be a way for an individual to find out what information about him is in a record and how it is used.

That there must be a way for an individual to prevent information about him that was obtained for one purpose from being used or made available for other purposes without his consent.

That there must be a way for an individual to correct or amend a record of identifiable information about him.

That any organization creating, maintaining, using, or disseminating personal records must assure their reliability and take precautions to prevent their misuse.

"The proposed Code," according to the report, "calls for two sets of safeguard requirements — one for administrative automated personal data systems and the other for automated personal data systems used exclusively for statistical reporting and research." The latter systems are used to influence public policy and therefore require special safeguards.

Under the proposed Code, violations of any safeguard requirement would constitute "unfair information practice subject to criminal penalties and civil redress. Until such a Code is enacted, however, the committee has suggested that the safeguard requirements be applied through Federal administrative action, emphasizing that the safeguards recommended do not require establishment of new mechanisms "and seek to impose no constraints on the application of EDP technology beyond those necessary to assure the maintenance of reasonable standards of personal privacy in record keeping."

At the same time, the committee turned thumbs down on creation of a previously suggested independent Federal agency to regulate the use of all automated personal data systems. "We doubt," the committee said, "that the need exists or that necessary public support could be marshalled at the present time" for such an agency. The group also said it believes that "the cost to most organizations of changing their customary practices in order to assure adherence to our recommended safeguards will be higher in management attention and psychic energy than in dollars."

ERVIN LESS THAN ENTHUSIASTIC

While praising the overall work of the advisory committee, Sen Ervin is less than enthusiastic about the Federal Code aspect of the report. "The advisory committee," he said in a Senate speech following release of the report, "is careful to note that the safeguards contained in the suggested Code of Fair Information Practice are minimum standards and offer only a least common denominator of acceptable practices in regard to personal data systems. And yet there is always the danger that once a least common denominator is enacted into law, it will be transformed in practice into the maximum protection actually available to citizens whose lives are affected by the misuse of personal data systems. In addition, the safeguards have been designed to apply generally to all personal data systems, public and private, State and Federal, large and small. It seems to me that standards specifically tailored for the personal data systems maintained by the Federal Government, interconnected with Federal Data Systems, or funded by the Federal Government, might be a more effective first step toward restraining abuses of personal data systems."

Ervin suggested that legislative hearings on the proposed Code be held so that everyone affected by personal data systems would have the opportunity "to express their views on the efficacy and practicality of the proposed safeguards."

Another area dealt with by the advisory committee which Ervin has difficulty in completely accepting concerned the use of the SSN as a universal personal identifier. The report recommended that the use of the SSN be limited to Federal programs that have a specific Federal legislative mandate to use it, and that new legislation be enacted to give an indi-

vidual the right to refuse to disclose his number under all other circumstances. However, the committee, seeing the SSN as an instrument for strengthening the administration of certain Federally-supported programs of public assistance, recommended that SSNs be issued to ninth-grade students in schools.

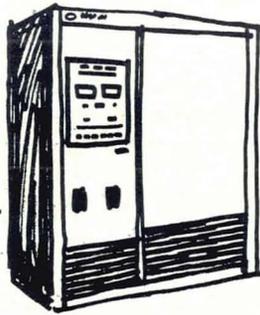
To this recommendation, Ervin said: "To my mind, the proper work of the schools is educating students, not issuing Social Security numbers to them for the convenience of the Social Security Administration and those who want a numerical peg on which to keep track of the activities of students in and out of school."

Meanwhile, according to the present Secretary of HEW, Caspar W. Weinberger, his agency "is now developing legislation and appropriate administrative regulations to assure the effective application" of the principles enunciated by the committee as safeguard requirements.

Copies of the committee's report are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for \$2.35, domestic prepaid. Request by title and GPO Bookstore Stock No. 1700-0016

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CIRCLE NO. 17 ON INQUIRY CARD

CORPORATE AND FINANCIAL NEWS

Suits & Countersuits.

● Computer leasor DPF, Inc. has filed suit against two securities firms and three individuals charging proxy solicitation violations. Several days preceding the filing, one of the individuals charged had entered an action against DPF seeking to obtain DPF's stockholder list.

● Xerox has filed patent infringement actions against IBM specifying IBM's new Copier II. Xerox had filed similar actions in 1970 and 1972 specifying IBM's first copier model. Neither the earlier actions nor an IBM counterclaim that Xerox has monopolized the plain-paper copier business have been resolved. For that matter, other anti-monopoly actions brought against Xerox this year by the Federal Trade Commission (January) and SCM Corp. (August) are also pending.

● Lockheed Electronics has countered a Digital Equipment claim that Lockheed's SUE minicomputer infringes a DEC patent by filing for an injunction against DEC's pursuit of that suit (no pun intended) "or any other suit" involving the patent in question. An earlier DEC-initiated SUE-suit (pun intended) involving another patent was dismissed by mutual consent.

More Than Expected. RCA Corp. will realize more than \$137-million from the sale of its commercial computer division to Sperry Rand Corp. When the original agreement was signed on December 17, 1971, it was projected that RCA's total revenues from the sale would range from \$100-million to \$130-million. RCA said it has agreed to accept a fixed cash payment of \$36.7-million in three installments as the final step in the transaction. Under the original agreement, Sperry made an initial payment to RCA of \$70.5-million and agreed to additional shared revenue contingency payments over the next five years. Sperry Rand has paid RCA \$19.8-million to-date under that revenue sharing provision, and RCA generated an additional \$10-million from selling spare parts and services to Sperry.

BOX SCORE OF EARNINGS

| COMPANY | PERIOD | REVENUES | NET EARNINGS (Loss) | EARNINGS (Loss) PER SHARE |
|---------------------|-----------------|---------------|---------------------|---------------------------|
| Adage | 12 mos. 3/31/73 | 5,019,831 | 51,660 | .07 |
| | 3/31/72 | 4,588,620 | 40,267 | .06 |
| Ampex | 12 mos. 5/28/73 | 256,604,000 | 3,459,000 | .34 |
| | 5/29/72 | 229,160,000 | (82,783,000) | (7.88) |
| Burroughs | 6 mos. 6/30/73 | 588,754,000 | 42,457,000 | 2.22 |
| | 6/30/72 | 472,632,000 | 32,467,000 | 1.75 |
| Computer Data Sys. | 12 mos. 6/30/73 | 2,395,000 | 240,900 | .46 |
| | 6/30/72 | 1,381,000 | 95,800 | .18 |
| Control Data | 6 mos. 6/30/73 | 432,152,000 | 32,340,000 | 1.98 |
| | 6/30/72 | 295,662,000 | 27,588,000 | 1.83 |
| Data Card | 12 mos. 3/31/73 | 4,832,353 | 417,722 | .28 |
| | 3/25/72 | 2,571,962 | 108,615 | .08 |
| Data General | 36 wks. 6/9/73 | 34,654,000 | 4,290,000 | .52 |
| | 6/3/72 | 19,643,000 | 2,282,000 | .28 |
| Decision Data Cmpt. | 6 mos. 6/2/73 | 7,303,470 | (681,737) | (.21) |
| | 5/31/72 | 438,654 | (1,176,824) | (.51) |
| DPF | 12 mos. 5/31/73 | 33,926,000 | 345,000 | .08 |
| | 5/31/72 | 42,324,000 | (34,744,000) | (8.62) |
| Fabri-Tek | 12 mos. 3/30/73 | 22,309,441 | 919,731 | .28 |
| | 3/31/72 | 13,638,010 | (672,514) | (.21) |
| General Instrument | 13 wks. 5/27/73 | 96,371,753 | 2,423,480 | .36 |
| | 5/28/72 | 71,272,482 | 1,356,117 | .20 |
| Hazeltine | 6 mos. 6/30/73 | 36,875,000 | 909,000 | .46 |
| | 6/30/72 | 27,142,000 | 475,000 | .24 |
| Honeywell | 6 mos. 6/30/73 | 1,098,132,000 | 37,737,000 | 1.99 |
| | 6/30/72 | 960,231,000 | 26,302,000 | 1.41 |
| IBM | 6 mos. 6/30/73 | 5,104,087,083 | 696,850,167 | 4.78 |
| | 6/30/72 | 4,759,254,948 | 617,904,358 | 4.27 |
| Inforex | 6 mos. 6/29/73 | 16,855,000 | 1,718,000 | .63 |
| | 6/30/72 | 9,656,000 | 10,000 | — |
| Kalvar | 12 mos. 3/31/73 | 7,291,000 | (1,341,000) | (1.14) |
| | 3/31/72 | 4,274,000 | (1,893,000) | (1.65) |
| Microdata | 9 mos. 5/31/73 | 6,536,106 | 575,892 | .37 |
| | 5/31/72 | 4,290,938 | 432,921 | .34 |
| Mohawk Data Sci. | 12 mos. 4/30/73 | 143,216,000 | (431,000) | (.07) |
| | 4/30/72 | 119,795,000 | (765,000) | (.13) |
| MSI Data | 12 mos. 3/31/73 | 13,489,746 | 602,351 | .34 |
| | 3/25/72 | 10,520,525 | 472,721 | .30 |
| Raytheon | 6 mos. 7/1/73 | 768,735,000 | 22,901,000 | 1.48 |
| | 7/2/72 | 738,353,000 | 21,112,000 | 1.31 |
| Scan-Data | 6 mos. 6/30/73 | 3,292,851 | 15,386 | .01 |
| | 6/30/72 | 1,940,871 | (715,643) | (.60) |
| Signetics | 24 wks. 6/17/73 | 37,784,000 | 2,694,000 | .64 |
| | 6/18/72 | 18,907,000 | 286,000 | .08 |
| Sycor | 6 mos. 6/30/73 | 14,901,500 | 2,510,300 | 1.66 |
| | 6/30/72 | 6,077,000 | 159,200 | .05 |
| T-Bar | 6 mos. 6/30/73 | 1,078,829 | 53,294 | .13 |
| | 6/30/72 | 633,182 | 17,943 | .05 |
| Wells Management | 12 mos. 3/31/73 | 5,425,820 | (622,945) | (.84) |
| | 3/31/72 | 4,221,588 | 110,910 | .15 |
| Xerox | 6 mos. 6/30/73 | 1,421,149,000 | 146,348,000 | 1.85 |
| | 6/30/72 | 1,161,065,000 | 120,490,000 | 1.53 |

RECENT ENTRIES: The **Amilon Corp.** has been formed in Woodside, N.Y., to manufacture cassette tape transports for the computer industry and audio markets . . . **Janus Consultants, Inc.** of Washington, D.C., has formed the **Janus Marketing Co.** to specialize in selling non-competing data processing and communications products exclusively to the government market . . . **Martin Marietta Corp.** and **Hartford National Bank and Trust Co.**, have formed a joint venture company, **Financial Industry Systems**, to offer DP resource management and related services to banks, insurance companies, and other financial institutions. FIS will be headquartered in Hartford, Conn. . . . A group of former engineering and manufacturing managers from **Century Data Systems** have organized. **Orbis Systems, Inc.**, Costa Mesa, Cal., to manufacture low-cost magnetic recording devices and systems, including floppy disc drives, for the OEM market. Chief executive of the new firm is John Ring, who directed development of the magnetic tape product line at Century for the past two years and was previously manager of the magnetic tape devices and systems group for ICL in England.

Breathing Easier. Tally Corp. seems on the road to recovery after a close call with its bank creditors (see this section, July). The Kent, Washington, peripherals firm recently announced significant purchase and manufacturing license agreements for its Series 2000 lineprinters with Hewlett-Packard and Sperry-Univac.

MERGERS AND AQUISITIONS: **Almqvist & Wiksell Informatics Corp.**, a text handling and information processing company, has acquired **Keymatic Data Systems Corp.**, a manufacturer of key-to-cassette encoders and editing systems for the computerized typesetting industry . . . Denver-based **Scientific Software Corp.** has reached general agreement with **Brooks Monroe and Co., Inc.** of New York City for the sale of **Education & Economic Systems, Inc.**, a wholly-owned subsidiary located in Boulder . . . **Data 100 Corp.**, Minneapolis, has completed its previously announced acquisition of **California Data Processors.** CDP, a two-year-old firm previously engaged only in the design and licensing of

minis and minicomputer memories, recently announced receipt of production orders for equipment valued at more than \$2.6-million . . . **Fairchild Camera & Instrument Corp.** has agreed to sell to **Penril Data Communications** substantially all of the business and assets of its **Electro-Metrics Division**, Amsterdam, N.Y. . . . **Sperry Rand** has agreed to acquire **Information Storage Systems**, the memory-manufacturing subsidiary of **Itel Corp.**, for an initial payment of \$23-million and additional

payments based on sales through 1975. ISS will continue to develop and manufacture products for Itel, which recently announced an agreement in principle to acquire **D.C.S. Computer Services** of New York for an undisclosed amount of cash. . . . The Management Services Division of **Lear Siegler, Inc.**, has acquired **Telecommunications Equipment Corp.**, a Dallas-based subsidiary of **Britco, Inc.** T.E.'s principal product line is a PABX key system.

Easygoing Vector Graphics, it's basic.

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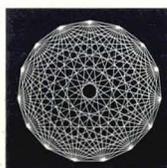
100 REM MEGATEK DESIGN
110 LET P=15
120 LET Q=0
130 FOR N=1 TO P-1
140   FOR M=N+1 TO P
150     LET A=(N-1)*6.2832/P
160     LET B=(M-1)*6.2832/P
170     CALL 1,127*(1+SIN(A)),127*(1+COS(A)),0,0
180     CALL 1,127*(1+SIN(B)),127*(1+COS(B)),3,0+1
190   LET Q=Q+2
200 NEXT M
210 NEXT N
220 END

```

You can now use BASIC language (as this program developed the pattern shown below) to easily plot lines and points. Megatek interfaces your mini (now available for all NOVA series) with your

x-y scope and supplies the software needed to allow interactive, dynamic displays. With 50 Hz refresh rate from its built-in memory, a wide variety of real-time flicker-free plots and even alphanumeric can be generated.

And the price is really right. Think of the possibilities. Better yet, see for yourself. Just call us for complete details on NOVA, PDP-11 and NAKED MINI/ALPHA 16 - (213) 530-0654 or write Megatek, 1526 West 240th Street, Harbor City, CA 90710.



MEGATEK
BUDGET PERIPHERALS

Graphics Interface: it goes for \$1095.

CIRCLE NO. 18 ON INQUIRY CARD

CORPORATE PROFILE

Featured this month:

COMPUTER HORIZONS CORP. (Over-the-Counter)

New York, N.Y.

OFFICERS & DIRECTORS: *Ronald Finegold*, President and Chief Executive Officer, Director; *John J. Cassese*, Executive Vice President, Director; *Martin E. Pelcyger*, Executive Vice President, Director; *Raymond Laser*, Vice President; *Joel R. Diamond*, Vice President; *Herbert S. Lopato*, Vice President; *Edward Knauer*, Vice President; *David W. Bialick*, Controller.

BACKGROUND: A New York company, Computer Horizons was incorporated in March 1969, and commenced operations in August 1969. The company's principal services are data processing consulting, systems analysis and design, and programming. The company also has two employment services subsidiaries, Stamford Associates (formed in February 1970) and Beamer Personnel (formed in April 1972). Prior to founding Computer Horizons, Ronald Finegold, John J. Cassese, and Martin E. Pelcyger held various management, technical, and marketing positions with Automation Sciences, Inc. Computer Horizons Corp. is not related to Computer Horizons, Inc., a Delaware corporation, or any other company of the same or a similar name.

FACILITIES: Administrative, technical, and marketing offices occupy the 7600 ft.² 15th floor at 747 Third Avenue, New York, N.Y. A sales office is located at 24 Commerce Street, Newark, N.J. Stamford Associates has its offices at 41 East 42nd Street, and Beamer Personnel at 527 Madison Avenue, New York, N.Y. Computer Horizons Corp. has 125 employees.

SERVICES: Computer Horizons derives its revenues from the following five types of services:

Data Processing Consulting — Ascertaining the overall data processing needs and objectives of client, and recommending the selection and use of equipment and personnel to meet them.

Systems Analysis and Design — Analyzing the client's specific data processing methods in order to automate his techniques or to improve currently automated techniques. The end product is a detailed information flow plan that will utilize client's personnel and selected data processing equipment.

Computer Programming — Translating a designed system into computer-readable instructions.

Personnel Recruitment and Placement — Matching applicants and positions in the data processing, insurance, finance, and retailing fields. Positions include management and senior technical personnel with annual salaries from \$10,000 to \$30,000.

Computer Time Brokering — Matching potential vendors and purchasers of available computer time.

CURRENT POSITION: Computer Horizons is continuing an established policy of addressing the large-scale data processing user market. Although primarily operating in the Northeast, the company has recently expanded its client base and sales coverage to the Southeast, Far West, and Canada. Major data processing users among its clients include Bell Telephone Laboratories; Con Edison; Chase Manhattan Bank; Merrill Lynch; the City of New York; Mobil Oil Corp.; W. R. Grace & Co.; and Mercedes-Benz of North America.

OUTLOOK: The year 1972 brought a significant recovery to the sagging information processing and computer services industry. Shipments of computers were up an average of 15% over 1971, a rate expected by IBM and other computer manufacturers to continue through 1976. For service companies that survived the 1970-71 shakeout, this growth in hardware shipments should be a minimum index of their own growth. Computer Horizons sees even deeper penetration of the present market by the services industry in view of such hardware developments as less expensive computer memories, which invite greater software utilization of existing equipment.

FINANCIAL SUMMARY: In March 1972, Computer Horizons sold to the public 220,000 shares of its common stock at \$3 per share. The proceeds, after underwriting discounts and commissions to Mayflower Securities Co., amounted to approximately \$550,000. There are currently 601,887 shares outstanding, of which 256,000 are publicly held. As of February 28, 1973, the company's audited annual financial statement listed total assets of \$1,259,608 and total liabilities of \$394,614, leaving a stockholders' equity of \$864,994. During the fiscal year, the company retired a \$25,000 note payable to a bank, and presently has no long- or short-term debt. Its current ratio is 3 to 1.

| | F.Y. 1973 | F.Y. 1972 | F.Y. 1971 | 6 Mos. 1970* |
|---------------------------|--------------|--------------|--------------|-----------------|
| Revenues | \$2,351,774 | \$1,402,335 | \$1,121,664 | \$303,599 |
| Net Earnings | 166,954 | 70,239 | 73,867 | 29,778 |
| Earnings / share** | .28 | .19 | .19 | .07 |
| Weighted Av. | | | | |
| No. of Shares | 605,031 | 378,844 | 390,177 | 399,083 |
| Outstanding | | | | |

*Six-month period — August 21, 1969 to February 28, 1970.

**Based on weighted average number of shares outstanding in each period.



BOHDAN O. SZUPROWICZ

THE "BETTER MOUSETRAP" CLICHÉ

If you are aware that professional investors today believe their best venture opportunities are listed on the New York Stock Exchange, you probably did not bother to look in on the "Venture Capital for the Computer Industry" session during the National Computer Conference.

We did. Not because we were looking for money, but because we hoped to gain some insights into the future of the industry. Surely, we thought, those who specialize in financing the computer industry must have a crystal ball worth peeping into.

Actually, the Venture Capital session was our last resort after we walked out of the "Economic Future of the Data Processing Industry" panel the previous day. That distinguished body of business editors recounting old, off-color jokes about computer salesmen failed to convince us that it was very conversant with the computer industry's past, so there was little point in staying to listen to their blind and random excursions into the increasingly complex unknowns of our future.

In a way, the Venture Capital session was another disappointment to us. Robert Johnston ably chaired a panel which defined admirably all the qualities investors look for in new venture situation, but which at the same time failed miserably to suggest where even a trickle of financing might be had by the most deserving computer desperadoes.

Probably the panel's most constructive suggestion dealt with the need to find an advisor who could dig up some warm trails of the hard-to-find capitalists. While those remarks could be regarded as hitting pretty close to their own advisory burrows, the gloomy tones in which the advisors spoke gave us the impression that they themselves might be secret candidates for a well-concealed hibernation. That, in turn, would put the young entrepreneur in a situation where he would have to find advisors to look for advisors.

Against these odds there surfaced several determined young computer byteslingers who opined that superior and advanced technology must out and will suffice to line up greedy Wall Street hyenas in front of your garage door.

The Better Mousetrap cliché was evoked a number of times as proof of superiority of genius over greed and other economic nonsense until Dick Brandon, himself an industry innovator and venture capital consumer, forcefully told the mousetrappers how very wrong they were.

Don Selbert of Selbert Ventures pointed out that discussions on selecting an underwriter, so common among starry-eyed inventors with a new electronic contraption, are but an academic exercise these days. Wall Street abhors "uncertainties," and these days when both the rules of the game and the game itself are uncertain, anything new is doubly uncertain for sure, for sure.

Thus it emerged that if you have the entrepreneurial urge, can work on your own, and are willing to undergo hardships, you might as well employ all those good qualities in trying to raise capital in your immediate vicinity from family, friends, sweethearts, widows, orphans, and whoever. Times are such that this is your best bet.

Much of the discussion became a prolonged argument between those who knew better and those who believed they had the best box and the "money mafia" was conspiring to take it from them for peanuts.

It became quite clear that no matter how revolutionary the product, marketing becomes the name of the game (as it always has been anyway to the peril of those who believe otherwise), and in uncertain times with tight money, it is far easier to catch the attention of investors with demonstrable improvements to existing products. The same old mousetrap, in fact, but with some sweeter smelling cheese in it is what the Wall Street mice seem to be sniffing for these days. They are frightened by unfamiliar contraptions.

Thus determination and persistence in the marketplace are, in the final analysis, the most valued entrepreneurial characteristics. They are the reasons why the guy with just another mousetrap becomes a household word, while your revolutionary multirodent eliminator continues to gather dust in a local museum.

But to reach such conclusions we did not need to attend learned seminars. A local discount store displays a sign encouraging its sales clerks to press on with much the same advice.

"Talent will not," says the sign, "and nothing is more common than unsuccessful men with talent.

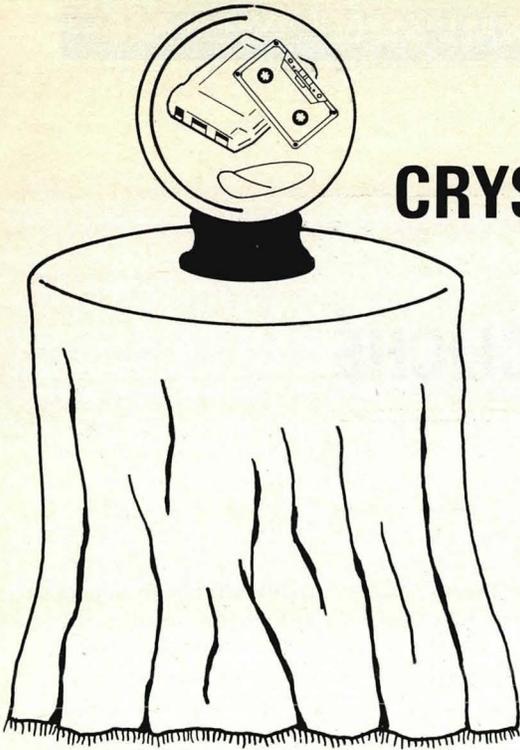
"Genius will not, and unrewarded genius is almost a proverb.

"Education will not, and the world is full of educated derelicts.

"Determination and persistence will!" concludes the sign. And that advice would seem to apply to both sales clerks and entrepreneurs. ▲

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

CRYSTAL-BALLING THE LOW-COST DATA RECORDING INDUSTRY



*A market research firm predicts
a bright future for cassette,
cartridge, and floppy disc devices.*

Lewis I. Solomon is bullish on the low-cost data recording industry. Mr. Solomon is president of a management consulting firm specializing in business and financial planning for electronic companies. His recently completed 100-page study, "The Data Recording Industry: An Analysis" (\$150.00 — from Venture Development Corp., 1 Washington St., Wellesley, Mass. 02181) is meant "to serve as a planning guide during the 1973-1980 period for manufacturers of digital cassette, cartridge, and mini-disc recorders; for users of these devices; and for those considering this field as a prospect for diversification and investment."

Solomon believes that the market for low-cost data recorders (i.e., "transports priced in the \$100-\$500 range") will expand "explosively" during the Seventies from its present level of \$53-million to \$186-million in 1975 and to \$379-million by 1980. He expects the fastest-growing (50% annualized rate) major application will be data communications terminals, which by 1980 could account for shipments of half-a-million recorders, or 40% of the entire low-cost data recorder market. Another way of interpreting this is that one out of every three data terminals will incorporate some form of recorder by 1980.

The remaining 60% of the inexpensive recorder market will be divided equally between "minicomputer-based" and "other OEM" applications, both of which are carefully defined in the report. For example, we were especially interested in the near-term projections of low-cost recorders for POS applications listed under the "other OEM" heading. Although the report projects a 30% ten-year overall growth rate for "other OEM" applications, sales this year of recorders for POS terminals are expected to increase ten times over 1972, and in 1975 to reach 47,000 units valued at \$25-million.

The report provides similar unit and dollar breakdowns for the four other specific markets classified under the "other OEM" heading: programmable calculators, word processors, small accounting machines, and automated testing equipment. These four markets are seen as collectively accounting for 66,000 low-cost recorders valued at \$36-million in 1975, and for 116,000 units valued at \$55-million in 1980.

The Venture Development study also segments the market by technology. Solomon projects that non-Philips-type cartridge units will capture 37% of all low-cost recorder rev-

enues by 1980, with digital cassette and floppy disc devices getting 35% and 28%, respectively. Solomon comments on these technologies as follows:

CARTRIDGE RECORDERS which improve on Philips cassette technology will grow from their present small base at a 37% annual rate. By 1980 they will be the dominant recording technology. Shipments will be \$65-million in 1975 and \$141-million in 1980.

DIGITAL CASSETTE RECORDERS will grow at a compound annual rate of 23%. Presently, shipments are at the \$32-million level. By 1975 they are expected to reach \$84-million, and grow to \$133-million in 1980.

FLOPPY DISC RECORDERS have had essentially zero market penetration to date, but will constitute a \$105-million market in 1980, and show a 50% annual growth over the decade.

A graph of sales over time shows cartridge recorders overtaking cassettes in late 1977 at \$120-million in annual sales, and floppy discs roughly paralleling the curve for cassette units, but at a level approximately \$40-million/year lower.

While predicting a boom in low-cost data recorders in general, Solomon cautions against rushing to invest in the industry indiscriminately. Indeed, some of the most provocative material in his report appears in the supporting chapters on the history and structure of the industry, on *de jure* and *de facto* standards, and on the merits of the various recording devices available. For example, on the future of the ANSI/ECMA specification as an industry standard, the report concludes that it "is too limited in its scope and was issued too early in the growth cycle of the low-cost data recording industry to become widely accepted." Of the four major digital cartridge designs, we read that "Only 3M has the product, the financial resources, the desire . . . and the business strategy to encourage the wide acceptance of its cartridge." And lest his projections be construed as rosily myopic, Solomon warns that "By the time present cassette, cartridge, and floppy disc technologies reach the stage where they are mature products (1975-1977), we believe semiconductor, amorphous, holographic, optical, etc. memory elements will be used to perform similar functions."

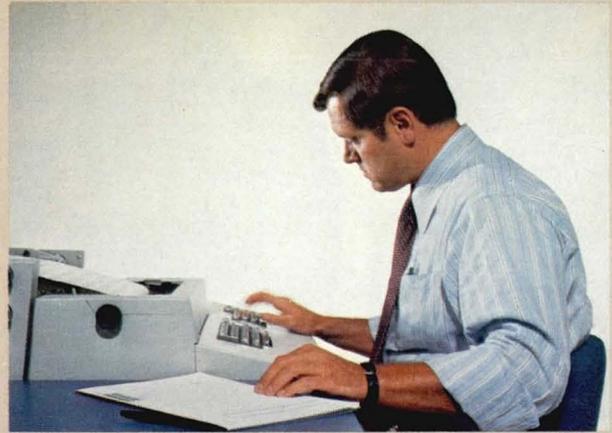
So play in the water, children, but watch out for the tide!

Nixdorf presents a no-nonsense guide on how to buy a business computer



1. Know the manufacturer.

Some computer firms are really brokers for other companies' computers. Avoid them. Buy your business computer from well-known, established manufacturers like Nixdorf, with 20 U.S. offices and over 30,000 business computers installed around the world. Depend on a company that has grown up in the business market . . . one that designs, builds, and services its own computers. Nixdorf, with \$140 million in annual sales, is that kind of company.



2. Know the computer.

First decide what you want your business computer to do — receivables, payables, payroll, sales analyses, inventory control . . . you name it. Then be sure it's programmed exactly as specified *before you accept it*. (That's Nixdorf policy.) Be sure it's modular, too. That way, you'll never outgrow it as your company grows. In Nixdorf's case, you simply plug in memory cells, discs, printers, cassettes and other modules as your business expands.



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If you call up for service in a hurry, will the field engineer come right out? Most computer manufacturers can't promise that. Nixdorf can. Because every Nixdorf office has a full-time field engineering staff waiting to help you. All Nixdorf computers are built of solid state modules, so a service call usually lasts only as long as it takes to change them.

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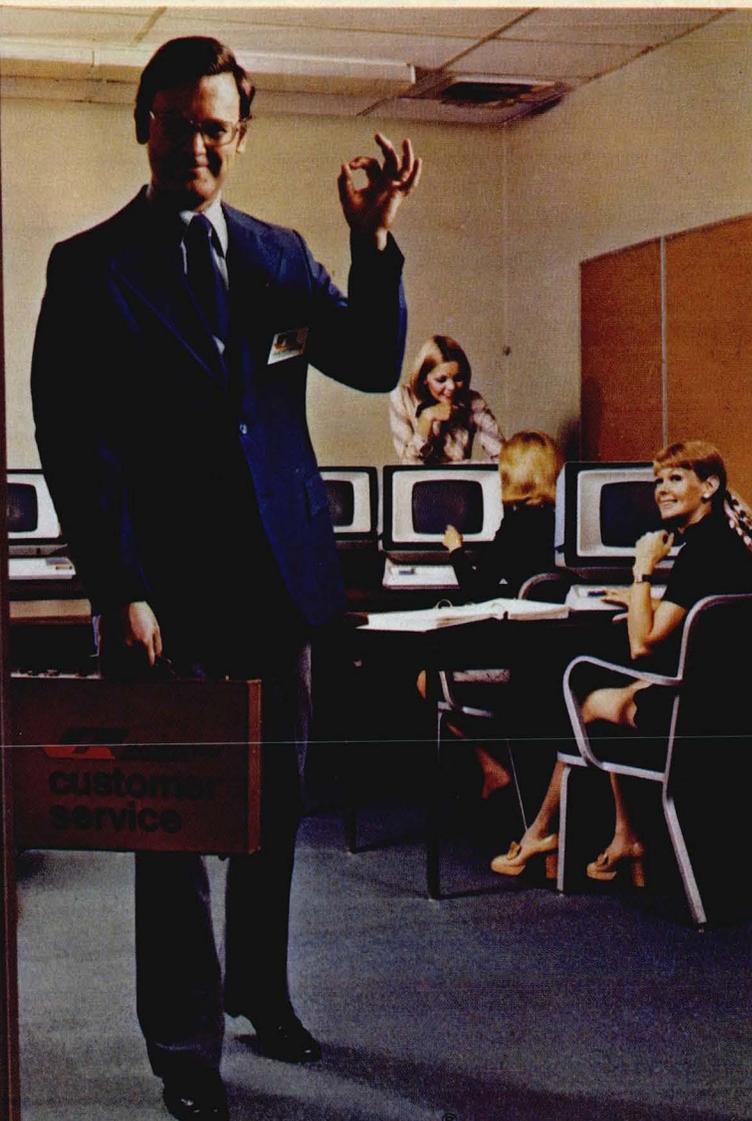
4. Know the facts.

Before you buy just any business computer, learn about Nixdorf. We sell everything from \$7,990 accounting computers to \$100,000 data processing systems. And our modular machine will adapt perfectly to your present office procedures . . . as a stand-alone system or on-line terminal to a large-scale computer. If you need to know . . . send in the coupon now.

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CIRCLE NO. 19 ON INQUIRY CARD



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They have a lot going for them.

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niques which zero in on trouble fast. Such as highly modular construction for quick replacement of parts.

Our commitment to keeping you on the air starts in the factory. With 100% testing of all parts and components. With a grueling "burn in" process that smokes out potential trouble at the source.

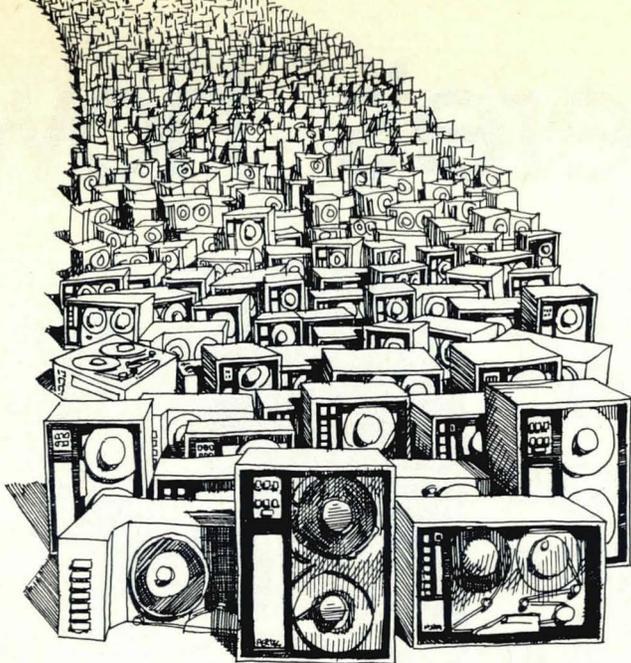
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You get interfaces which have become the standard of the industry. (Even our competitors describe their components as "Perotec-compatible".)

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Whatever you need in a tape drive, look into Perotec. We pioneered low-cost transports, we developed the first cost-effective phase encoding capability, and we continue to keep and often set the pace in industry advancement.

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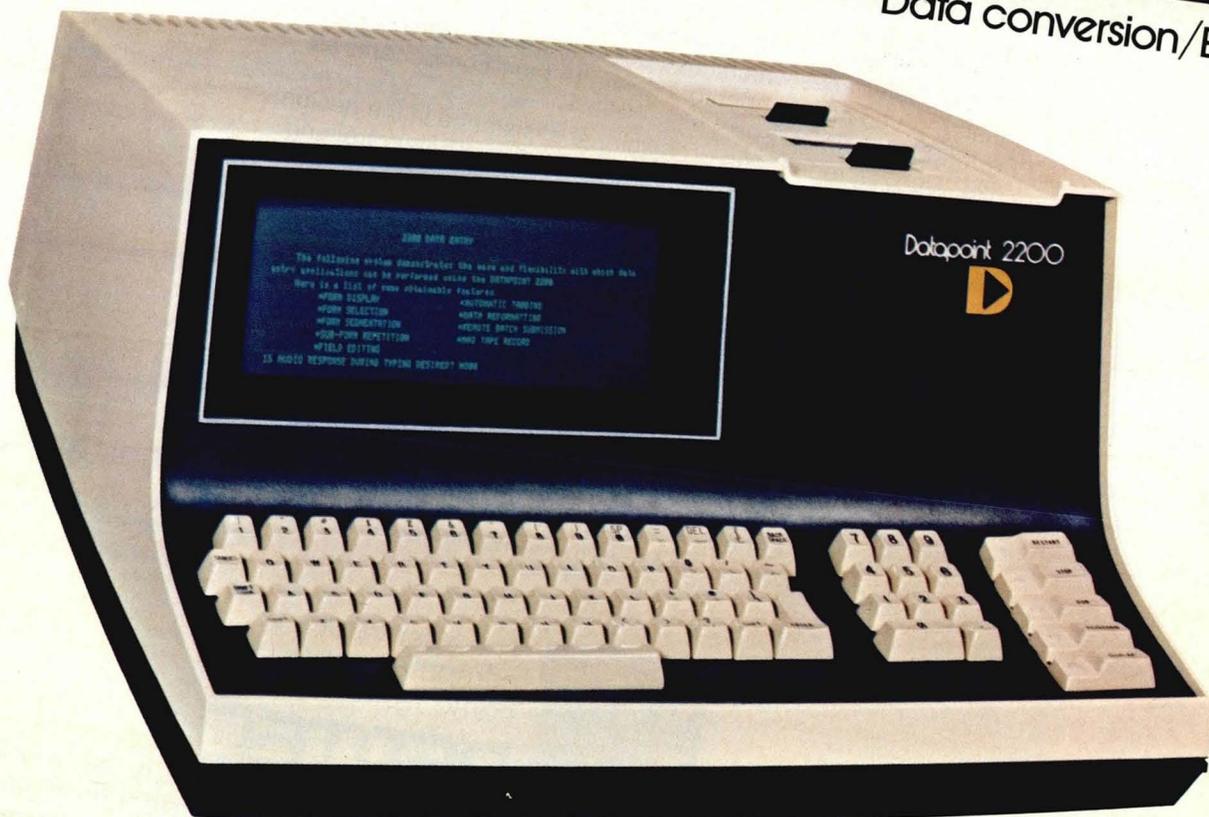
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Here's how

with the
Datapoint 2200
-a single
integrated system
for:



Data conversion/Entry



2200 DATA ENTRY

The following system demonstrates the ease and flexibility with which data entry applications can be performed using the Datapoint 2200.

Here is a list of user obtainable features:

| | |
|----------------------|-------------------------|
| *FORM DISPLAY | *AUTOMATIC FORMING |
| *FORM SELECTION | *DATA REORGANIZING |
| *FORM IDENTIFICATION | *REMOTE DATA SUBMISSION |
| *JOB-PROM PROMPTING | *JOB TAPE RECORD |
| *FIELD EDITING | |

IS MOVED RESPONSE DURING TYPING RESTRICT? MORE

Datapoint 2200



Datapoint delivers



Data processing



Data communications

The Datapoint 2200 Business Computer System from Datapoint Corporation has given new meaning to the term versatility. In one typewriter-sized unit, the 2200 combines a powerful general purpose computer, a full sized CRT display screen, a comprehensive keyboard, and dual tape cassette units which can store both source and program data. A choice of communications adaptors is available for easy interface with other computing systems through standard telephone service. Emulator software packages for most standard terminal units are also available which allow the 2200's ready integration into existing data network facilities.

Other Datapoint 2200 software includes DATABUS, the high-level Datapoint Business Language; a BASIC language compiler; SCRIBE, a text processing language; a macro assembler; RPG II; Disk and Tape Operating Systems and many utility programs. The basic processing power of the 2200 can be augmented by a complete roster of optionally available peripheral units, which include serial and line printers, 7- and 9-channel tape units, a multiple drive disk attachment and numerous communications interface adaptors.

This comprehensive hardware/software capability makes it possible for the 2200 to work effectively in a variety of applications, including:

- 1.) **Data Conversion and Entry** — Possibly the most popular current application for the 2200. The CRT display screen permits easy visual scan of data entered via the keyboard. The internal computer's full programmability allows full and varying format display plus incorporation of various error checks, for fully verified data entry. This data can be stored in the unit's own tape cassette, for either on-line or off-line transmission to a central processor system.
- 2.) **Dispersed (On-Site) Data Processing** — Through a simple selection procedure, the Datapoint 2200 can be utilized as a formidable independent computer system with up to 16K memory. Through DATABUS,

it's especially well suited for business applications such as inventory control, general ledger, payroll, accounts receivable and payable, and production scheduling. With the BASIC programming language the 2200 can serve many scientific, engineering and educational applications. Used in combination with a larger central system, it can remove the burden of pre-processing and editing chores for input data that would otherwise tie up the larger system.

- 3.) **Remote Job Entry** — The Datapoint 2200 functions efficiently as a high speed terminal for the transmission of source data in volume to a central processor and the receipt at field offices of management reports and statements. Utilizing optionally available tape and/or printer attachments, data can be moved at up to 9600 baud.
- 4.) **Time Sharing** — The 2200 can be readily utilized as a time sharing terminal, linking directly via telephone service with a central time shared computer system for interactive problem solving. Its video screen allows easy problem statement display and editing.

All these capabilities are available not in four separate units but in a single integrated system, the Datapoint 2200. Prices on the 2200 begin as low as \$6,040. For information on how Datapoint can provide you with a single answer to your data conversion, data communications and data processing requirements, write or call the sales office nearest you or contact: Datapoint Corporation, 9725 Datapoint Drive, San Antonio, Texas 78284, (512) 696-4520.

Datapoint

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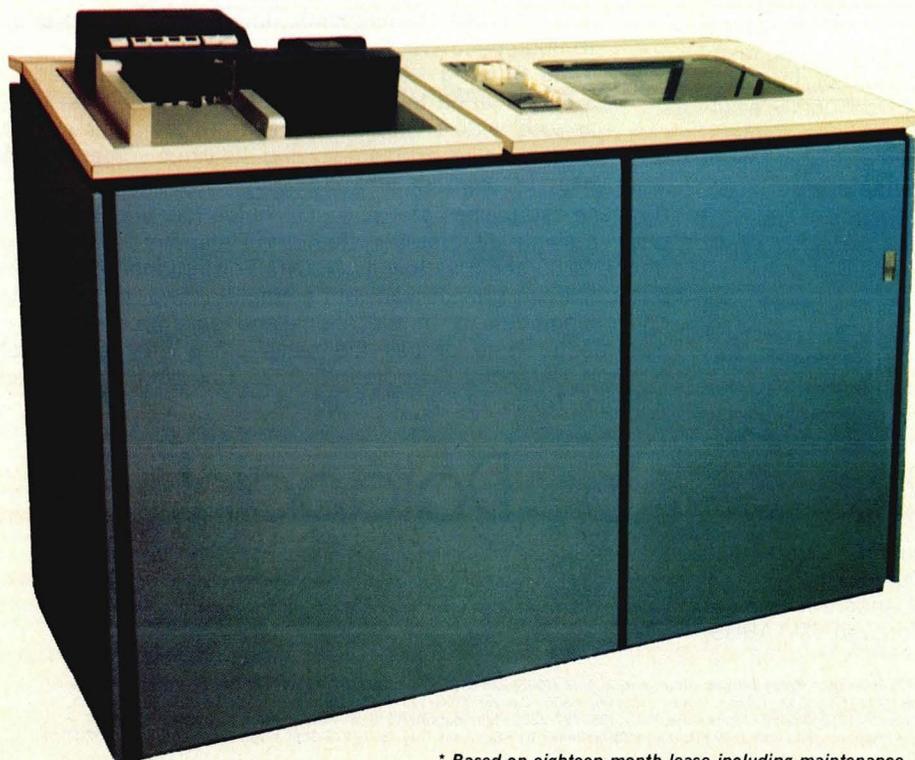
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REMCOM
Model 4780 \$1,350/Mo.
UCC
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* Based on eighteen-month lease including maintenance. Purchase price \$26,610 with one year maintenance.

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.



From the manuscript, *Hystoria de Corpore Christi*, by St. Thomas Aquinas.

Jesuit Father Uses Computer to Analyze Works of St. Thomas Aquinas

After almost 25 years of collecting data, organizing and revising it, Roberto Busa, a Jesuit father, and scientists from IBM have completed a computer-based linguistic analysis of over 10 million words from the works of St. Thomas Aquinas. Called the Index Thomisticus, the scholarly work is now on magnetic tapes at IBM's scientific center in Venice. Father Busa expects to see the first of 45 volumes in print

by the end of the year.

Of the 179 works which were examined, he notes 100 are directly attributed to St. Thomas Aquinas. Another 61 are by other authors, who were associated with the Thomistic works. The final 18 "are of doubtful authenticity," says Father Busa.

The Jesuit scholar began the project in the early 1940s when he was teaching at the Aloisianum Faculty in Gal-

lerate, Italy near Milan. But when confronted with its enormous size and complexity, Father Busa went to IBM in 1949 with the idea of using data processing equipment to record the vast amount of information on the project. He recalls: "I was convinced the computer with its speed and accuracy would help enormously in the compilation of data involved in this study."

That same year IBM offered its full scientific and technical support and soon afterwards work began at Gal-lerate. There Father Busa and other scholars transcribed each line and then each word from all the works of St. Thomas Aquinas to punch cards and then to tapes.

St. Thomas Aquinas, the 13th-century philosopher and theologian, taught that philosophy is based on reason and theology on faith and revelation. Many attribute his greatness to the originality with which he brought Greco-Roman and Arab thought to terms with Christianity.

Father Busa, who wrote his own
(Continued on next page)

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Community Projects Get Boost from IBM Fund 4th page

Can a Computer Help Fix a Computer?

Deliveries to supermarkets were overdue; grocery items were backing up at the main distribution point in New Jersey; and original orders were not available. In short, the whole distribution system for a major supermarket chain had been thrown out of kilter. A management snafu? No. Simply a computer system which needed help.

As soon as the local IBM branch office learned of the problem, it reached Ken Brady, the customer engineer on the account, through its radio dispatch system. Brady quickly drove to the customer site.

He found the computer was receiving intermittent channel overruns caused by heavy programming demands on the channel. However, after going through his diagnostic procedures he ran into trouble in solving the problem. Brady called his regional technical support center in Springfield, New Jersey for help.

Here he talked to Tech Edenfield, who acts as an interface between the customer engineer in the field and IBM's remote maintenance support program or RETAIN/370 (REmote Technical Assistance and Information Network/370) in Raleigh, North Carolina.

Edenfield then keyed in the symptoms to an extensive data bank of information in the IBM system in Raleigh and within seconds was able to get an answer to the problem, which he passed on to Ken Brady at the customer site. The final solution—a minor part change. What might have taken several hours to diagnose took a fraction of that with the help of the RETAIN/370 computer system.

Other situations, however, are more complicated and not so easily solved through a search of the data bank. In such a case, when the customer engineer needs additional help, he can link the System/370 equipment which has problems with the RETAIN/370 computer.

This data link allows the remote support center representative to run diagnostics on the customer's system just as though he were on site. Results of the RETAIN/370 diagnostic runs appear on the representative's terminal where he can look at them while discussing recommended courses of action with the customer engineer.

Both problems and corrections are fed back to RETAIN/370's data bank to keep it current for future users. Publication of appropriate new solutions then follows. RETAIN/370 was designed to support most IBM products,

in both hardware and software areas, (including the System/3 and System/7 as well as the System/370). Only the System/370, though, can be linked to RETAIN/370 to display diagnostics remotely.

IBM's four field technical support centers, located in Los Angeles, Chicago, Washington, D.C. and Springfield handle calls from all over the country. At least one of the centers can be reached 24 hours a day, 365 days a year.

Teleprocessing Link

The remote maintenance support program also involves another function—the Teleprocessing Test Center, also in Raleigh. This additional aid makes it possible for a customer engineer anywhere in the country to use a regular phone line to test a teleprocessing terminal by working directly with the test center computer.

Both the teleprocessing test center and the four field technical support centers across the United States through the use of RETAIN/370 provide quick and efficient support to the customer engineer in the field.

With this strong backup “the customer is able to get service, which in the end reduces the computer's downtime significantly,” says David Brown, manager of the Springfield support center. “This is probably the single most important factor of the program.” **IBM**



Tech Edenfield at the Springfield support center goes over feedback from RETAIN/370 on a computer problem as he talks to customer engineer Ken Brady.

Jesuit Father Uses...

(Continued from preceding page)

doctoral thesis on the terminology of the spiritual life in the works of St. Thomas Aquinas, feels the Index Thomisticus will be an important aid to other Thomistic scholars. He says: “For the first time scholars will be able to examine in depth even such matters as authenticity, textual criticism, style, chronology and translation quickly and accurately with the help of computers.”

He says: “This is the first work which will document the medieval Latin used by scholars after the 12th century.” He explains: “Scholarly Latin was the international language of all sciences and learning up until the 19th century, but until the Index Thomisticus we did not have any historical dictionary of the Latin in use since the 12th century.”

The Index Thomisticus, itself, is divided into two parts—the indexes and the concordances. The index alphabetically notes each word along with a reference to its distribution and frequency. Besides a general index for the entire study, there is also one for each work. The concordances, on the other hand, list alphabetically all the words and cite every passage in which a word appears.

Complex Methodology

In preparing this broad project for the computer Father Busa and IBM engineers developed a complex methodology. Every text was edited and annotated with the right codes to define the types and characteristics of each phrase and each word. After this tedious process, the texts were transcribed onto magnetic tapes and then revised. The next step was to establish all the root words or “lemmas”. Finally, five separate concordances were drawn up according to types of terminology, morphology and word frequency.

While the system was especially designed to organize the Index Thomisticus, it has proved useful for many other literary projects and other areas of study involving large amounts of text. One of the most prominent was the indexing of the Dead Sea Scrolls. Many words were missing and whole sections had crumbled to dust. But by using this new method, scientists were able to program the computer to analyze the words preceding and following each gap. Then thousands of words were scanned to find the ones which most nearly fit into the context.

Thus, by introducing these indexing and coding techniques, Father Busa with the help of IBM has made it possible for scholars to make further strides in the field of linguistic analysis. **IBM**

First Customer Receives IBM System/370 Model 125

"With this new system and our new application approach, we can virtually double our loan processing load without significantly increasing our administrative costs. We also can easily handle a full line of mortgage banking applications including maintaining the status of applications in process, servicing all types of mortgages, such as payment of property taxes and insurance premiums, the automatic generation of accounting entries and interfacing with other systems such as general ledger and checking accounts."

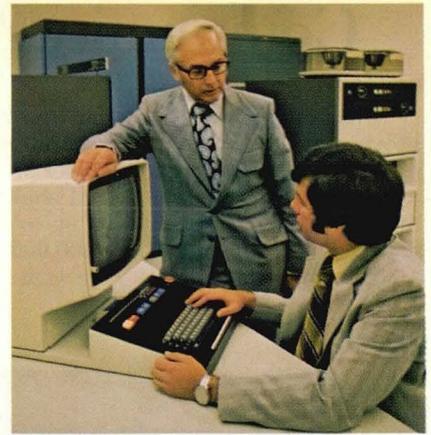
This is how vice president Wayne Spielman feels about the newly-installed IBM System/370 Model 125 at the Wells Fargo Mortgage Company in Santa Rosa, California, which services a total of \$850 million in loans

primarily for the residential market in California.

The Model 125 has a high-speed monolithic circuit technology and a virtual storage capacity many times larger than the computer's actual main storage. Another advantage is its internal storage, which provides greater memory in a given space and higher speeds than found in earlier machines of comparable size.

Another feature of the Model 125 is the cathode ray tube console, which greatly simplifies the operator's job. The TV-like screen can display data being entered through the console keyboard, as well as information in the system. It can also show the internal status of the system.

The new System/370 Model 125 is



Wayne Spielman with DP Manager Larry Bonin (right) at Wells Fargo Mortgage's System/370 Model 125.

an apparent success at its first customer, the Wells Fargo Mortgage Company, where Wayne Spielman says: "In the end, the Model 125 offers us the flexibility and speed we need in this highly competitive mortgage loan business."

IBM

IBM's Graduate School for DP Professionals

"The course was both comprehensive and interesting and gave me a greater insight and perspective of my role as a DP manager."

"It was thoroughly professional and highly informative."

"The course was very stimulating with first-rate instruction. I have some definite ideas I want to implement in our own DP department upon my return."

These are just a few of the reactions from students at IBM's Systems Science Institute. Now in its sixth year, SSI

provides graduate level studies on a tuition basis to its customers who are qualified data processing professionals or financial managers. At four locations—New York, Washington, Chicago and Los Angeles—SSI is teaching customers advanced courses similar to those taught IBM's own systems engineers.

"Information processing systems are becoming more and more complex," says Brew Merrill, coordinator of the four SSI centers. "This is mainly because of advancements in computer sys-

tems and the greater use of data processing in the business decisions of a company. We hope SSI will help all of our students to apply today's sophisticated systems to the complex management needs of our contemporary world."

To reach this end SSI is offering a wide variety of courses in the areas of management of data processing projects, system design and analysis and financial modeling. Classes are small and emphasis is on a low student-to-teacher ratio. Practical applications of theoretical problems are key.

"The thrust of everything we do is to help the executive solve a specific problem relating to his own business," says Merrill about the financial modeling course. On the technical side: "Our aim, is to give the senior systems analyst more modern tools such as queuing theory and simulation so that he can use them in the implementation of his own company's system. Equally important is the actual management of data processing projects. Through our courses here, we help the student develop his management techniques and skills."

The SSI faculty, many of whom have advanced degrees, are all experienced DP professionals with many years in the industry. Brew Merrill says: "Our whole philosophy at SSI is the instructors should have 'lived' the material they are teaching. Only in this way can we give DP professionals the up-to-date tools and techniques needed in the data processing industry."

IBM



Jim Greenwood goes over a problem with Denise Seizer, Director of Management Information Systems at the Community Blood Council of Greater New York.

Community Projects Get Boost from IBM Fund

Community projects around the country are getting a boost from the IBM fund for community service. The fund, started last year, supports volunteer projects through community organizations to which IBM employees belong. Most of the grants range from \$100 on up to \$1,000 but there is no specific limit. Already nearly \$400,000 has been contributed.

The approach is simple. "We want the money to go where

it will make a real difference—not where it will take the place of donations from other sources," says Walton E. Burdick, IBM vice president for personnel plans and programs. "Our real aim," he continues, "is to encourage employees to commit themselves to community projects."

So far IBMers from at least 44 states have used the IBM fund. Here are just a few examples.



Aid to Fragrance Garden for Blind

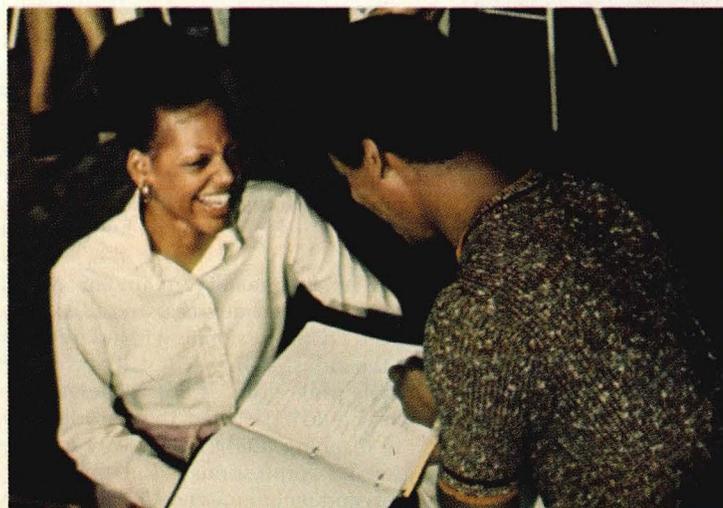
In Piedmont Park in Atlanta there is a small fragrance garden for the blind with gardenias, roses, mint and other herbs and scented flowers—all placed in raised flower beds for easy reach. Handrails guide the blind along shaded paths. There is also a nearby fountain and a small garden sculpture.

The Cherokee Garden Club is now working to complete the project, which was started two years ago. The club is also arranging to have several hundred brochures printed in Braille to serve as a guide to the garden. One of the club's active members, Margaret Duval, who is an administrative account specialist in IBM's Data Processing Division, asked IBM to help support the project. She was given \$450 to cover the expense of the Braille brochures and two concrete benches which were placed in the garden.

Radio System for Ambulance Corps

In Yorktown Heights, N.Y. the Yorktown Volunteer Ambulance Corps now has a radio in each of its two ambulances so that its volunteers can call ahead to local hospitals to alert them to the arrival of a patient and inform them of his condition. Both ambulances can also communicate with each other and with local police headquarters.

The radios cost almost \$1,500 each. Volunteers were able to raise enough money for one but not the other. At that point two volunteer ambulance attendants, Jim Cooley, a mathematician at IBM's Thomas J. Watson Research Center, and Lou Gultz, an electronic technician in the Systems Products Division, were able to interest IBM in the project. Within a month they received a check to cover the cost of the second radio.



Costumes and Sets for Theater

Barbara Tasker, of IBM's Office Products Division in New Orleans, has been an active member of the Dashiki Project Theater, which was founded in 1968 to promote black productions of new and original plays written and performed by black Americans, West Indians and Africans. "It is one of the few consistently producing black theater groups in the entire South," says Barbara. When Dashiki needed additional funds to finance a musical comedy, Barbara applied for and received \$500 from IBM to help pay for costumes, set construction and the auditorium rental.

IBM®

Digital cassette or punched tape?

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Remex has for many years produced a wide range of punched tape products to meet market needs. Introduction of Remex digital cassette systems as an additional product line is meant to be just that—an additional product, to be used where it fits best. The same applies to other products now

on the market, floppy discs, cartridge drives, minidisks, etc. None is a complete alternative for another.

The making of a good peripheral product takes much more than the desire to be in the business. It takes experience, continuous commitment and a thorough knowledge of the product's areas of use. Remex can deliver this in both punched tape and digital cassette systems. Now, with industry acceptance

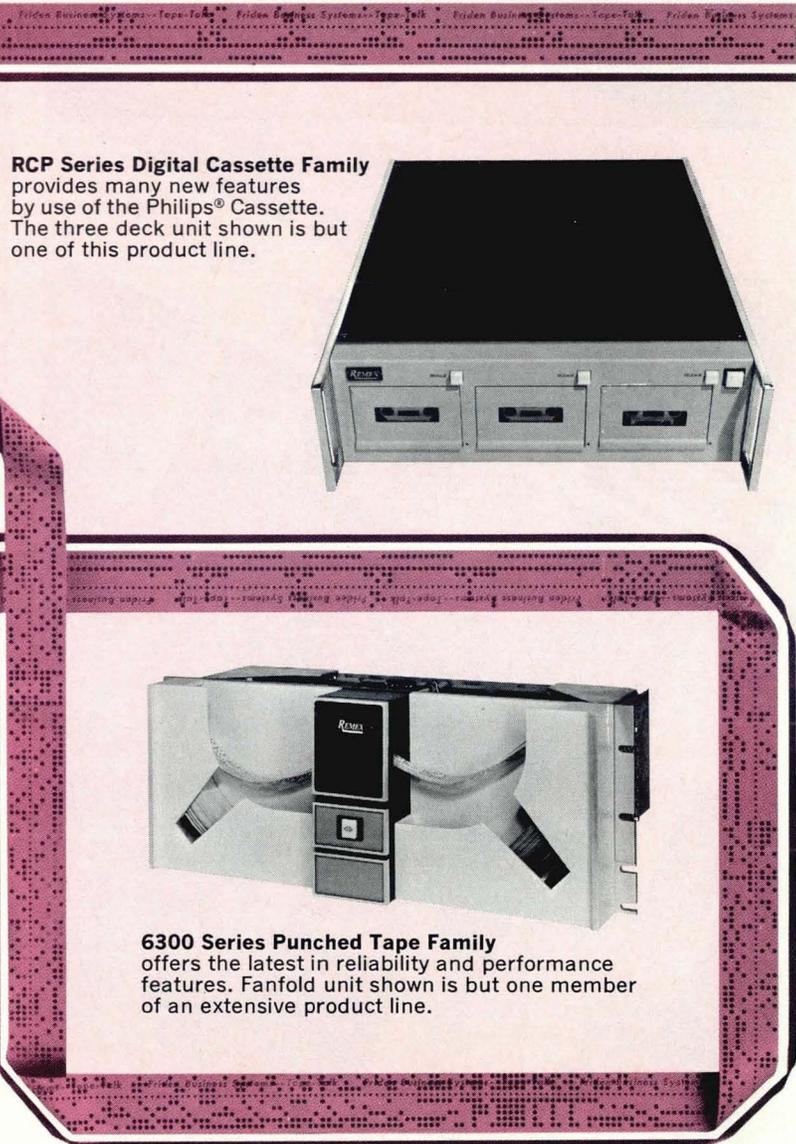
established for cassette, both products have great value and will live long and healthy lives.

Many details on Remex cassette systems are thoroughly explained in new technical brochures. Let us show you that we mean to be good for your business. Call or write Remex, 1733 Alton St., Santa Ana, California 92705. (714) 557-6860. In Europe and the U.K., contact S.p.A. Microtecnica, Torino, Italy.

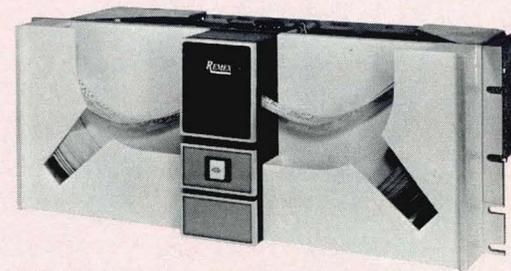
Guidelines in Selecting a Peripheral Concept

Write for your copy of the basic evaluation guide in selecting the best peripherals for a given application.

REMEX
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RCP Series Digital Cassette Family provides many new features by use of the Philips® Cassette. The three deck unit shown is but one of this product line.



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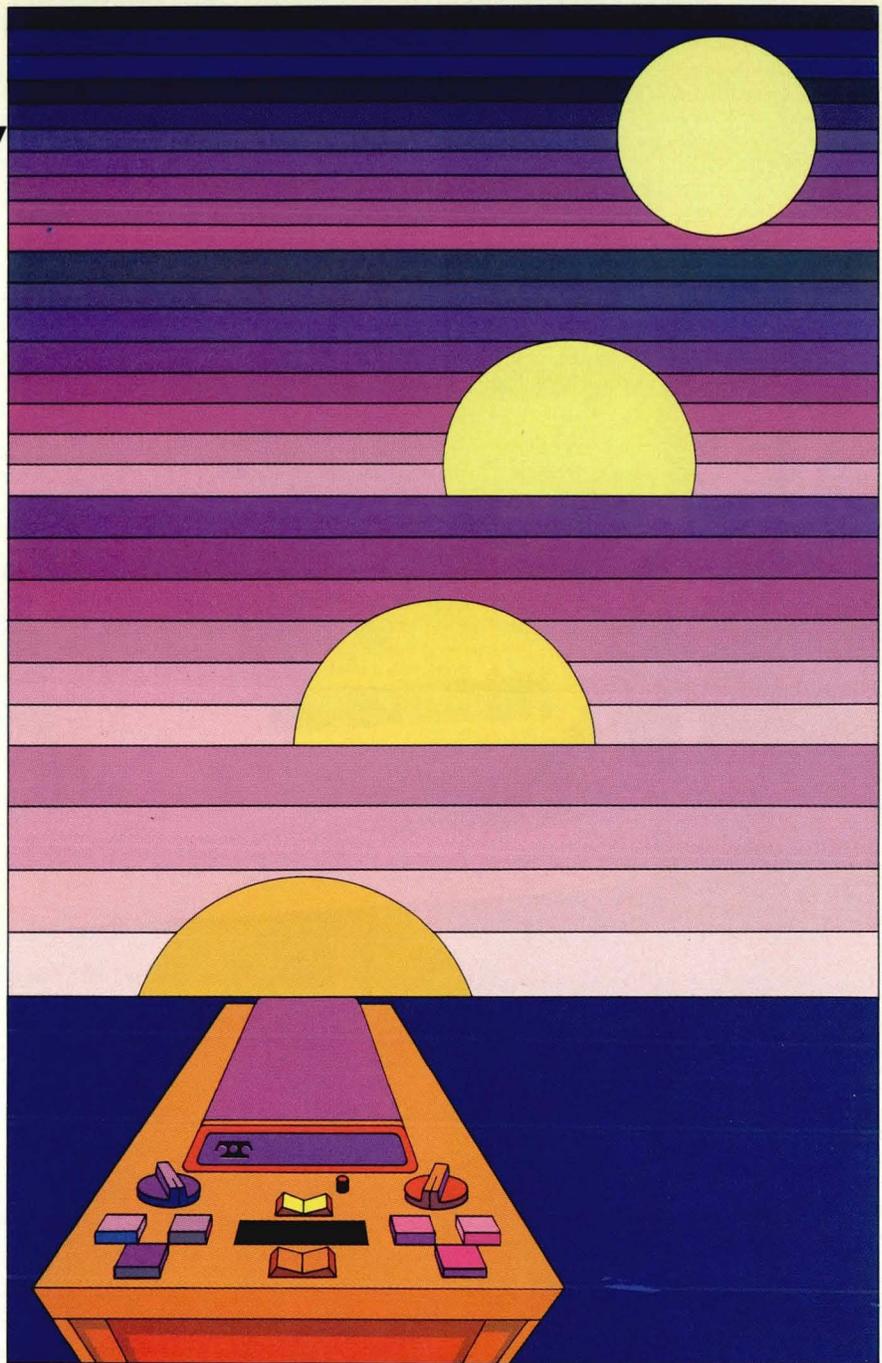
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available. At up to 2400 baud for efficient utilization of voice grade channels.

Not only does the 4210 send out previously prepared tapes while everyone is at home relaxing, the unit also receives new data. And if time is critical, the automatic rewind and local print-out option allows data to be recorded and printed out.

Completely unattended. So when everyone shows up in the morning, the data received during the night is there, waiting. And the machine is ready to start its daytime job as a data preparation terminal.

It takes more than manufacturing facilities to build this kind of versatility into the machines Teletype Corporation offers. It also takes commitment. From people who think service is as important as sales. In terminals for message communications and computers.

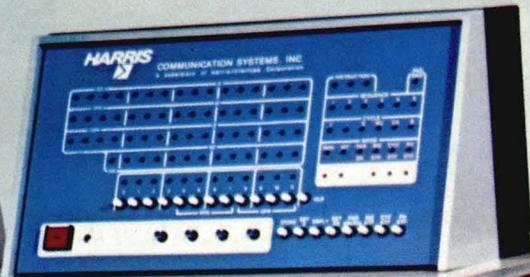
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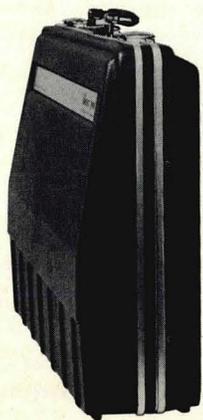
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TEXAS INSTRUMENTS

INCORPORATED

CIRCLE NO. 27 ON INQUIRY CARD

A SPECIAL SECTION FEATURING THIS MONTH:

DATACOM NEWS

DATACOM Q & A

DATA COMMUNICATIONS

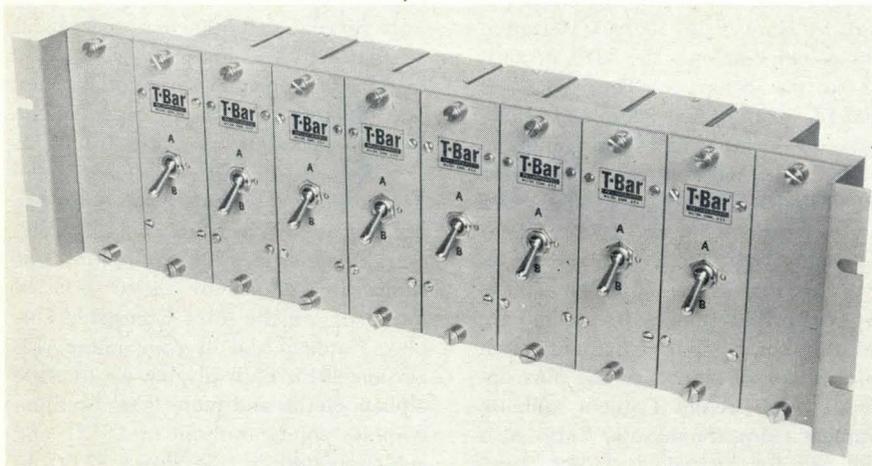
PRODUCT PROFILE

DATACOM NEWS

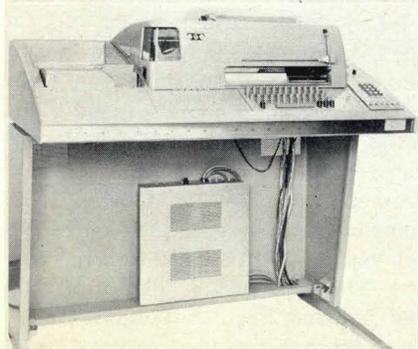
MODEMS, MUXES and MISC.: Dataprobe's (South Hackensack, N.J.) new EIA interconnect system uses T-link boxes with built-in LED indicators. Cost is \$896 for 20 circuits . . . Data Products Corp.'s Telecommunications Division (Stamford, Conn.) has introduced the UM-EIA a "universal" modem module for use in TTY networks. The module is the basic building block in the firm's DataPak Fre-

quency Division Multiplex system . . . The DH11 communications interface from Digital Equipment Corp. connects up to 16 async channels to a PDP-11, with transmission speed, character length and polarity, stop code length, and transmission mode all *software-selectable* for each channel. The basic unit sells for \$4,000; with channel adapters and cables for 16 local terminals, about \$318 per channel . . .

General DataComm Industries (Wilton, Conn.) offers TTY users its 101-5 Multimodem (\$605), a full-duplex serial modem for dial-up operation at speeds to 300 baud. The Bell 101C replacement mounts in a Model 33 or 35 . . . From Penril Data Communications (Rockville, Md.), a 2400-baud, Bell 201B-compatible modem, the 2400B-1 . . . OEM modem manufacturer Inter-tel (Burlington, Mass.) has announced a new product line and a new market strategy. The firm's Modem Communication System line consists of medium-speed modems, modem-related options, and communication system accessories targeted for end-users of medium- to large-scale networks . . . Science Accessories Corp.'s (Southport, Conn.) CC-4 Coupler accepts up to 48 bits of parallel data and transmits them serially (binary or BCD) at 110 to 9600 baud . . . Three from T-Bar (New York, N.Y.): ASCII Unattended Remote Control Switch (\$500 to \$3,000); EIA Channel Switch for IBM 270X, 3705 or Memorex 1270; and EIA Fall Back Switch (\$98.50 per position).



T-Bar's EIA Fall Back Switch



General DataComm's "Multimodem" mounts in TTY.



CC-4 serializing coupler from Science Accessories Corp.

• • • •

INDEPENDENTS' DATACOM GROWING, TOO

Independent telephone companies have recorded a 250 per cent increase in datacom connections during the past five years, according to J. K. Galloway, president of the U.S. Independent Telephone Association. The number of connected modems increased from 4800 in 1967 to 16,800 at the end of 1972, according to Galloway. Although statistics for the independents are heavily weighted by large companies such as GTE, United, and Continental, Galloway reported that many of the very small companies have also found data "a revenue source of growing importance." You betcha.



TERMINALS • TERMINALS

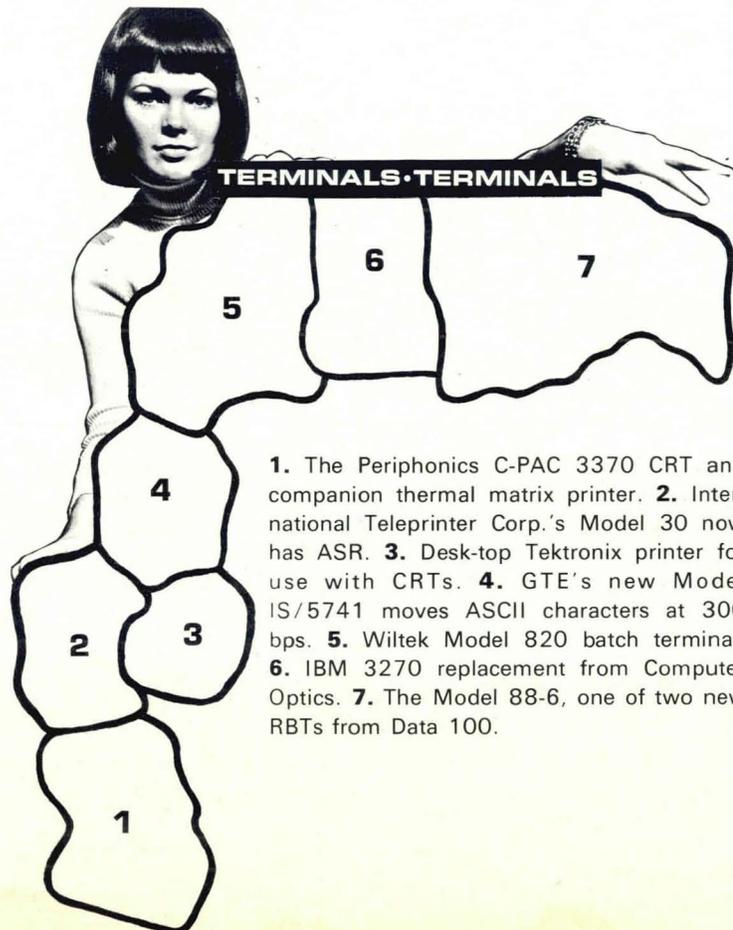
..... Amalgamated Wireless Ltd. (Arlington, Va.) has introduced an intelligent CRT terminal with a 28x80-character screen capacity and 96-character ASCII subset . . . Plug-compatible with the IBM 3270 Display System, the new CO:77 from Computer Optics (Bethel, Conn.) can save the user from \$2,000 (eight-station system) to more than \$8,000 (16-station system) per year over the 3270, according to the company. The CO:77 is available with 480-, 960-, and 1920-character screens, and can include a character or page printer . . . Data 100 (Minneapolis, Minn.) offers two new terminals: The Model 71, an IBM 3780-compatible batch terminal for bi-sync operation at 2000 to 72000 bits/sec, priced from \$810 per month; and the Model 88-6, a remote batch terminal for \$545 per month plus options . . . Fairchild Camera and Instrument Corp. (Sunnyvale, Cal.) has a teletypewriter terminal buffer complete with editing that allows transmission at speeds up to 1800 bits/sec. Prices: 8K version, \$1,600 or \$63/month; 16K version, \$2,200 or \$86/month, excluding maintenance . . . The Frederick Electronics subsidiary of Plantronics (Santa Clara, Cal.) now offers an expandable teletypewriter buffer. Priced at \$1,595, the Model 1300A Electronic Storage Unit operates at speeds up to 1200 bits/sec with 2,560 characters of storage . . . The IS/5741, a 30-chars/sec ASCII teletypewriter for \$115/month is the

first in a series of ASCII terminals to be offered by GTE Information Systems . . . A 24X64-character-capacity CRT terminal, the C-PAC 3370 is now available for use on Periphonics Corp.'s (Bohemia, N.Y.) T-COMM 7 front-end processor . . . International Teleprinter Corp. (Carlstadt, N.J.), a Singer subsidiary, has introduced an ASR version of its 30-chars/sec Model 30 that sells for approximately \$2,200 to \$3,200, depending on options and size of order. The paper tape module is also separately available to OEMs . . . Sycor's (Ann Arbor, Mich.) Model 340 intelligent terminals now offer the option of TWX/Telex compatibility . . . Two recent additions to the Tektronix (Beaverton, Ore.) 4010 series of terminals are the 4014 Computer Display Terminal and its companion APL version 4015. Both display up to 8500 alphanumeric characters and more than 1-million graphics points, transmit in ASCII, and are supported by the firm's PLOT-10 software. Model 4014 is \$8,450; Model 4015, \$8,950, plus options. Also available is the 4632 Video Hard Copy Unit (\$2,950), a non-impact printer that works with standard T.V. or digital video signals . . . Trivex, Inc. is now using the variable-speed Memorex 1250 communication terminal for hard-copy printout in its CRT 40/80 terminal system. The 1250 runs at 10, 15, 30, 60, and 120 chrs/sec . . . Western Union Data Services Co. must be starting a "terminal of the month club" — First the EDT 300 MSR, then the EDT 33

MSR, now this month's installment, the EDT 1200 KSR. It's good for 10, 30, and, yes, 120 chars/sec, generates 128 ASCII characters, and is equipped with an EIA RS232 plug for possible connection to your own equipment (Western Union doesn't mind, remember?). Excluding modem, monthly rental is \$165 on a one-year lease; \$185 for a minimum 90-day lease . . . The new **Wiltek** (Norwalk, Conn.) Model 820 adds a 200-card/min card reader to Wiltek's basic batch terminal . . . **Ann Arbor Terminals'** (Ann Arbor, Mich.) Series 204 Display Controllers are designed for superimposing alphanumeric data on ordinary TV video, displaying 1, 2, or 3 lines or a full screen of 16 lines (32 characters per). Controllers, \$930 to \$1155; keyboards, \$250 to \$300; video monitors, \$130 to \$398 . . . **Centronics** (Hudson, N.H.) printers can now be used with Honeywell Series 16 minicomputers via a new Centronics interface (\$1,200) . . . **Delta Data Systems** offers a polling interface option (\$375) that enables its Delta 5000 Series CRT terminals to operate in polling, "quick select" (computer transmission to one terminal), and broadcast modes . . . A new version of **Hughes Aircraft's** (Oceanside, Cal.) Conographic-12 graphics/alphanumeric display terminal features 1029-line resolution. Prices start at \$12,700 . . . Still waiting for the phone company to install tone dialing in your exchange? You can "convert" your rotary dial phone for only \$58

with **Interface Technology's** (St. Louis, Mo.) Model 721 Remote Data Entry Terminal, a 12-key pad with an internal speaker for audio coupling to the mouthpiece. The more comfortable-looking Model 720 (\$65.50) has an external speaker . . . The IT 800 NL intelligent terminal from **Megadata Computer and Communications Corp.** (Deerpark, N.Y.) accepts Associated Press and United Press International wire service transmissions and displays them on video monitors in full- or split-screen format. The 300-words/min terminal, which also includes a keyboard/CRT edit monitor for locally originated messages, sells for \$4,250 (quantity discounts available) . . . Another new version of the **Sycor** (Ann Arbor, Mich.) Model 340 intelligent terminal — a remote job entry configuration — is the "lowest cost, intelligent [IBM] 2780 [-compatible] terminal on

the market," according to the manufacturer. With keyboard, CRT, 7K memory, bi-sync communications, 250 cards/min reader, and 80 chars/sec printer, the lease-plus-maintenance price is \$463/month; with 300 lines/min printer, \$878/month . . . **TEC** (Tucson, Ariz.) has announced a CRT terminal for less than \$1,000. The **MINI-TEC**, latest in the company's **DATASCREEN** line of terminals, has an 80x12-character buffer, displays 63 ASCII characters, transmits at speeds from 110 to 9600 baud, and features blink, protected display areas, field tab, and keyboard or computer cursor control. In OEM quantities, \$995; one to five units, \$1,300 . . . **Terminal Communications** of Raleigh, N.C., has a 30 chars/sec teleprinter, the TC-241, designed for compatibility with IBM 2740 Models 1 and 2. . . . *Datacom News cont'd. on next page*



1. The Periphonics C-PAC 3370 CRT and companion thermal matrix printer.
2. International Teleprinter Corp.'s Model 30 now has ASR.
3. Desk-top Tektronix printer for use with CRTs.
4. GTE's new Model IS/5741 moves ASCII characters at 300 bps.
5. Wiltek Model 820 batch terminal.
6. IBM 3270 replacement from Computer Optics.
7. The Model 88-6, one of two new RBTs from Data 100.

SMALLER SWITCHER — Computer Communications, Inc. of Culver City, Cal., has added a little brother to its CCI-7000 family of message switching systems. Upward-compatible with the larger multiprocessor models of the series, the 32-line CCI-7000 Model I is a store-and-forward switcher usable in terminal message switching and/or front-end (to IBM System/360 or 370) configurations. Up to 256 asynchronous and binary synchronous terminals can be connected via switched or dedicated lines. Depending on terminal types and line disciplines, throughput ranges from 2000 to 3000 chars/sec. A typical turnkey configuration would consist of a CC-701 communications processor, and I/O processor, 32K bytes of core storage, 1.3 million bytes of disc storage, interface modules for 32 low-speed lines, a color CRT console, and operating software, selling for about \$125,000.

FOR YOUR PBX — The "Galaxy," a computer-controlled, dynamically reconfigurable automatic call distributor from **Collins Radio**, switches time-division multiplexed, pulse code modulated voice signals, displays line status via CRT, and prints out summary reports . . . Computer Assisted Toll Analysis (CATA), a telephone usage cost analysis service for **ComTrol** (St. Paul, Minn.), groups all toll calls within a given period by cost-per-minute WATS band, 10-digit number, type (station, person, WATS, direct-dialed) and duration. For clients without WAT service, WATS data can be simulated for the study period.

CONTRACTS, ETC.: Under a seven-year contract, **CPI Satellite Telecommunications** will lease one full transponder (480 full-duplex circuits) on **American Satellite Corps's** domestic communications satellite network, which is initially using Telesat Canada's Anik satellites . . . **Collins Radio** will supply a \$2.8-million banking data communications system to **Integreer Databehdling A/s** in Norway . . . **General Data Comm Industries** has a \$500,000 contract from **United Press International** for a nationwide communications network, part of a major UPI

POLICE DATAKOM — Dallas County (Texas) has installed a Telecontroller message switching system to provide better communications between the Dallas County Sheriff's Office, other law enforcement agencies, and the Texas Dept. of Public Safety. Sold by **Action Communication Systems** of Dallas, the switcher allows agencies in the 16-county North Central Texas region to query county, state and national files . . . In Georgia, the **Fulton County Sheriff's Dept.** has replaced the traditional police blotter with an IBM 3270 CRT. Linked to the county's S/370 Model 145, the terminal provides an up-to-the-minute index of the jail's population, establishes a court schedule, and calls attention to persons detained for an unusual period of time without hearing or trial.

MESSAGE SWITCHER — Interdata (Oceanport, N.J.) has introduced a full-blown store-and-forward message switching system, available from the manufacturer on a single-source turnkey basis. Called the MS-5, the new system is built around Interdata's well-known "New Series" Model 50 communications processor and its Real-Time Telecommunications Executive (RTEX) operating system. A typical turnkey installation consisting of microprogrammed, 32K-byte Model 50, five megabits of disk storage, magnetic tape, card reader, teleprinter, and a 30-line telecommunications subsystem module, goes for \$190,000. The MS-5 can be used as a single front-end, controlling a terminal network, or can be configured in a multiple-switcher network, with each MS-5 acting as a regional switching center. MS-5 systems can also be combined to any level of redundancy, according to Interdata. Major operating features include speed, format and code independence; header, text, and format validations; message copies on request; automatic recovery and restart; and an optional billing system. IBM S/360/370-oriented on the host side, the MS-5 is compatible with a long list of carriers and services.

project to convert manual editing and copy transmission systems to an all-electronic system . . . **Moore Systems** of Sunnyvale, Cal., has won the contract for the alarm and control equipment portion of **Western Union's** WESTAR domestic communications satellite system . . . **TRW**, prime contractor for the \$36-million joint Navy/Air Force Fleet Satellite Communications System, has awarded a \$4.5-million subcontract for the receiving subsystem to **Electronic Communications**, an NCR subsidiary.

TIME-SHARING — Remote Computing Corp. of Palo Alto, Cal., seems to be just completing an expansion every time we look. RCC recently announced support of the popular Datapoint 2200 Intelligent Terminal (120 chars/sec). RCC also offers programming and software support for Datapoint 2200 Computer Aided Data Entry (CADE) applications. Users will be assisted in developing individualized editing programs and in converting time-sharing programs to take advantage of CADE techniques.

SWITCHLESS TELEPHONE — At the Dallas-Fort Worth airport (now under construction), the LITCOM division of Litton Industries will install its first non-military Terminal Communications Switching System, (TCSS), which LITCOM also calls by the more descriptive name, "switchless telephone." Basically a radiotelephone system via a single coaxial cable, the TCSS places a radio-frequency tuning apparatus behind the dialing mechanism of each telephone station (in this case, at air traffic controllers' positions, pilots' cockpits, etc.) so that each telephone becomes a single-sideband transceiver with its own assigned frequency. The system carries voice, data, television, and facsimile, and is said to allow faster access than conventional switching systems. Since it eliminates the need for a separate circuit for each dialable number, the TCSS could go a long way toward neatening up a lot of communications systems — not to mention conserving copper.

Hello? — The Peking satellite earth station, whose construction has been covered in these pages, has gone into commercial operation, according to RCA Global Communications, supplier of the station. Linking Peking via the Pacific Intelstat IV to Jamesburg (Cal.), and other countries' earth stations, the Peking station is now handling regular commercial traffic including telephone, leased channel, telegram and facsimile, and can carry live television between the People's Republic of China, the United States, and other locations in the Pacific area. RCA Globcom is also expanding the Shanghai station it installed in early 1972. The day may not be far off when an American chop-suey manufacturer sponsors *Kung-Fu* in Shanghai.

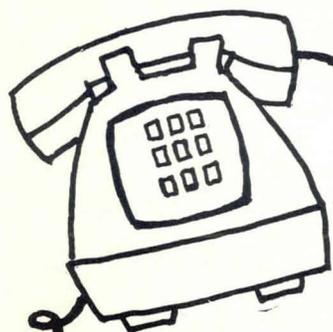
BANKING — The Society for World-wide Interbank Financial Telecommunication (SWIFT) was legally incorporated as a nonprofit society with 239 member banks in North America and Europe. SWIFT is looking toward a 1976 completion of its planned store-and-forward message switching network with switching centers in Amsterdam and Brussels, and concentrators in 14 cities on the two continents. London-based **Logica Limited** wrote the detailed hardware and software specifications for the giant project . . . **Financial Data Sciences** of Winter Park, Fla., is wooing the banking market with a bunch of new product offerings. The firm's new Transaction Teller Terminal 108 (\$8,600), a microprocessor-based terminal for small branches and institutions, features a cassette tape unit with audit controls. Two other newcomers, the Communications Network Concentrator 410 (\$55,000 to \$120,000), both handle up to 128 lines, with 20 terminal processors on each line (each terminal processor connects up to 16 teller terminals or auxiliary devices). Rounding out the lot is a new card reader/writer that encodes the customer's account balance as well as identification data on a plastic card, thus allowing it to replace a passbook.

"Pocket Terminal" from Interface Systems is four keys up on Bell Touch-Tone telephones.



TALKING . . . AND LISTENING — The use of voice recordings in such applications as telephone switching systems and voice answerback data entry systems has always presented problems. Ordinary tape recordings sound human, of course, but they wear out fast. Electronic voice synthesizers, on the other hand, last almost forever, but sound like science-fiction robots because their basic recording unit is not the whole spoken word but the phonetic segments that make up words. **Master Specialties Co.** of Costa Mesa, Calif., thinks it has a solution. With a proprietary analog/digital conversion technique, MSC says it can reduce the usual 40 kilobits normally required to store a typical word to as little as 8 kilobits, while still retaining natural voice qualities. The firm claims the quality is so good, in fact, that a listener could recognize the person whose voice was used in the original recording. . . To validate that claim, you might want to use **Datawest Corp.**'s (Scottsdale, Ariz.) new "Voice System", a computer-based voice-print identifier. Expandable from eight lines to 128 lines, it requires no other terminal but the telephone, and is said to be compatible with all currently-available mainframe equipment. . . The T-16 "Pocket Terminal" from **Interface Systems** of Ann Arbor, Mich., is a Bell Touch-Tone compatible, 16-key pad for use with voice answerback systems, including the firm's own Model S-11. The eight-ounce, acoustically-coupled terminal sells for \$140, with quantity discounts available.

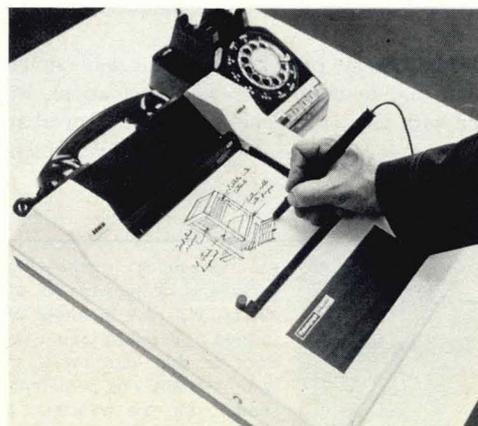
TASK/MASTER IMPROVEMENTS — **Turnkey Systems Inc.** of Norwalk, Conn., has announced a direct interface to IBM's DBOMP and BMP file-handling systems via TSI's "Task/Master" telecommunications monitor. Available in fourth quarter 1973, the new interface will allow full multi-thread operations among on-line tasks operating under the facilities. TSI also said it would add full file reconstruction facilities. Currently available for use in a virtual memory environment under DOS/VS, OS/VS1 and OS/VS2, "Task/Master" will be modified for improved operation with VS and VT access methods by the fourth quarter.



Hello, Landlord? — It's nice to know that if the temperature in your apartment falls below -40°F, your phone will still operate (although you may not). Photo shows a phone in a test chamber at Western Electric's Indianapolis engineering center.



Telephone that writes — From **Telautograph Corp.** of Los Angeles, the "Telepen" sends and receives diagrams, signatures, and the like via simple acoustic coupling. The 19-pound graphics transceiver holds up to 500 pages of roll paper, and can receive messages without operator assistance.



DATA BASE SYSTEMS — BATCH UPDATING

Bradley V. O'Brien • Western Union Data Services, Mahwah, N.J.

Q What are some typical data base systems?

A The original teleprocessing systems — for airline reservations and stock price inquiry — were designed specifically to provide remote access to a data base. The applications of data base systems have gone well beyond those original two and now include such systems as retail credit, warehouse inventory, hotel reservations, and stolen car lists.

Q What is the essential distinction between inquiries and updates?

A An inquiry into a computerized data base usually requires an immediate or very rapid response back to the inquirer. However, the process of *updating* the data base may or may not be a fast response function. In the case of airline reservations, the data base inquiry and data base updating are generally carried out in one integrated transaction from the reservation clerk's location. Conversely, for credit and stolen car data bases, updating is performed on a batch basis during the "off-line" time of the data base computer. There are very few applications where the updating response time must be immediate.

Q Which process can use the simplest terminals?

A The inquiry process. In credit and stolen car applications, and in most inventory applications, a Touch-Tone phone with computer-generated voice answerback capability provides a very simple, low-cost terminal which is perfectly adequate.



As manager of market planning, Mr. O'Brien is responsible for all market research and new business planning performed at Western Union Data Services. Prior to this assignment, Mr. O'Brien was assistant vice president, market research, for the Western Union Telegraph Co., and before then held various marketing and engineering positions with General Electric and Honeywell.

Q What types of transactions update a data base?

A In general, there are only two basic transaction types which update a data base: additions and deletions. For example, in a warehouse these would be warehouse withdrawals or sales orders, and warehouse receipts. In the case of stolen cars, they would be stolen cars reported and stolen cars recovered.

Q How and when is the data base updated?

A Since any interruption of the system's inquiry/response capability is costly, information prepared during working hours from the various transactions which update the data base is usually stored at the remote terminal for automatic collection and processing by the central computer during the night.

Q How much updating information is typically required?

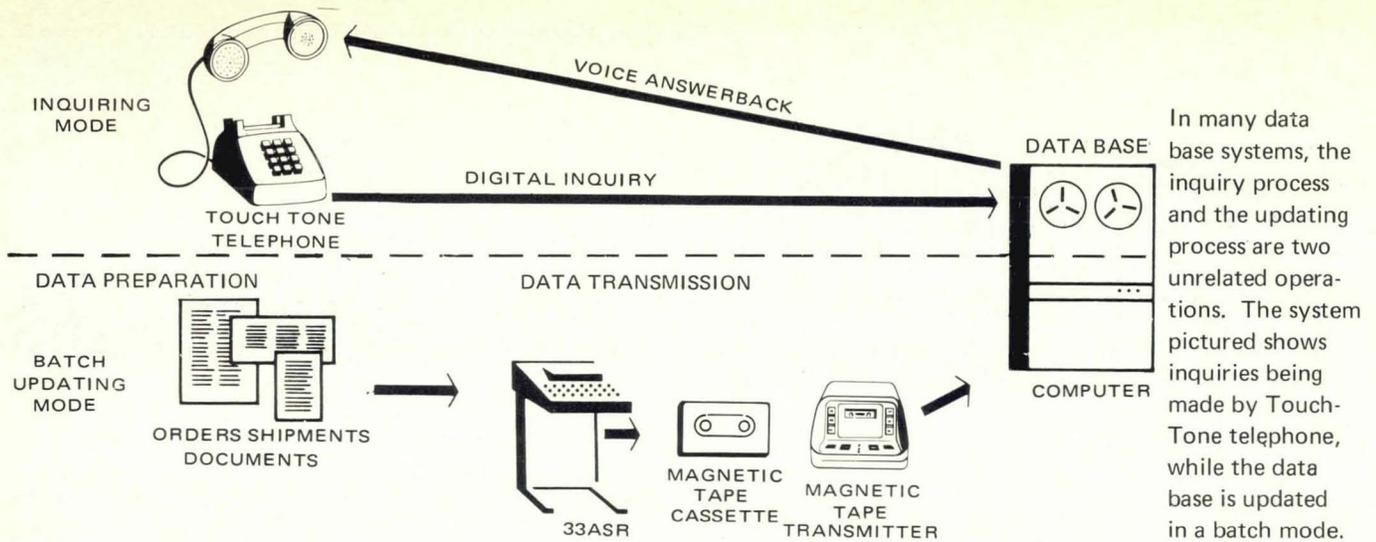
A The volume of information required for data base updating varies widely depending on the size of the data base and the activity of the updating transactions. For physical goods data bases, such as warehouse and store inventories, the data volume tends to be in the 10,000 to 20,000 character range per remote location, per day. Information-only type data bases, such as credit, stolen cars, etc., tend to have lower volume per remote location.

Q What about security?

A Whatever considerations dictate that security precautions must be taken for inquiries apply as well to the updating phase of the data base application. One common security step is to have all calls for updating information originate from the computer centers.

Q Dial-up or dedicated lines?

A Because of the rapid response required in the inquiry



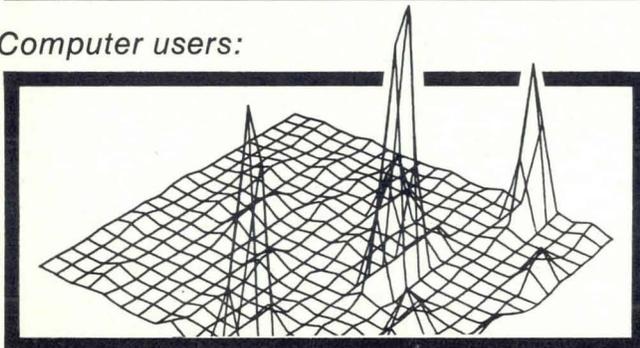
In many data base systems, the inquiry process and the updating process are two unrelated operations. The system pictured shows inquiries being made by Touch-Tone telephone, while the data base is updated in a batch mode.

operation, inquiry terminals are connected by dedicated lines to the central computer. If these inquiry locations are also the updating locations, the updating terminals will be connected by the same dedicated lines. However, frequently the inquiry and the updating functions are performed at different places. In these situations, because of the relatively higher volume per connection and the lower speed of response requirement for updating, dial-up lines are usually satisfactory and much more economical. The off-hour use of a dial-up network presents attractive economics for its use in a batch-type transmission environment.

Q What is the most important consideration in choosing a terminal?

A As with most data communication applications, the predominant consideration in the choice of a terminal is data volume. The reason is two-fold. One, the tradeoff between terminal equipment cost and line cost is a direct function of volume. Second, the most expensive element of any terminal-oriented system is the terminal operator. This creates another tradeoff between equipment cost and operator cost, which also is a function of data volume. ▲

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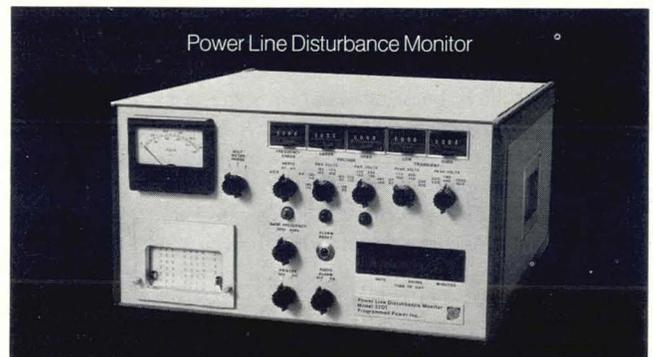
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CIRCLE NO. 29 ON INQUIRY CARD



Part I — Communications Equipment

The development of modern computer systems has included a long series of achievements. The continuing and dramatic increases in raw computing power per dollar represent one such achievement. This progress in mainframes has been paralleled by the development of a host of impressive electromechanical peripheral devices. While they haven't managed to keep up with the pyramiding speed advances made in mainframe operations, these devices have nonetheless achieved extraordinary levels of performance and reliability.

Before you retort that you are all too well acquainted with drives that plow furrows in discs with their heads and card readers that function more like paper shredders, consider the even more perverse behavior of most other mechanical devices in your everyday life. By all comparative standards, modern computer peripherals are remarkable.

Another achievement in computer history has been the building of an unparalleled marketing dynasty (that's IBM, for those who have been off-planet for the last 15 years).

There have been some non-achievements as well. The most obvious is the slowness with which adequate software has been developed. After all, the concepts of multiprogramming, timesharing, virtual storage, and management information systems have been around ever since the 1950s. The struggle to make good use of the expanding computer processing power available has been matched, however, by the slowness with which business procedures have been codified and improved to accommodate the opportunities offered by computer systems. Truly, a great amount of work remains to be done before all the potentials of the computer will be fully exploited.

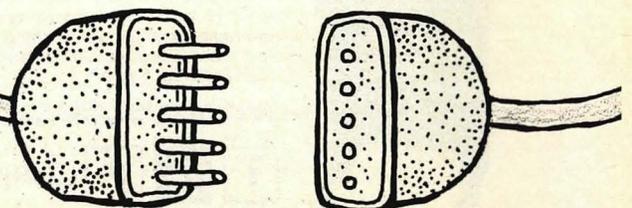
There is one more story that needs relating. And that is the subject of this Profile and the one to follow next month. The same dominance that has enabled IBM to build an empire has also given rise to a whole new market: the building of replacement components for the thousands of IBM computers in the field.

PLUG-COMPATIBILITY

There have always been replacement-parts industries for various types of products such as automobiles and radios. But the computer system is quite different from other products. It is composed of a number of units connected together by nothing more complicated than a cable. Changing a unit such as a disc drive or printer is simply a matter of unplugging it, wheeling in a new one, and connecting the plug. Physically, that's all there is to it. Everything is fine as long as the new device works just like the old one. There are few mechanical details to worry about, and those are generally related to timing.

Of primary concern are the logical interfaces — the interpretation of the digitally encoded commands that tell the device what to do and when to do it. While it is possible to work directly with a computer system and discover its logical interface, this is generally not a practical endeavor. The number, type, form, and binary coding of the command system can usually be determined from the conventional manuals accompanying a computer system. But there is still one big gap, and that has to do with the plug itself. On which wire does which signal come, and what are the precedence and timing relationships among all the various types of signals? IBM makes this information available to other vendors, but only after IBM's own product is delivered.

The foregoing discussion relates primarily to devices connected directly to the computer in the same room. This brings up a dichotomy in plug-compatible devices: directly connected devices such as disc drives, tape drives, line printers, and even main memory; and a second type which comprises a wide variety of remote communications devices. This profile deals with the plug-compatible communications devices; the directly connected units will be similarly reviewed next month.



COMMUNICATIONS DEVICES

Communications equipment can be classified in several different ways, depending on whether function, speed, application, input/output media, network organization, or some other characteristic is taken as the separating criterion. One common grouping is conversational, batch, and controlling; in this grouping, the manner of use and basic function within a system are combined to categorize the equipment. To reduce this article to manageable size, some distinction was necessary. Thus, we are talking mainly about batch and controlling equipment. For the purposes of this article, clustered CRT data entry systems are regarded as batch terminals in the sense that data flow is generally in large blocks to the central point (conversational or inquiry operation can also be achieved with clustered CRT systems).

Within the group of conversational communications devices not covered, there are plug-compatible units as well. The most notable examples are the many CRT and typewriter terminals available to replace Teletype teleprinters or IBM 2740/2741 I/O terminals. The batch and controlling devices reviewed this month include many examples, however. The rapid increase in the ratio of processor performance to cost and size has enabled a number of companies to field a multiple-item product line without the conventional research and development costs through the expedient of programming.

COMMUNICATIONS INTERFACING

One key characteristic that distinguishes a communications device from a directly connected device is that the plug-to-plug interface is much simpler. A rigid specification EIA Standard RS-232, governs virtually all communications devices used in commercial computer communications systems, with the single exception being Touch-Tone and equivalent telephones when used as communications terminals. The communications interface is quite simple by comparison with that of a directly connected device. The severe limitations of the communications channel prevent the implementation of all the various parallel data and command paths common to directly connected devices. The varying and unpredictable timing relationships among signals transmitted over long distances make it unfeasible to implement such a complex interface.

But you're not home free — not by a long shot. The communications device, like its directly connected counterpart, requires an exchange of commands and replies to control the system's functions, particularly in a clustered system with many devices at one point sharing a single controlling element and connection to a line, or in a multipoint system with many devices at different locations sharing a single line. The command structure is achieved by adding sequences of control characters at the beginning of a string of data characters.

In addition, transmission over a communications line is much more error-prone than a transfer of data across a cable connecting, say, a disk drive with the host computer. Thus, an additional level of command structure is imposed to check whether data has been received correctly and whether transmission can proceed or the previous data must be retransmitted.

The sum total of these command procedures is called the line protocol. Fortunately, there are some standards in this area. There is an official ANSI standard (also called ASCII), and there is the unofficial, but widely used IBM Binary Synchronous (or BSC or bisync) protocol. Other computer manufacturers have developed their own, which are frequently minor adaptations of ANSI.

As with all binary-encoded data, there must be compatibility with respect to the coding technique or code used. Again, there are two widely used forms corresponding to the two popular line protocols: ASCII with the official ANSI standard, and EBCDIC with IBM's method (IBM does offer the option of ASCII operation with most of its communications gear, but bisync with EBCDIC predominates).

MINICOMPUTER EMULATION

Imitation of a particular communications device by proper interpretation of a string of control characters is just the sort of thing that a small computer can do very well. It is no surprise, then, that a large market has arisen in imitating not only IBM communications equipment, but that of sev-



Mr. Reagan joined Datapro Research Corp. in 1969 and played a major role in the development of Datapro 70, the Company's looseleaf EDP information service. His specialties as Research Director cover data communications, software analysis, scientific computer applications, and the compilation and presentation of technical information. Positions held previously involved editing and management functions at Auerbach, another EDP report organization, and computer stress and vibration analysis as an engineer for the U.S. Army and GE. Mr. Reagan graduated Cum Laude from Louisiana Polytechnical Institute in 1958 with a B.S.M.E. and has done graduate work in applied mechanics at the University of Cincinnati.

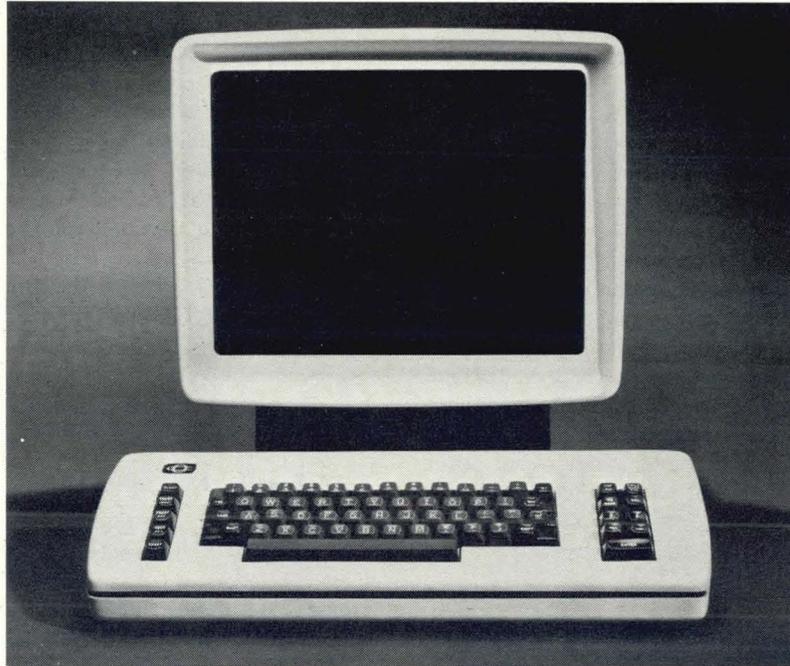
TABLE 1

COMPATIBLE CRT DISPLAY TERMINALS & SYSTEMS*

| Company | IBM 2260 | IBM 2265 | IBM 3270 | Features & Other Compatibility |
|-----------------------------------|---------------------------|--------------------|------------------------------|--|
| Beehive Terminals | Super Bee | Super Bee | Super Bee | programmable; 9600 bps; 2048-char display |
| Comptek | Model 200 | Model 200 | Model 200 | programmable; 9600 bps; 2000-char display; XDS-compatible (Model 400/F7) |
| Computer Optics | CO:75/E | — | CO:77 | shared-controller programmable; 9-displays (CO:75) & 32-displays (CO:77) per controller |
| Conrac | — | — | Model 401 | shared-controller; 9600 bps rate; 1000/2000-char display; Burroughs TC800-compatible model |
| Courier Terminal Sys. | Executerm 60, 250 & 260 | Executerm 65 & 265 | most features in Executerm's | stand-alone/shared-controller models; 4800 bps; 1920-char display; Spectra 70-compatible models |
| Data Disc | Anagraph | — | — | shared-controller programmable; 16-displays per controller; graphics capability; 4800 bps |
| Datapoint | 3360 | 3360 | — | stand-alone/shared-controller models; 64-displays per programmable controller; 4800 bps; 1920-char |
| Delta Data Sys. | Delta 5200 & Multi Term 2 | Delta 5300 | Delta 6000 | stand-alone/shared-controller models; 95-displays per programmable controller; 9600 bps; 3072-char |
| Four-Phase Systems | System IV/40 | — | System IV/40 | stand-alone/shared-controller models; 16-displays per programmable controller |
| GTE Information Sys. | IS/7700 | 7000/7100 | IS/7800 | stand-alone/shared-controller models; 24- to 30-displays per programmable controller |
| Incoterm | SPD 10/20 | SPD 10/20 | SPD 10/20 | stand-alone/shared-controller models; 4-displays per programmable controller; Burroughs TC500/700-compatible |
| ITT Data Equip. & Sys. | 3100/3104—3108-3116-3132 | 3100/3101 | — | stand-alone/shared-controller models; 16-displays per controller; 2400 bps; 1920-char display |
| Megadata | SR 1070/2080 | — | — | shared-controller; 31-displays per controller; 2400 bps; 1600-char display |
| Raytheon Data Sys. | PTS-100 | PTS-100 | PTS-100 | stand-alone/shared-controller models; 64-displays per programmable controller; 9600 bps; 1920-char |
| Sanders Data Sys. | 810 | 810 | 810 | stand-alone/shared-controller models; 32-displays per programmable controller; 9600 bps; 1920-char display |
| Sycor | — | — | 250 | stand-alone/shared-controller models; 32-displays per programmable controller; 4800 bps; 1920-char display |
| Sys Computer | Editerm 200 | — | Editerm 200 | shared-controller programmable system; 32-displays per controller; 9600 bps; 1920-char display |
| Terminal Communications | TC 60/160 | — | — | shared-controller system; 24-displays per controller; 2400 bps; 960-char display |
| Texas Scientific | Entelekon 80 & 100 | Entelekon 80 & 100 | Entelekon 100 | stand-alone/shared-controller models; 64-displays per controller; 9600 bps; 1920-char display |
| Trivex | 40/80 | — | — | shared-controller system; 32-displays per controller; 9600 bps; 960-char display |
| Wyle Computer Products | Series 8000 | Series 8000 | most features in 8000s | 9600 bps; 1920-char display |

*Table compiled by staff of MODERN DATA

**The IBM 3270 is a fine display system.
To compete with it, Computer Optics
made a superior display system that is
truly interchangeable and far less expensive.
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ten key numeric pad; up to 9600 bps transmission rate; large cursor with reverse image; full range of display sizes: 960, 480 or 1920 characters; n-key rollover vs. IBM's two-key rollover.

Computer Optics: the company itself—Computer Optics has been selling information display systems since 1968. It is the organization that puts its *first* emphasis on expanding the state of the art in computer peripherals technology. This kind of venturesome thinking created the CO:77 Information Display System. And Computer Optics is pressing forward with work on ahead-of-the-art computer developments for the years immediately ahead.

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PRODUCT PROFILE

eral other mainframe manufacturers as well. Minicomputers perform this emulation in a straightforward manner by executing a program that interprets the control characters and responds accordingly.

One big advantage of this approach is that different programs can be loaded to permit imitation of more than one type of communications device. The growth of remote batch computing services put the facilities of many different service organizations at the fingertips (literally) of the user. But not all services accommodate all popular batch terminals. A terminal that can imitate several different terminals makes available a wider choice among the services that you can use.

There are two divergent views on the use of a minicomputer to provide emulation. One says that cost is the important market factor, resulting in units whose sole function is to imitate one or more competitive batch terminals. The other view says that the market is for units that can not only imitate several other terminals, but can also do an appreciable amount of data processing at the local site. Provision of additional processing facilities beyond emulation requires the development of language processors and other aids for programming the unit. To some extent, these can be picked up from the minicomputer manufacturer — but software support is not the forte of most minicomputer vendors, particularly the ones who specialize in OEM sales. For the additional software development work, you can expect to pay a premium.



Fig. 1 — The GTE IS/7800 Series of intelligent CRT terminals, replacements, and enhancements for the IBM 3270 series, includes local and remote cluster units, stand-alone terminals, and terminal systems oriented to special inquiry/response applications (brokerage quotations, airlines reservations, etc.).

HOW TO BUY COMPATIBLES

Buying advice for plug-compatible communications devices is similar to that for any high-technology item. Define your needs carefully. Be sure to identify whether what you want is a "cheaper" IBM 2780 or whether what you really want is a "more powerful" IBM 2780. You can almost, but not quite, have both.

Negotiation with the vendor requires explicit definitions of what is to be included and when. Because software is frequently a vital component of modern plug-compatible com-

munications devices, the specific emulation packages and other routines required should be given the same attention as the transmission speed and code. It is not unusual for a vendor to develop only one emulation package out of a group it has advertised, with the other packages lagging far behind. Chatting with other users of particular equipment will not guarantee satisfaction, but it is one good way of checking the reliability and credibility of the vendor.

The list of target communications equipment aimed at by the vendors of plug-compatible devices includes virtually the entire array of IBM units (including the company's programmable communications processors), as well as a few selected devices from Control Data and Univac. Some plug-compatible manufacturers, such as Incoterm, will undertake to emulate about anything you name on a negotiated basis.

COMMUNICATIONS DEVICES MARKETED

For your reference, we will present thumbnail sketches of the devices that most commonly serve as the targets for plug-compatible replacements.

CRT Terminals [Table 1]

The IBM line can be divided into three main groups: CRT terminals, batch terminals, and programmable communications controllers.

The CRT group includes the venerable 2260/2265 line and its replacement, the 3270 family. The 2260 is a clustered system supporting up to 24 displays at one location under one controller. The chief complaint against the 2260, other than price, is the lack of editing controls to facilitate free-form data entry. The 2265 is a stand-alone, single-display version of the 2260 and is compatible with it. The 2260 and 2265 are transmission-compatible with nothing else in the IBM line, including the 3270. This family will not be supported under IBM's Network Control Program (NCP) for the 3704 and 3705 Communications Controllers.

In comparison with the 2260, the 3270 Information Display System features faster transmission speeds (up to 4800 bps), larger display sizes (up to 1920 characters), faster printers (40 or 66 cps), lower costs in equivalent configurations, and the kind of editing controls long offered by independent CRT manufacturers. The 3275 is the stand-alone version. Users are generally happy with the 3270 as a replacement for the 2260. However, they are not so happy as to preclude an excellent marketing opportunity for the independent suppliers, particularly among System/360 users who don't relish upgrading to a System/370 or going through some fairly extensive software conversions to use the 3270.

Batch-Conversational Terminals [Table 2]

The IBM batch terminals are a diverse lot. There is the old standard, the 2780, and its replacement, the 3780. The IBM System/360 Model 20 must also be included, as well as a stripped-down version of the 360/20 called the 2922. Also included in this group, for lack of a better place to put it, is the unusual 3735 Programmable Buffered Terminal.

The IBM 2780 was the first really popular batch terminal, although not the first of its kind. Approximately 8000 of these terminals were installed. The 2780 can read 400

TABLE 2

COMPATIBLE BATCH—CONVERSATIONAL & RJE TERMINALS AND SYSTEMS*

| Company | IBM 2770 | IBM 2780 | IBM 3780 | IBM 360/20 | IBM 2922 | IBM 3735 | Other Compatibility & Transmission Rate |
|--------------------------|-----------------|--------------------------|--------------------|--------------------|--------------------|--------------------|---|
| Badger Meter | — | DTS 100M | DTS 100M | DTS 100M | — | — | 19,200 bps transmission |
| Computer Technology | — | Satellite One | — | — | — | — | ICL 7020 & CDC 200 UT emulations |
| Data 100 | — | Models 70, 74, 78, 80 | Model 71 | Model 78 | Model 74 | Model 88 | ICL 7020 & HIS 100 emulations; 2400/4800/9600/19,200 bps transmission |
| Data Computer Sys. | CP-4B | CP-4B | CP-4B | CP-4B | — | — | to 100 Kbps transmission |
| Datapoint | 2200 | 2200 | — | — | — | — | IBM 1050, Univac DCT 2000 & CDC 200 UT emulations; 19,200 bps transmission |
| Digital Equipment | — | DECcomm 11D21, 11D26 | — | — | — | — | 4800 bps transmission |
| Digital Info. Devices | 3700 | 3700 | 3700 | 3700 | 3700 | 3700 | 4800 bps transmission |
| Electronic Associates | — | Spacer | — | Spacer | Spacer | — | Univac 1004 & DCT 2000, & CDC 200 UT emulations; 9600 bps transmission |
| GTE/Info Sys. | IS/1500 | IS/1500 | IS/1500 | IS/1500 | IS/1500 | — | 9600 bps transmission |
| Harris Comm. Sys. | — | Cope 1200, 1280, 1281 | Cope 1200, 1280 | Cope 1200, 1281 | Cope 1200, 1281 | Cope 1200, 1281 | Univac 1004 & DCT 2000, & CDC 200 UT emulations; to 50 Kbps transmission |
| Hetra Comp. & Comm. | Mark IV | MarkIV | MarkIV | Mark IV | Mark IV | — | Univac 1004 & DCT 2000, & CDC 200 UT emulations; to 230 Kbps transmission |
| Incoterm | SPD 900 | SPD 900 | SPD 900 | SPD 900 | SPD 900 | — | ICL 7020, Univac 1004, CDC 200 UT emulations; 9600 bps transmission |
| Keane Associates | System/4 RBE | System/4 RBE | — | — | — | — | 9600 bps transmission |
| M&M Computer Ind. | — | 515, 580 | 515, 580 | 560, 565 | 560, 565 | — | Univac 1004, CDC 200 UT & HIS 6000/ DN335/DN30; 9600 bps transmission |
| Mohawk Data Sciences | 2400 | 2400 | 2400 | 2400 | 2400 | 2300 | Univac 1004 & DCT 2000, CDC 200 UT, & HIS 115/105; to 50 Kbps transmission |
| Pertec | RJES DT 1311 | RJES DT 1311 | — | — | — | — | to 19,200 bps transmission |
| Potter Instr. | — | System 85 | System 85 | — | — | — | 2400 bps transmission |
| Qantel | — | Answer | — | — | — | — | 9600 bps transmission |
| Remcon | — | 2275, 2280 | — | — | 4700 | — | 9600 bps transmission |
| Sanders Data | 810/804 | 810/804 | — | — | — | — | 9600 bps transmission |
| Sycor | 340 | 340 | — | — | — | — | 4800 bps transmission |
| Unitech | — | UT-1 | UT-1 | UT-1 | UT-1 | — | IBM 360/30, Univac 1004, & CDC 200 UT; 9600 bps transmission |
| Westinghouse C & I | — | 1550, 2550 | — | 2550 | — | — | Univac 1004 & DCT 2000, & CDC 200 UT; 9600 bps transmission |

*Table compiled by staff of MODERN DATA

PRODUCT PROFILE

cards/minute, punch 355 cards/minute, and print 240 lines/minute, subject to the effective line transmission rate. It was the first of the BSC (bisync) terminals. Except for the weak bar printer that resisted extended high-speed printing, the 2780 was well liked. The introduction of lower-cost, higher-performance units by other manufacturers that could emulate the 2780, and therefore replace it on a plug-for-plug basis, spelled the beginning of the end for the 2780.

The 3780 was IBM's response to the competitive pressures. It can print at 300 to 425 lines/minute, depending on the character set selected, read cards at 600 cards/minute, punch cards at 160 columns/second, and transmit at up to 7200 bits per second. The rated speed of the card and printer components are seldom achieved in actual practice,

The 3735 Programmable Buffered Terminal is an intelligent terminal oriented toward automating the preparation of standard forms used in business operations, such as invoices, checks, orders, etc. Arithmetic operations, data editing, data validation, and logical decisions can be used to expand an operator's capabilities as she is stepped through a form in line-by-line, field-by-field fashion under control of a program stored in the terminal's integral disc unit. Data stored on disc can be printed out at 15.5 or 66 (optional) characters per second — a speed that is by no means competitive with batch terminals. For some users, the 3735 fills the need for a way of automating the collection of data for processing at a central computer site while generating needed business documents at the same time.

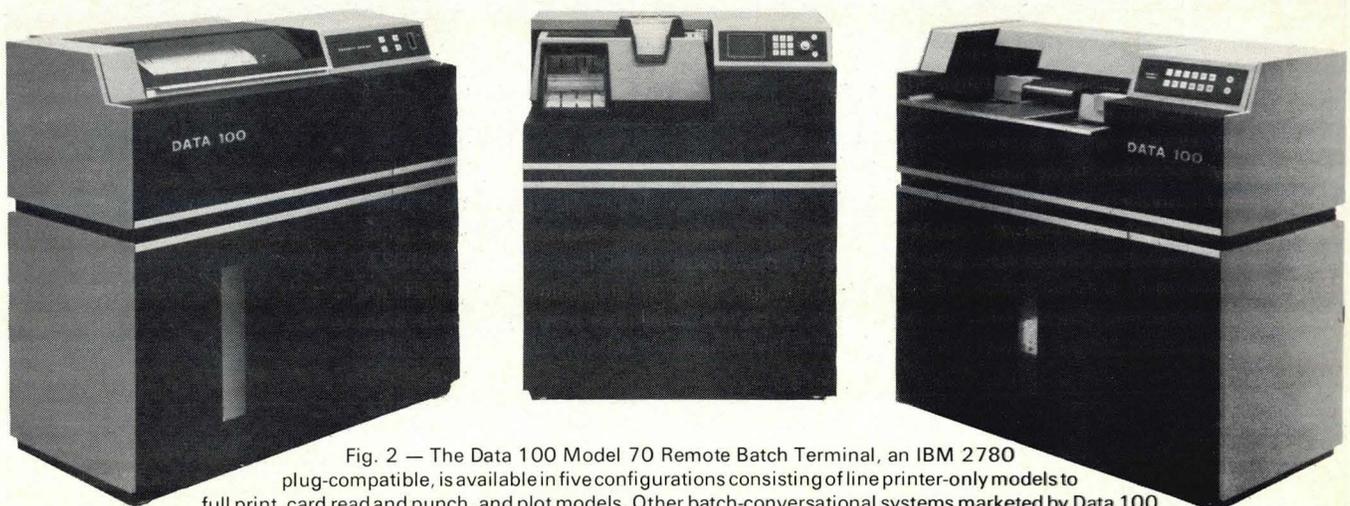


Fig. 2 — The Data 100 Model 70 Remote Batch Terminal, an IBM 2780 plug-compatible, is available in five configurations consisting of line printer-only models to full print, card read and punch, and plot models. Other batch-conversational systems marketed by Data 100 include IBM 3780, 360/20, 2922 & 3735, HIS 100, and ICL 7020 replacement/enhancement emulations.

except when transmitting short records at the highest transmission speed. The 3780 is also a BSC terminal, as are all the IBM terminals announced during the past few years. An oscillating bar printer is also used in the 3780, and its reliability in continuous high-speed operation is suspect.

The IBM System/360 Model 20 has been called one of the best high-speed remote batch terminals ever built. But it has never been called inexpensive. The 2922 Programmed Terminal offers the same advantages as the Model 20, within limits, but at 25 to 40 percent less cost. The advantages include the availability of a processing element that makes interleaved transmission and reception possible (under HASP), the capability for a significant amount of off-line processing, and the reliability of the 1403 Printer for continuous high-speed operation. The 2922's configuration is limited to 8K bytes of memory, a 500 line/minute printer, a 500 card/minute reader, a BSC communications interface of up to 7200 bps, and an optional card punch and printer-keyboard. Even at the reduced price, the 2922 is still not price-competitive with the man independent remote batch terminals. However, it does permit RPG or Assembler-language programming and perhaps the execution of existing Model 20 programs — but watch out for the limited core capacity.

Communications Controllers [Table 3]

The 3705 Communications Controller represents IBM's long-overdue acknowledgment that a programmable communications "front end" is a good idea to relieve the awesome burden that controlling a large number of communications lines places on the computer mainframe in terms of both storage space and processing time. The full benefits are not yet realized, though. Existing now for the 3705 is software to support emulation (even IBM is doing it) of IBM's previous hard-wired controllers, the 270X line. Still in the works is the NCP (Network Control Program) that permits full advantage to be taken of the front-ending function. The 3705 supports all recent IBM terminals and, in the emulation mode only, also supports older terminals such as the 2260. The 3705 can control up to 255 lines (emulation mode) or 352 lines (NCP mode) and can include up to 240K bytes of core memory.

The 3704 is a smaller version of the 3705 with the same software support; it can accommodate up to 32 lines. A 3704 can also be used remotely to serve as a concentrator, communicating through a 3704 or 3705 at the central site to the host computer.

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| Company | IBM** 270X | IBM** 370X | Mainframe Compatibility and Features |
|------------------------------------|------------------------------|----------------------------|--|
| Action Comm. Sys. | ACS <i>Telecontroller</i> | ACS Telecontroller | IBM 360/370 — 3705-emulation; front-end processing; message store & forward; stand-alone inquiry/response |
| Automated Sys. | — | — | NCR Century — front-end processing |
| Collins Radio | <i>C-System</i> | <i>C-System</i> | IBM 360/370, Univac 1100 — front-end processing; message store & forward; stand-alone inquiry/response |
| Computer Communications | CC-70 CC-7000 | CC-70 CC-7000 | IBM 360/370 & 1130, CDC 3000/6000, XDS Sigma — front-end processing(CC-70) — front-end processing; message store & forward; stand-alone(CC-7000) |
| Comtec Data Sys. | CT/90 | CT/90 | IBM 360/370, Univac 1100, Burroughs B3500/4700 — 2703/CTMC-emulations; front-end processing; message store & forward |
| Comten | 3670 | 3670 | IBM 360/370, others custom — 270X-emulation; front-end processing; message store & forward |
| Courier Terminal Sys. | MCC | MCC | IBM 360/370 — 270X/370X-emulation |
| Cybermatics | <i>TinCanFE</i> | <i>TinCanFE</i> | IBM 360/370, Univac 1100 — 2803-emulation; front-end processing; message store & forward; stand-alone inquiry/response |
| Data Pathing | 2102A, 2104 | 2102A, 2104 | IBM 360/370, Univac 1100, Burroughs B2500 — front-end processing; stand-alone inquiry/response |
| Dataserv | 770 | 770 | IBM 360/370 — 270X-emulation; front-end processing; message store & forward; stand-alone inquiry/response |
| Digital Equipment | <i>DECcomm 11D23</i> | <i>DECcomm 11D23</i> | IBM 360/370 — 2848-emulation; front-end processing [non-turnkey system for user application programming] |
| GE/Comm. Products Div. | <i>DigiNet 1600</i> | <i>DigiNet 1600</i> | IBM 360/370, HIS 6000 — front-end processing; message store & forward |
| General Instrument | <i>System 75</i> | <i>System 75</i> | IBM 360/370 — 2803/3803-emulations; front-end processing; message store & forward; stand-alone inquiry/response |
| GTE Info Sys. | IS/1101 <i>IS/1102</i> | IS/1101 <i>IS/1102</i> | IBM 360/370, CDC 3000/6000, XDS Sigma — 270X-emulation; front-end processing (IS/1101); message store & forward; stand-alone inquiry/response(IS/1102) |
| Harris Comm. Sys. | Cope 4705 | Cope 4705 | IBM 360/370, Univac 1100, CDC 6000 — 270X/370X/70-1600/C-SP-emulations; front-end processing |
| Honeywell Info. Sys. | <i>System 700</i> | <i>System 700</i> | IBM 360/370, HIS — front-end processing |
| Incotel | <i>MS</i> | <i>MS</i> | IBM 360/370, others — front-end processing; message store & forward; stand-alone inquiry/response |
| Informatics Comm. Sys. | <i>ICS-IV 250, 500</i> | <i>ICS-IV 250, 500</i> | IBM 360/370 & 1130 — front-end processing; message store & forward; stand-alone inquiry/response |
| Intercomputer | i270, i370 <i>i50</i> | <i>i50</i> | IBM 360/370 — 270X-emulation; front-end processing(i270/370); message store & forward; stand-alone inquiry/response(i50) |

* Table compiled by staff of MODERN DATA

** Italicized model/system numbers denote functional- but not plug-compatibility

PROCESSOR / FRONT-END SYSTEMS*

| Company | IBM** 270X | IBM** 370X | Mainframe Compatibility and Features |
|------------------------------|-------------------|-------------------|---|
| Interdata | 270X MS-5 | 270X MS-5 | IBM 360/370 — 270X-emulation; front-end processing(270X); message store & forward; stand-alone inquiry/response (MS-5) [also OEM systems] |
| Memorex | 1270 | — | IBM 360/370 — 270X-hardwire replacement |
| Microdata | 1600/60 | 1600/60 | IBM 360/370 — front-end processing; message store & forward; stand-alone inquiry/response [non-turnkey system for user programming] |
| Modular Computer Sys. | Modcomp III | Modcomp III | IBM 360/370, CDC 6000 — front-end processing; message store & forward; stand-alone inquiry/response |
| Omnus Computer | Omnus 1 | Omnus 1 | IBM 360/370, Univac 1100 — 270X/370X-emulation; front-end processing; message store & forward |
| Peripherals | T-Comm 7 | T-Comm 7 | IBM 360/370, Univac 1100 — 2803-emulation; front-end processing; message store & forward; stand-alone inquiry/response |
| Prentice Electronics | P-3000 | P-3000 | IBM 360/370 — 270X/370X-emulation; front-end processing |
| Remote Computing | — | — | Burroughs B5500/5700 (Fred System) — front-end processing |
| Sanders Data Sys. | 732 Sandac 200 | Sandac 200 | IBM 360/370 — 270X-emulation (732); front-end processing; message store & forward; stand-alone inquiry/response (Sandac 200) |
| Scidata | Communicator | Communicator | IBM 360/370 — front-end processing; message store & forward; stand-alone inquiry/response |
| Telefile Computer | 270XCP TCP-64 | TCP-64 | IBM 360/370 — 270X-emulation (270XCP); front-end processing; message store & forward; stand-alone inquiry/response (TCP-64) |
| Teleprocessing Industries | — | — | Univac 418, 494, & 1106(C2000/2100) — front-end processing |
| Teleswitcher | DCS-5000 | DCS-5000 | IBM 360/370 — front-end processing; message store & forward; stand-alone inquiry/response |
| Texas Instruments | — | — | IBM 360/370(EMS-II) — message store & forward; stand-alone inquiry/response |
| Texas Scientific | Entelekon 70X | — | IBM 360/370 — 2848-emulation; front-end processing |
| Univac | 3760 Series 60 | 3760 Series 60 | IBM 360/370 — 270X/370X-emulations; front-end processing; message store & forward(3760); stand-alone inquiry/response(Series 60) |
| Varian Data Machines | 73/DC 620/DC | 73/DC 620/DC | IBM 360/370, HIS 600/6000, CDC 3000/6000 — 370X-emulation; front-end processing [non-turnkey system for user application programming] |
| Wavetek Data Comm. | ADC 1000 | ADC 1000 | IBM 360/370 — 270X/2848-emulations; front-end processing |
| Wells TP Sciences | T-578 | T-578 | IBM 360/370 — 2848-emulation; front-end processing; message store & forward; stand-alone inquiry/response |

Other Mainframer Communications Devices

The Control Data 200 User Terminal is no longer being manufactured, but is still available. It is basically a conversational terminal with a CRT and keyboard as prime components. Batch operation can be handled through an optional 333 card/minute card reader and 300 line/minute printer. Alternatively, a Selectric I/O typewriter can be specified. The 200 UT is basically an ASCII terminal. It gained sub-



Fig. 3 — The Cope 4705, a communications controller marketed by Harris Communication Systems as a direct replacement for the IBM 270X and 370X transmission control units, which supports a variety of I/O devices and communications facilities.

stantial popularity through Control Data's own remote batch processing and time-sharing networks. The 200 has been superseded by Control Data's 730 Series Remote Batch Terminals, which span a large performance range; the 730 Series includes an emulator package for the 200 UT.

In the tradition of computer manufacturers providing equivalent equipment, the Univac DCT 2000 was an early competitor of IBM's 2780 but was not compatible with it. The DCT 2000 was conceived as a multimedia terminal, but its peripheral equipment never expanded beyond punched cards, printers, and punched tape. In 1966, Univac was clearly ahead of its time. Today, the multi-media concept is gaining momentum. The peripheral

For complete details on data communications terminals or systems that are compatible with and/or offer superior cost-performance features over mainframer-supplied hardware, circle the appropriate number on the Reader Inquiry Card.

Compatible CRT Terminals & Systems

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|---|-----|
| Beehive Terminals, Salt Lake City, Utah..... | 115 |
| CompuTek, Cambridge, Mass..... | 116 |
| Computer Optics, Bethel, Conn..... | 117 |
| Conrac Corp., Covina, Cal..... | 118 |
| Courier Terminal Systems, Phoenix, Ariz..... | 119 |
| Data Disc, Palo Alto, Cal..... | 120 |
| Datapoint Corp., San Antonio, Texas..... | 121 |
| Delta Data Systems, Cornwell Heights, Pa..... | 122 |
| Four-Phase Systems, Cupertino, Cal..... | 123 |
| GTE/Information Systems, Stamford, Conn..... | 124 |
| Incoterm, Natick, Mass..... | 125 |
| ITT/Data Equipment & Systems, E. Rutherford, N.J..... | 126 |
| Megadata, Dear Park, N.Y..... | 127 |
| Raytheon Data Systems, Norwood, Mass..... | 128 |
| Sanders Data Systems, Nashua, N.H..... | 129 |
| Sycor, Inc., Ann Arbor, Mich..... | 130 |
| Sys Computer, Hackensack, N.J..... | 131 |
| Terminal Communications, Raleigh, N.C..... | 132 |
| Texas Scientific, Houston, Texas..... | 133 |
| Trivex, Costa Mesa, Cal..... | 134 |
| Wyle Computer Products, El Segundo, Cal..... | 135 |

Compatible Batch-Conversational & RJE Terminals & Systems

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| Badger Meter/Electronics Div., Richmond, Cal..... | 136 |
| Computer Technology, Ltd., Herts, England..... | 137 |
| Data 100, Minneapolis, Minn..... | 138 |
| Data Computer Systems, Santa Ana, Cal..... | 139 |
| Datapoint Corp., San Antonio, Texas..... | 140 |
| Digital Equipment, Maynard, Mass..... | 141 |
| Digital Information Devices, Lionville, Pa..... | 142 |
| Electronic Associates, West Long Branch, N.J..... | 143 |
| GTE/Information Systems, Stamford, Conn..... | 144 |
| Harris Communication Systems, Dallas, Texas..... | 145 |
| Hetra Computer & Communications, Melbourne, Fla..... | 146 |
| Incoterm, Natick, Mass..... | 147 |
| Keane Associates, Wellesley Hills, Mass..... | 148 |
| M & M Computer Industries, Orange, Cal..... | 149 |
| Mohawk Data Sciences, Utica, N.Y..... | 150 |
| Pertec, Chatsworth, Cal..... | 151 |
| Potter Instrument, Plainview, N.Y..... | 152 |

speeds of 250 lines/minute, 200 cards/minute (read), and 75 cards/minute (punch) are commensurate with the 2400 bps transmission speed. The DCT 2000 was conceived during an aggressive communications development program by Univac. Although several other terminals were announced, some of which have become popular, the original emphasis was not maintained.

The 3735 Programmable Buffered Terminal is an intelligent terminal oriented toward automating the preparation of standard forms used in business operations, such as invoices, checks, orders, etc. Arithmetic operations, data editing, data validation, and logical decisions can be used to expand an operator's capabilities as she is stepped through a form in line-by-line, field-by-field fashion under control of a pro-

LITERATURE

Compatible Batch-Conversational & RJE Terminals & Systems Cont'd

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| Qantel Corp., Hayward, Cal. | 153 |
| Remcon, Garland, Texas | 154 |
| Sanders Data Systems, Nashua, N.H. | 155 |
| Sycor, Inc., Ann Arbor, Mich. | 156 |
| Unitech, Inc., Austin, Texas | 157 |
| Westinghouse/Computer & Instrumentation, Pittsburg, Pa. | 158 |

Compatible Communications Processors & Front-Ends

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| Action Communications Systems, Dallas, Texas | 159 |
| Automated Systems, Houston, Texas | 160 |
| Collins Radio, Dallas, Texas | 161 |
| Computer Communications, Culver City, Cal. | 162 |
| Comtec Data Systems, Hawthorne, Cal. | 163 |
| Comten, Inc., St. Paul, Minn. | 164 |
| Courier Terminal Systems, Phoenix, Ariz. | 165 |
| Cybermatics, Ft. Lee, N.J. | 166 |
| Data Pathing, Sunnyvale, Cal. | 167 |
| Dataserv, Burlingame, Cal. | 168 |
| Digital Equipment, Maynard, Mass. | 169 |
| GE/Communications Products, Lynchburg, Va. | 170 |
| General Instrument, Hicksville, N.Y. | 171 |
| GTE/Information Systems, Stamford, Conn. | 172 |
| Harris Communication Systems, Dallas, Texas | 173 |
| Honeywell Information Systems, Wellesley Hills, Mass. | 174 |
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| Informatics Communications Systems, River Edge, N.J. | 176 |
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| Interdata, Oceanport, N.J. | 178 |
| Memorex, Santa Clara, Cal. | 179 |
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| Varian Data Machines, Irvine, Cal. | 194 |
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| Wells TP Sciences, Clifton, N.J. | 196 |

gram stored in the terminal's integral disk unit. Data stored on disk can be printed out at 15.5 or 66 (optional) characters per second — a speed that is by no means competitive with batch terminals. For some users, the 3735 fills the need for a way of automating the collection of data for processing at a central computer site while generating needed business documents at the same time.

Univac 1004, introduced in 1962, was a curious development. It combined plugboard programming with a core memory capability. It was hugely successful at the time. It was put to use extensively as a batch terminal because it was the least expensive computer system having high-speed peripherals. It was the terminal most used during the beginnings of remote batch processing. Many different communica-

tions interfaces and protocols were developed for the 1004. In looking for a plug-compatible replacement for a 1004, be very specific about which comm adapters you need to emulate.

These are the main targets for the independent vendors. There are others, including specialized IBM terminals such as the 2968, which is built around a 1401 processor and magnetic tape drives, and the IBM airline reservation terminals (PARS).

CONCLUSION

Plug-compatible communications systems have their good points and bad points. Emulation techniques give you a wider choice of vendors and, through competitive pressures, tend to reduce the price you pay. The trend toward compatibility with existing equipment also tends to fix communications techniques; this gives the mainframe software developers more time to catch up, but also reduces the opportunities for innovative techniques to improve transmission.

While the mainframe computer manufacturers were occupied with developing, coding, and debugging operating system software and upgrading the central processors and peripherals, the independent vendors of communications systems used the emerging minicomputer technology to compete in the market already established by the mainframe vendors, as well as to open some new doors such as front-ending. Meanwhile, the developers of multistation key entry (key-to-disk) systems were finding that data communications was a required option. The two areas are now blending together, with key entry systems acquiring capabilities to emulate some of the popular batch terminals and communications terminals acquiring key entry capabilities. Multi-level systems are appearing that can control key entry or communications stations located remotely from the control unit, which in turn is remote from the host or central processing facility.

While the exact directions of future communications developments cannot be accurately predicted, one point is very clear: plug-compatibility with respect to communications systems should be regarded as just one function that can be incorporated, if desired, along with other functions such as key entry or limited data processing facilities to implement your overall data processing objectives. ▲

THE CASE OF THE MISSIONARY UNMASKER

"Circumstances, and a certain bias of mind, have led me to take an interest in such riddles, and it may well be doubted whether human ingenuity can construct an enigma of the kind which human ingenuity may not, by proper application, resolve."

—William Legrange, in Edgar Allan Poe's "The Gold Bug."

The news release was from Southern Missionary College in Collegedale, Tennessee, but it was not on SMC letterhead. Even more intriguing, the subject was an offer to supply, for \$5.00, two programs for unmasking files protected by the Hewlett-Packard 2000F timesharing system. Why would a college — a *missionary* college, no less — not only make such potentially dangerous programs available, but also provide them at cost? And why *two* programs?

We found the answers after a few telephone calls. It seems that Computer Spectrum, an on-campus service bureau sponsored by SMC, had utilized the H-P 2000F masking feature in a program called General File Quiz (GFQ). The program was developed at the request of an SMC physics professor who wanted his students to be able to take examinations at their convenience. When accessed via a timesharing terminal, GFQ displays a quiz made up of 15 to 20 randomly selected exam questions. The students are required to repeat the quiz until they have correctly answered all the questions in one selection.

A theology student in another physics professor's class was fascinated by the program, especially by the security provisions which prevent students from accessing the quiz questions without identifying themselves and being scored. Deciphering the security routine became a challenge; then an obsession. Finally, after many, many hours of CPU time (and at the cost of a failing grade in Old Testament literature!), he found the H-P masking algorithm.

By this time the first physics professor suspected some hanky-panky and Computer Spectrum was called in to determine if the H-P algorithm could be discovered. Computer Spectrum decided to give it a try, and the job was assigned to assistant manager Steve Sowder. A professional programmer, Sowder got it after only three hours. He also bumped into the theology student, who, it should be noted, had properly received permission from *his* physics professor to

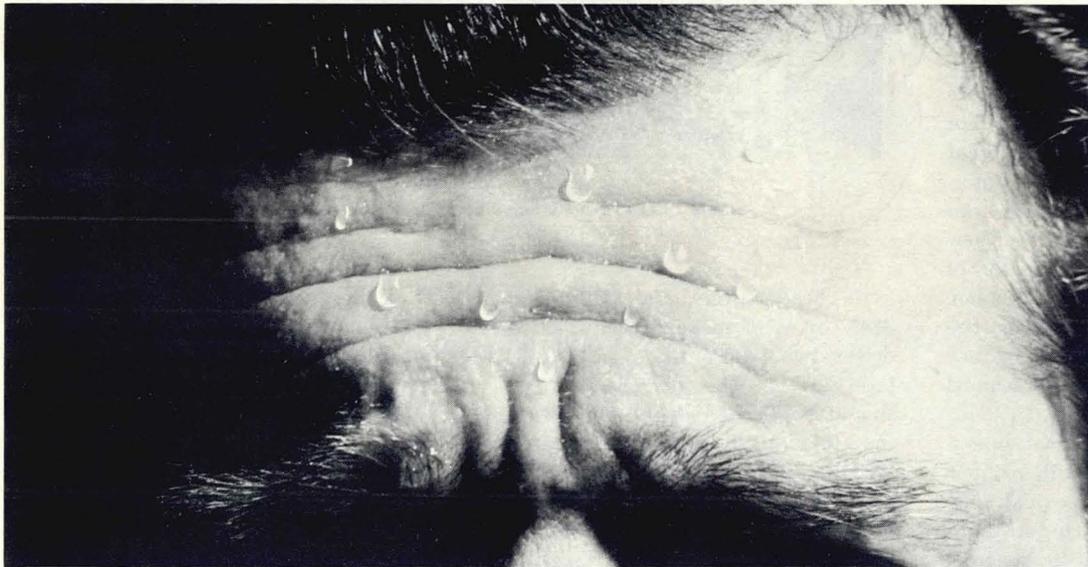
look for the algorithm, and had no idea of the brouhaha he had caused. When the student saw Sowder working on the program, he casually introduced himself and showed him his solution.

The next morning, Glenn Holtkamp, Computer Spectrum's manager, informed Hewlett-Packard's Atlanta office of the two independent programs and asked that H-P provide the college with a new and more secure masking routine. According to Holtkamp, H-P Atlanta at first did not believe his claims that the two programs did indeed bypass the system's security provisions, but after Holtkamp demonstrated the programs, H-P disabled the LIB command for listing files. Holtkamp told MODERN DATA that all this occurred in April, and since then he has received no commitment from H-P for another security routine. MODERN DATA called H-P's Palo Alto offices and this does seem to be the case, although an H-P spokesman did say that the company "is aware of the incident and the situation is being investigated.") Computer Spectrum's offer to provide the unmasking programs at cost, then, was intended simply to prod H-P into action.

Holtkamp makes it clear that he has no ill feeling towards Hewlett-Packard and, in fact, "Nobody yells their praises louder than I do." He said Computer Spectrum has been running the 2000F 24 hours a day, 7 days a week, and except for the temporary loss of a few records from a head crash, there has been no downtime on the system attributable to H-P hardware or software. Computer Spectrum uses the 2000F to service commercial accounts as well as the college, and business has been so good that by September Computer Spectrum will become an independent, for-profit organization with Holtkamp as its president. By then Holtkamp also expects to be able to offer Hewlett-Packard his own masking package, one that he claims "cannot possibly be defeated." Not even by theology students.

— A.R.K.

**You don't need
minicomputers.
You don't need
peripherals.
You need solutions.**



You can buy black boxes from a lot of people. But maybe you don't want the problems of interfacing a lot of components. Then ending up with a system that does too little and costs too much.

We'd like to talk to you about a possible solution to your problem.

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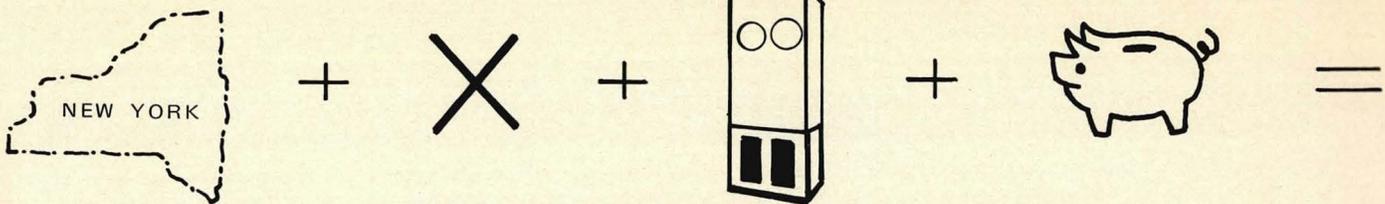
you with a complete system ready for you to use or to market. Our systems are already working in a wide variety of applications. We manufacture our own minicomputers and peripherals so we can offer you total computer systems at a very attractive price.

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CIRCLE NO. 32 ON INQUIRY CARD



THE NEW YORK TIMES INFORMATION BANK

Seventy years of news goes online.

"Knowledge is of two kinds," Samuel Johnson maintained, "We know a subject ourselves, or we know where we can find information upon it." For those who don't know the subject themselves, the *New York Times* Information Bank could make it a lot easier to "find information upon it." Furthermore, according to *Times* director of information services Dr. John Rothman, researchers are routinely using the bank to "conduct research that they would never even attempt by manual methods."

Placed into full commercial operation in May 1973, the \$3-million information bank contains three and one-half years of *Times* article abstracts and varying amounts of abstracts from 65 other publications. Commercial service is now offered under a new price structure that depends on timing and volume of usage. Basically, the service consists of online article abstracts stored in a new IBM S/370 Model 145 and accessed by remote CRT terminals plus complete articles on microfiche via weekly mail delivery.

The idea of an information bank at the *Times* started in the early Sixties, when the newspaper already offered a printed index coupled with microfilms of clippings. In 1968, printing of the index was computerized and a thesaurus (a master list of index terms and cross-references) was published. The index itself went online at the *Times'* headquarters in 1971, and three years of *Times* editions were entered into the system. November 1972 saw the first remote terminal installed (at the University of Pittsburgh) for test purposes. The subscriber installation was connected in February of this year.



The *Times* index room, where 500 to 600 articles per day are abstracted and indexed.

At headquarters, the 370/145 has 384K bytes of memory, five 3330 disk drives, two 1403 printers, and five 3420 tape drives. The dedicated 370/145 should be backed up with a twin by the time this is printed. The internal terminal system consists of two IBM 4279 control units with 64 (32 each) Model 4506 display units and keyboards. Subscriber CRT terminals are programmable, 1920-character Inco term units, with Centronics 101 impact printers (160 chars/sec). Remote microfiche equipment consists of 3M "500" reader-printers. System software is IBM DOS with BTAM; applications software, developed by IBM's Federal Systems Division, is *Times*-proprietary and *Times*-maintained.

As of May 1973, the information bank's data base consisted of nearly 400,000 records (*Times* article abstracts) covering the period between October 1969 and March 1973. Each month, the daily and Sunday issues yield about 9000 discrete items, which include virtually all the news and editorial matter and exclude only those items of no discernible research value. Even significant advertisements are entered into the data base.

New entries into the bank, according to the *Times'* plan, will be made no later than 96 hours after publication. In addition, the *Times* will gradually

work backwards to the beginning of this century (the age of its clipping morgue), a job the *Times* estimates will take eight to twelve years.

Articles of research value from 65 other publications are also being entered into the data base. These sources include American and British newspapers, major newsweeklies, business and trade publications, sports magazines, and journals of news and commentary on social, political, economic, and cultural subjects. Items are selected if they: (1) deal with subjects not covered by the *Times*, (2) provide more detail, (3) treat subjects from a different point of view, or (4) provide subjects of substantial research value not otherwise obtainable. Publications beyond those now selected will be added if justified by subscriber interest, according to the *Times*.

The service provided is fully interactive, of course, and, like any good timesharing service, offers all sorts of hints to the subscriber at the other end of the line. The massive thesaurus, for example, suggests that the inquirer try terms related to the one he has entered in order to access a greater number of abstracts. On the other hand, the service accepts a great variety of restrictions from the subscriber in order to limit the search. By means of AND, OR, and NOT operators, the re-

searcher can connect his data descriptors and narrow the search to, say, articles about "United Farm Workers AND citrus NOT California OR Texas OR Arizona." In this example, articles about UFW activities in Florida's orange groves would likely be among the displayed abstracts.



The morgue at the *Times* dates back to the turn of the century.

Other search tools are also available, including "modifiers" such as editorials only, UPI stories only, biographies only, or March through June 1973 only. When a retrieved abstract is displayed, it contains bibliographic information, including (naturally) the *Times* microfiche number. The subscriber can then look up the complete article if he has subscribed to the optional microfiche-by-mail service.

For the beginner, the interactive messages are in simple English-language form both ways; for the experienced researcher, codes and symbols provide time-saving short cuts.

Prices for the service start at \$675/month, excluding equipment, for unlimited usage during half of the day or limited usage over the whole day. Other subscriptions include unlimited, all-day service (\$1,350/month, excluding equipment) and a special program for non-profit libraries. At present, service is available Monday through Friday only; weekend service will be added later, at an additional charge. Microfiche service is \$900/year.

Being the first of its kind, the *New York Times* Information Bank is a big step forward in the field of information science. But, as the old joke about television used to go, you can't wrap fish in it. ▲

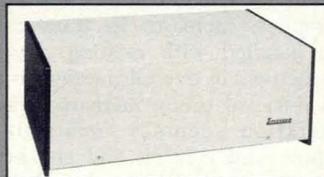
COMMUNICATIONS TESTING AND CONTROL

DEBUG ON-LINE SYSTEMS



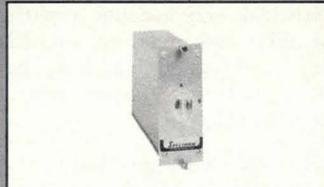
The Universal Monitor insures fast, accurate diagnosis of problems in hardware, software, and communication lines. Hard copy printout of everything sent or received on the data link, including line control characters, makes errors visible. Accommodates any 5 to 8 bit code, and speeds to 9600 bps.

SHARE YOUR MODEMS



The Modem Interface Splitter enables multiple connections to a single RS232 interface. Eliminate multiple modems and service terminals where several polled terminals are located next to each other.

LINE SELECTORS

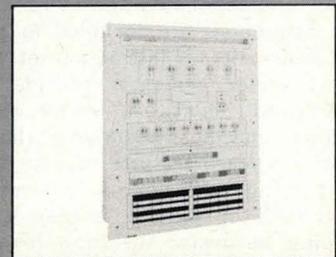


Manual or relay controlled switches for interconnection of RS232 interfaces.

Each Selector transfers up to 16 leads of one interface to either of two others. May be customer patched or factory wired in various gang or tandem configurations for virtually any switching arrangement. Free standing, desk cabinets, and rack mountings available.

Offers new speed and convenience in rearranging circuits between ports, data sets, and terminals.

TECH CONTROL CENTERS



Custom design arrangements of patching fields, switches, and status indicators for monitoring and control of communication systems.

Rearrange leased lines; bring in spare modems; switch to backup systems; bridge for testing.

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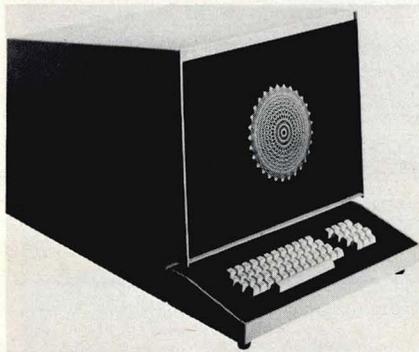
CIRCLE NO. 33 ON INQUIRY CARD

NEW PRODUCTS

HONEYWELL DDP-516 MEMORY

AMS has introduced plug-compatible solid state main memories for Honeywell DDP-516 minicomputers. The add-on memory plugs directly into an assigned memory area in the 516, containing timing/refresh/control circuitry to ensure "transparent" interfacing. Basic 4K capacity can be expanded to 16K within the 516; expansion to 32K to 64K may be configured on special order. *Advanced Memory Systems, Inc., Sunnyvale, Cal.*

Circle No. 317 on Inquiry Card



INTERACTIVE GRAPHICS SYSTEM

The PDS-4 is a minicomputer-based, interactive, refreshed graphic display system that features a 990 nanosec memory cycle and execute time. Over 3000 characters may be displayed on a 17" CRT, and up to 2000 inches of vectors drawn with 1024 x 1024 resolution at a 40 frames per second refresh rate. Byte manipulation and "Push and Pop" instructions are included in the 16-bit minicomputer instruction set. An internal vector generator provides 2 vectors/word (short), 1 vector/word (medium), and 2 words/vector (long) formats. Standard features include fast data plotting with auto-incrementing in either X or Y, and display sub-routining hardware up to 8 levels. Characters or symbols are stored in readwrite memory and all keyboard functions are software defined, allowing the assignment of any function to any key. Characters and symbols may also be rotated 90°, 180°, or 270°. Peripheral options include hardcopy output, memory expansions, disk cartridge storage, floating-point processor, and 2D rotation hardware. Basic system price for a PDS-4 is under \$14,000. *Imlac Corp., Needham, Mass.*

Circle No. 265 on Inquiry Card

BANKING COMMUNICATIONS

System 3000 is an operator-assisted, computer-communications system designed for large banks for automating wire and cable, and money transfer operations. Because of the high monetary value of the transactions handled and the relatively loose formats under which messages are received, the System 3000 employs a blend of computer processing and operator intervention or control. Final decision-making processes and overall validation functions are left in the hands of the operator. Benefits include a decrease in operating costs for space, equipment, forms, and supplies; increases in transaction volume handled with existing personnel; reductions in overall message transit and retrieval times; increased transfer operation accuracy; centralized supervision and control; and enhanced message security for the bank and their customers. In addition, the System 3000 provides facilities for transaction astorage and retrieval, billing processing, statistical and account reporting, balance filing and updating, time/date stamping, and other banking operations. *Western Union Teleprocessing Industries, Mahwah, N.J.*

Circle No. 307 on Inquiry Card

KEY-TO-DISK DATA ENTRY

The new computer-controlled Entrex System 280, smaller brother of the 32-station System 480, supports up to eight data entry keystations, providing up to 2.4 Mchar. of intermediate disk storage for output onto 800/1600 bpi, 7-9-track tape. Entry is via the Data/Scope, a CRT key-station with a 360-character display and either key-punch or typewriter style keyboards. Hardware and software allow for such validation and editing procedures as: mandatory entry and completion fields; batch totals-zero balance; automatic data emit; error flag insertion; and search-for-record. Data stored on the intermediate disk is allocated dynamically, resulting in greater disk utilization and making output to tape necessary only at the end of a shift or work period. The System 280 with eight stations can be leased for as little as \$1,458 per month. *Entrex, Inc., Burlington, Mass.*

Circle No. 250 on Inquiry Card

PRIME 300 WRITABLE STORE

Prime has enhanced the capabilities of their 300 Series microprogrammed 16-bit virtual minicomputer by the introduction of a writable control store. The new feature allows the user to apply the speed (280 nanosec typical for microinstruction cycle) and large word size (64-bit) of the mini's control microprocessor to the execution of application programs. By microprogramming frequently used subroutines, algorithms and special machine instructions with no direct machine-language equivalents, the CPU's efficiency is improved in terms of both increased speed and reduced main memory requirements. The writable control store is offered with both the Prime 330 or 332 minicomputers. Prime Computer, Natick, Massachusetts.

Circle No. 251 on Inquiry Card



3270-COMPATIBLE DISPLAY SYSTEMS

Compatible with IBM 3270 display configurations, the CO:77 provides users with performance advantages at lower costs — savings ranging from \$2,000 per year for an 8-station system to over \$8,000 per year for a 16-station model. Components of the CO:77 are: a display station with 480, 960, or 1920 character capability and moveable keyboard; and a control unit that can service up to 32 displays. Character and page printer options are also available. The CO:77 offers a choice of two character sets — a standard 7 x 9 dot matrix image for inquiry, file maintenance, or data entry operations, and an optional 16 x 18 matrix for text editing and word processing applications requiring high-quality upper/lower case character display. *Computer Optics Inc., Bethel, Conn.*

Circle No. 266 on Inquiry Card

Our new time-sharing terminals operate at 120 cps in interactive or batch mode. Either way you save.

And you save in two ways: You reduce communications line costs and cut computer connect time.

With these 1200 baud terminals you make full use of telephone line capacity. So even with moderate terminal usage, your savings can really mount up.

We offer two models of our EDT-1200 series: The KSR, which operates at 10, 30 or 120 cps, switch selectable. The MSR (Magnetic Send-Receive) additionally offers a magnetic tape cassette buffer for data storage and high-speed transmission.

These electronic terminals use regular paper, and since they are impact printers you can get up to six copies. You can set and clear horizontal tabs locally and remotely.

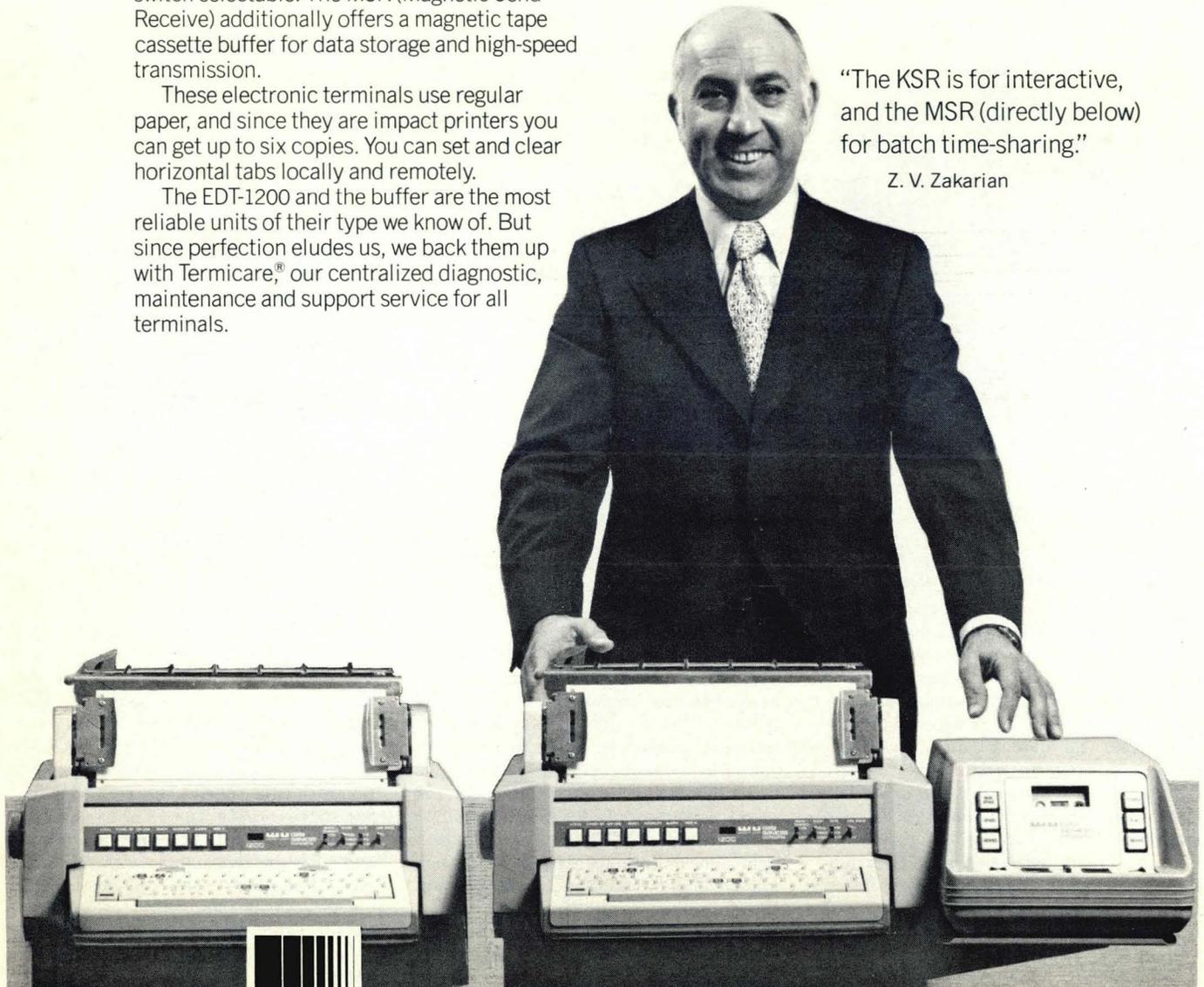
The EDT-1200 and the buffer are the most reliable units of their type we know of. But since perfection eludes us, we back them up with Termicare,[®] our centralized diagnostic, maintenance and support service for all terminals.

With these new terminals our product line is now up to 78 models with 228 options, with speeds of 10, 15, 30 and 120 cps.

For details about the EDT-1200, or about any of the 306 ways we can help you with terminals, please contact me. Z. V. Zakarian, Western Union Data Service Company, 16 McKee Drive, Mahwah, N.J. 07430. 800-631-7050 (N.J. 201-529-1170).

"The KSR is for interactive, and the MSR (directly below) for batch time-sharing."

Z. V. Zakarian



western union data services company

CIRCLE NO. 34 ON INQUIRY CARD

NEW PRODUCTS

DATA CHANNEL CONCENTRATOR

The C-32 is designed to forward data from modems, terminals, or multiplexers to available computer ports on a first-come, first-served basis. The C-32 makes connections in response to such signals as Data Terminal Ready, Ring Indicator, Request-to-Send, etc. The standard C-32 can concentrate up to 32 channels to up to 16 computer ports; larger systems are also available. No speed or code programming is required, and the C-32 can switch asynchronous or synchronous data at rates up to 9600 bps with negligible delay. Prices start at \$3,250 with delivery within 60 days. *Timeplex, Inc., Norwood, N.J.*

Circle No. 315 on Inquiry Card



KEY-TO-DISK SYSTEM

First in a series of systems to be based on the IS/1500 Processing System, the GTE IS/1511 Shared Processor key-to-disk system is designed for low-to-high volume keypunch or key-tape operations. The IS/1511 can support from 4 to 32 CRT key-entry stations, employing a cycle steal technique to ensure real-time, continuous data entry operations during core or disk-to-tape dumps. The system can store up to 240 formats on-line for operator recall, and allows for the creation of temporary input formats when desired. Other features include processor reformatting, on-line correction and updating, and operator input statistics record-keeping. *GTE Information Systems, White Plains, N.Y.*

Circle No. 289 on Inquiry Card

A/D MINICOMPUTER INTERFACING

Analog/digital 12-bit data acquisition subsystems for minicomputer applications have been announced by Analogic. The MP6912 A/D modules provide complete scanning, signal conditioning, A/D-conversion, and program/control/timing circuitry needed for multi-channel, high-speed operation in data acquisition environments. Resolution/throughput combinations can run as high as 100 KHz (12-bit) to 500 KHz (4-bit). The plug-in modules are priced at \$695 in single unit quantities. *Analogic Corp., Wakefield, Mass.*

Circle No. 280 on Inquiry Card

TTY-COMPATIBLE CRT DISPLAY

The Consul 580 is a TTY-compatible CRT terminal capable of displaying 24 lines of 80 characters each. An EIA RS-232-C interface with switch-selectable transmission speeds of 110, 300, 1200, 2400, and 9600 baud is standard on the 580. An optional 20 ma current loop interface is also available. Other features include a manual inhibit or enable of upward scrolling, serial ASCII printer interface, full cursor control and erase keys, and black-on-white character display. Prices start at \$1,795, with OEM discounts of over 30%. *Applied Digital Data Systems, Hauppauge, N.Y.*

Circle No. 283 on Inquiry Card

POWER LINE MONITORS

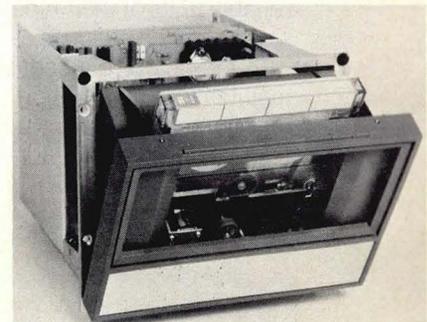
Programmed Power has recently introduced a family of power line disturbance monitors for computer, control and communications operations. The portable instruments can simultaneously detect, count, categorize, time and log utility power line under/over voltages, transients and frequency variations on single- or three-phase lines. Features include a transient response of 0.5 to 100 or 500 microsec; transient amplitudes of ± 50 to ± 600 volts; five event counter registers; a time and event listing printer; an integral power supply for continuous operation under blackout; visual panel light and audio horn alarms; and visual phase/voltage panel meter. Prices for the monitors range from \$2,995 to \$3,600, with delivery within eight weeks. *Programmed Power, Inc., Menlo Park, Cal.*

Circle No. 254 on Inquiry Card

PRINTER/PLOTTER

The Gould 4820 electrostatic printer/plotter incorporates solid state logic to increase stability and reliability in computer interfacing. The unit uses an eight-bit data path for input from the computer, and comes with an optional 96-ASCII character generator for 5 x 7 dot matrix upper/lower case alphanumeric. The 4820 prints at rates up to 3000 LPM, and plots up to 75 square inches per second at an 80 dot/inch resolution. The 4820 accepts data via DMA channels for on-line operation; because of its data requesting format, the printer/plotter operates at full speed without dedicating the CPU to driving the printer. Tape formats for off-line operation are also available. The 4820 can be utilized with CRT systems that employ raster-type output. The unit can take data directly from the CRT's refresh memory, and can also be used with graphic terminals for interactive applications. Printing and plotting software and interfaces for most computers are available. The 4820 is priced at \$10,900. *Gould Data Systems, Newton, Mass.*

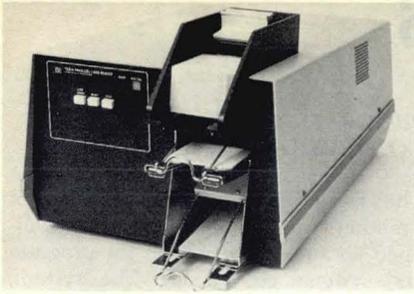
Circle No. 253 on Inquiry Card



3M CARTRIDGE DRIVE

The DCD-3 drive, designed for OEM markets, provides reliable data interchange and recording capabilities for the 1/4" DC300A tape cartridge. Available with 1-, 2-, or 4-track read-while-write heads, the drive has such standard features as 1600 bpi density, 48 Kbps transfer rates, 30 ips bi-directional read/write, and 90 ips bi-directional shuttle speed. The DCD-3 is offered initially in a "door load" configuration for half-rack mounting, and can be expanded with optional pre-wired card cages and read/write, encode/decode and direction control circuit cards. A single channel version is priced at \$330 in OEM quantities. *3M Company, St. Paul, Minn.*

Circle No. 322 on Inquiry Card



MARK CARD READER TERMINAL

Designed for use as a data entry device for computers or intelligent terminals, the H-P 7261A Parallel Card Reader accepts randomly mixed marked or punched 80-col cards at a maximum feed rate of 300 cpm. The device reads ordinary pencil marks as well as prepunched or preprinted data, ignoring card areas reserved for handwritten or printed messages. The standard input hopper capacity is 300 cards with a 500-card hopper as an option. Another option allows selected cards to be fed into a separate hopper under computer control. The 7261A is priced at \$2,575, with OEM or quantity discounts available. *Hewlett-Packard, Palo Alto, Cal.*

Circle No. 318 on Inquiry Card

TTY MODEL 37 ENHANCEMENT

Designed to meet the requirements of the newspaper industry, the Teletype Model 37 Receive-Only enhancement incorporates an OCR font with the AP/UPI wire service code compatible printer terminal. Printout is therefore compatible with the input requirements of OCR composition systems. *Teletype Corp., Skokie, Ill.*

Circle No. 252 on Inquiry Card



2400 BPS MODEM

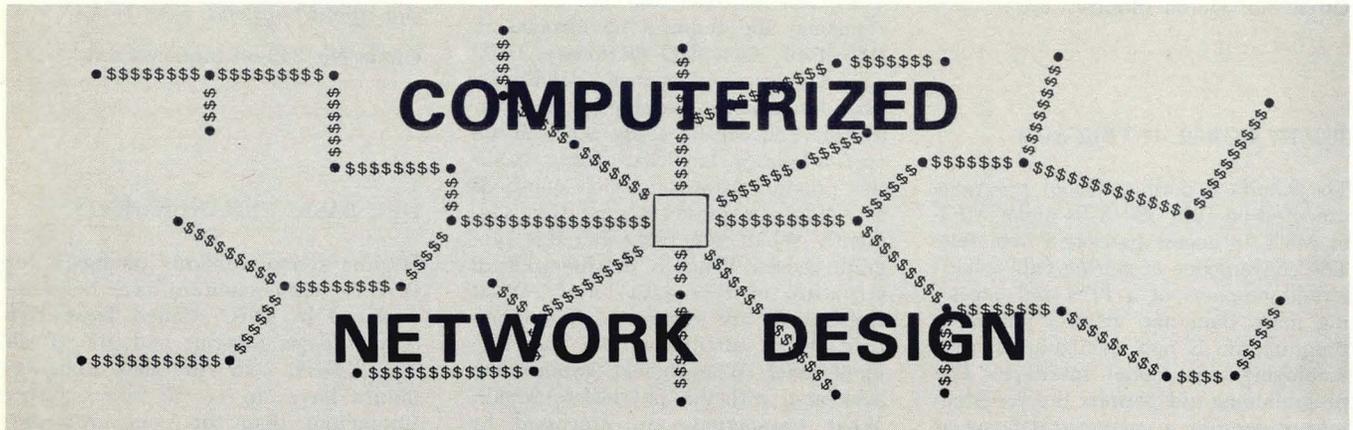
Available in stand-alone or rack mountable configurations, the GDC 201-9 modem contains diagnostics for local and remote verification of data set and system operation. The modem uses four phase PSM modulation to provide 2400 bps synchronous operation on unconditioned 2- or 4-wire type 3002 line facilities. Standard features include auto fast sync, carrier detect, external/internal transmitter timing, mark hold or receive data during carrier loss, and full 201A or 201B WECO compatibility. Analoop and Dataloop diagnostics allow the location of failures within the system regardless of whether the fault is in local or remote equipment. *General DataComm Industries, Norwalk, Conn.*

Circle No. 324 on Inquiry Card

OEM CASSETTE TRANSPORT

The Model 172 Digital Cassette Tape Drive offers read/write speeds to 20 ips, search and block read/write speeds to 40 ips, and a fast wind rate of 120 ips — all having forward/reverse capabilities. A drive with cassette loader, single track head, preamp, and interconnect card is priced at \$285.00 in 500-unit quantities. A model with the above, and Servo amplifiers, single-channel read/write electronics, and interface goes for \$555.00 in similar quantities. *Dicom Industries, Sunnyvale, Cal.*

Circle No. 314 on Inquiry Card



- **PLANET** --- Private Line Analysis and Network Engineering Tool --- is a new system of computer programs for planning and optimization of data communication systems. Tailored specifically to each client's needs, the service includes substantial pre- and post-installation consultation on its structure and application.

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CIRCLE NO. 35 ON INQUIRY CARD

NEW SOFTWARE AND SERVICES

SYSTEM/3 SOFTWARE

Engineering Computer Systems has introduced three software packages with expanded report outputs for the IBM System/3. The packages — including payroll, accounts payable and general ledger systems — produce more than ten reports each. The expanded payroll system, available in source deck format for a one-time fee of \$435, produces 24 weekly, monthly or quarterly reports from both active and inactive employee master files. The accounts payable system, priced at \$295, produces 17 different types of reports, including an optional daily invoice edit listing, covering a complete invoicing, vendor control and expense reporting system. The general ledger system, also priced at \$295, produces 10 periodic reports from trail balances through P & L and consolidated balance sheets. All three packages, programmed in RPG II, run on a System/3 Model 10 with either card or disk configuration. In card systems, a minimum of 12 Kbytes of main memory are required; 16 Kbytes are needed for the disk system. *Engineering Computer Systems, Lexington, Massachusetts.*

Circle No. 348 on Inquiry Card

360/370 COBOL INTERFACE

The interface permits Cobol programs executed on IBM 360/370s under MFT or MVT to access partitioned data sets. The convenience of storing data as different members of a PDS and accessing more than one member during a program run is now available to users employing this Cobol interface. The programming aid permits the programmer to describe a partitioned data set as a standard sequential file. A subroutine call executed prior to the Open statement for the file, selects the member to be processed. The selected member may then be opened for Input, Output or I-O, and normal Open, Close, Read, Write and Rewrite statements are used. The system is distributed as an object deck which is made available to the OS loader at execution time, or to the linkage editor. The interface will operate with IBM E and F, and ANS Versions 2, 3 and 4 Cobol compilers, as well as with the CLI Fast Cobol compiler. Distribution materials include the object deck and programmers manual, available for a onetime license fee of \$250. *Digital Solutions, Troy, N.Y.*

Circle No. 357 on Inquiry Card

DATASYSTEM 300 MULTI-USER ENTRY

The Foreground/Background package is designed to provide multi-user data entry for PDP-8-based DEC DataSystems 330 and 340 systems using COS-300 Commercial OS software. It allows the execution of any application or utility program in the background while up to three foreground terminals are performing data entry, each job being different. The new software has the capability of updating or interrogating existing files, or the ability to retrieve a record, display it, change a field in the record, and write the record back in the same file position. The package is available for \$1,000. *Digital Equip. Corp., Maynard, Mass.*

Circle No. 346 on Inquiry Card

IMS ENHANCER

UCC Ten Data Dictionary/Manager provides essential data definition and control capabilities for IMS users in either an on-line or batch environment. UCC Ten handles both IMS and O/S elements, and requires no changes to IMS itself. As a data dictionary, UCC Ten manages and controls definitions. All information is maintained in a central file and can be easily accessed via cross-reference facilities. These facilities provide answers to such questions as: What programs access this segment?; What data bases can this program access? What is the hierarchical structure of this data base?; What transactions are secured to this terminal?; What attributes does this segment have?; What logical terminals are associated with this physical terminal?; What transactions are processed by this program?; What is the DBD for this data base?; What is the PSB for this program?; and many more. As a data manager, UCC Ten simplifies the implementation and day-to-day use of IMS. It includes capabilities to automatically generate control statements (DBD, PSB, SSA, PCB, etc.), enforce standards, create both test and production definitions, and assist in data base design. UCC Ten runs on-line as an IMS 360/370 application, and in batch as a DL/1 program. On-line operation requires a 50K IMS message processing region; the batch mode requires a maximum of 100K in addition to the normal requirements of DL/1. *University Computing Co., Dallas, Texas*

Circle No. 354 on Inquiry Card

PROGRAM & SYSTEM CONVERSION SERVICES

The Rand Teleprocessing Division of Brandon Applied Systems has developed an automated system for program and systems conversions. The system, known as Meta Transformation System (MTS), provides for: Language-To-Language Conversion, such as IBM 360-ALC-to-ANS Cobol, Autocoder-to-Cobol, Map-to-Fortran, or machine language-to-PL/1; Machine-To-Machine Conversion in the same or other language, such as NCR 315 Neat-to-Burroughs B6700 Cobol, IBM 7010 Cobol-to-370 Cobol or RCA 301-to-370 Cobol; and Systems Philosophy-To-Systems Philosophy in the same or other language or machine, such as old generation-to-new generation, tape-to-disk, tape/disk-to-data base, or tape/disk/data base-to-full on-line transaction oriented processing. MTS uses a series of 40 software packages, operating on a dedicated IBM 370/155. Each system is analyzed, broken down into logical segments, translated into a complex meta-language, optimized for the target machine, repackaged into programs, translated into new object language, tested, and installed. *Brandon Applied Systems, New York, N.Y.*

Circle No. 342 on Inquiry Card

DEC BASIC ENHANCEMENTS

Higher speed versions of Basic for PDP-11 minicomputers have been introduced by DEC. Called Basic PTS (Paper Tape System) and RT (Real-Time) Basic PTS, the new enhancements have up to 15 times faster throughput than the company's previous core-only basic. The Basic PTS version is a core-only, single-user Basic for use by generalists in interactive environments. RT Basic PTS is an extension of Basic PTS with 20 real-time commands; this extension enables the user to fully utilize DEC's Laboratory Peripheral System (LPS-11), a subsystem designed to interface with the PDP-11. Applications for the new Basic packages include general problem solving, scientific calculations, analytical instrumentation, industrial testing, data collection and reduction, monitoring and logging. Basic PTS is available on license for \$500; RT Basic PTS goes for \$700. *Digital Equipment, Maynard, Mass.*

Circle No. 343 on Inquiry Card

MINICOMPUTER MARKET SURVEY

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The results of
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survey of the minicomputer
market are now available in a
special research report.

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

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



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

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

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

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

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Circle No. 399 On Inquiry Card

NEW LITERATURE

FLOPPY DISK FAMILY

The IMS MU/100 Series of floppy disk cartridge drives are reviewed in a new data sheet. The TTL interface compatible units feature an average access time of 16.7 millisecond; a transfer rate of 1.06 Mbits/sec; a single disk (removable) cartridge or dual disk (cartridge plus fixed disk) drive assembly; cartridge capacity of 500 Kbits; and fixed disk capacity of 125K or 250 Kbits. *Intelligent Memory Systems, Boulder, Col.*

Circle No. 396 on Inquiry Card.

MEDIUM SPEED LINE PRINTER

Pertec's first member in a family of line printers is fully detailed in an operations bulletin. The P7330 printer operates at two speeds — 160 or 300 LPM — using a 64-ASCII character set and a 132-column format. *Pertec Corp., Chatsworth, Cal.*

Circle No. 386 on Inquiry Card

THE RISE OF THE PHOENIX 360

Before placing that order for a 370, read this brochure on the Phoenix System, an enhanced 360 with system data management software; OS, DOS and extended DOS; high performance spooling; a 370 instruction set; and complete support and maintenance services. *Greyhound Computer Corp., Phoenix, Ariz.*

Circle No. 395 on Inquiry Card

CASSETTE DRIVES

Philips-type cassette drive mechanisms with read/write speeds of up to 15 ips and search speeds of 100 ips are detailed in a product folder. *Conrac/Cramer Div., Old Saybrook, Conn.*

Circle No. 393 on Inquiry Card

MINI KEYPUNCH

A new brochure describes the Model 402 Vari-Punch, a portable electric keypunch which prints and punches numeric data on 80-column cards or multiple copy card sets. *Varifab, Inc., Old Greenwich, Ct.*

Circle No. 375 on Inquiry Card

DATA COMMUNICATIONS HANDBOOK

Microdata has recently published a handbook that will interest both the novice and more advanced data communicator. The complete handbook covers the basics of data communications (data sets and muxes, terminals, common carriers and data networks, modes and codes, error and transmission control); the application of computers in data communications; the design and implementation of data networks and systems; and Microdata's line of minicomputer communications processors and products. The handbook is well worth the asking price of \$2.50, containing text, tables and summaries that provide the reader with a comprehensive presentation of the "why's", "how's" and "what's" of data communications technology. *Microdata Corp., Irvine, Cal.*

Circle No. 368 on Inquiry Card

PLOTTER POWER FOR BATCH TERMINALS

Users of Data 100 Model 78 batch terminals can now obtain plotting power by using the BTC-7/100, a Houston Instrument plotter interface which is described in a new four-page brochure. *Houston Instrument, Bellaire, Texas*

Circle No. 372 on Inquiry Card

COMMUNICATIONS CONTROLLER

The features and operational details of the Cope 4705 Communications Controller are described in a new brochure. The 4705 is an alternative to IBM 270X and 3705 transmission control units, providing enhanced emulation capabilities. *Harris Communications Systems, Dallas, Texas*

Circle No. 383 on Inquiry Card

MINI-BASED BUSINESS SYSTEMS

Another entry in the fast growing field of dedicated small-to-medium mini-computer-based business systems is described in a series of product releases. Using a 16-bit mini with a full complement of peripherals, the systems come supported with DOS software, Cobol and RPG compilers; and training, facilities management and maintenance services. *Systems Corp., Honolulu, Hawaii*

Circle No. 382 on Inquiry Card

CONSTRUCTION/MAINTENANCE SYSTEM

Optima-Maxima, a computerized project control and management system for architects, contractors, and manufacturers performing construction or maintenance on their own facilities, is discussed in an eight-page brochure. The system is used in planning and specification activities, scheduling, and manpower and materials allocation. *Andco/Management Technology Group, Buffalo, N.Y.*

Circle No. 392 on Inquiry Card

MINICOMPUTER PROGRAM LISTING

A booklet contains an abstract listing of programs available to support Tennecomp's Minidek/Doubledex tape cartridge storage system in mini-computer applications. *Tennecomp Systems, Inc., Oak Ridge, Tenn.*

Circle No. 376 on Inquiry Card

COMPUTER TIME BOOKLET

This National Edition of the *Computer Time Report* lists installations which offer computer time, their price structure, and their hardware/software capabilities. *Time Brookers Inc., Elmsford, N.Y.*

Circle No. 384 on Inquiry Card

OFF-LINE 80-TO-96 COLUMN CARD CONVERTER

The 1020, an 80-to-96 column converter for "computerless" card conversion, is reviewed in a new data sheet. The converter consists of an 80-column card reader interfaced to a 96-column buffered keypunch recorder which allows, in addition to card conversion, the keypunching and verification of 96-column cards for new applications. *Decision Data Computer, Horsham, Pa.*

Circle No. 380 on Inquiry Card

SECURE DATA TRANSMISSION

The Model 213 Crypto Generator, a encrypting/decrypting module for secure data transmission and computer data storage is detailed in a four-page brochure. Sequence length (randomness) of the code generator is more than 66 billion bits and over 25 billion programmable code combinations are available. *Crypto Industries, San Diego, Cal.*

Circle No. 388 on Inquiry Card

INTELLIGENT CRT SYSTEMS

A product folder details the IS/7800 Series of intelligent CRT terminal systems. The IS/7800 is hardware/software compatible with IBM 3270 display systems, and offers upper/lower case displays for 240, 480, 960, or 1920 characters. *GTE Information Systems, White Plains, N.Y.*

Circle No. 389 on Inquiry Card

THE COMPUTER DATA ENTRY MARKET

This new 2-volume, 355 page Frost & Sullivan report states that computer data entry sales, \$1.2 billion in 1972 will top \$2 billion in 1975 and double that to \$4 billion by 1982.

Forecasts in dollars and units and of average unit prices through 1982, for 30 products in the keypunch and buffered keypunch, keyboard to storage, alphanumeric display terminals, optical readers, keyboard readers, magnetic readers, industrial data collection, electronic point of sale, pushbutton telephone and portable data recorder product categories.

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2000 bps
ICC's two compatible 2000 bps modems operate reliably over dial-up or dedicated lines—even when line quality varies.



7200 bps
Modem 4800/72 delivers 7200 bps data over C-1 lines, with 4800 bps dial backup. It offers features like multichannel operation, built-in test and automatic adaptive equalization.

2400 bps
Dependable 2400 bps transmission is easy with ICC's 201B on-line compatible modems. The new LSI model has some really great features.



9600 bps
Modem 5500/96 operates dependably over C-2 lines, and even offers 4800 bps dial backup, multi-channel operation, built-in test, and automatic adaptive equalization.

3600 bps
Fast line turn-around, and a reverse low-speed channel are two of the ways Modem 3300/36 increases the efficiency of 3600 bps transmission.



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