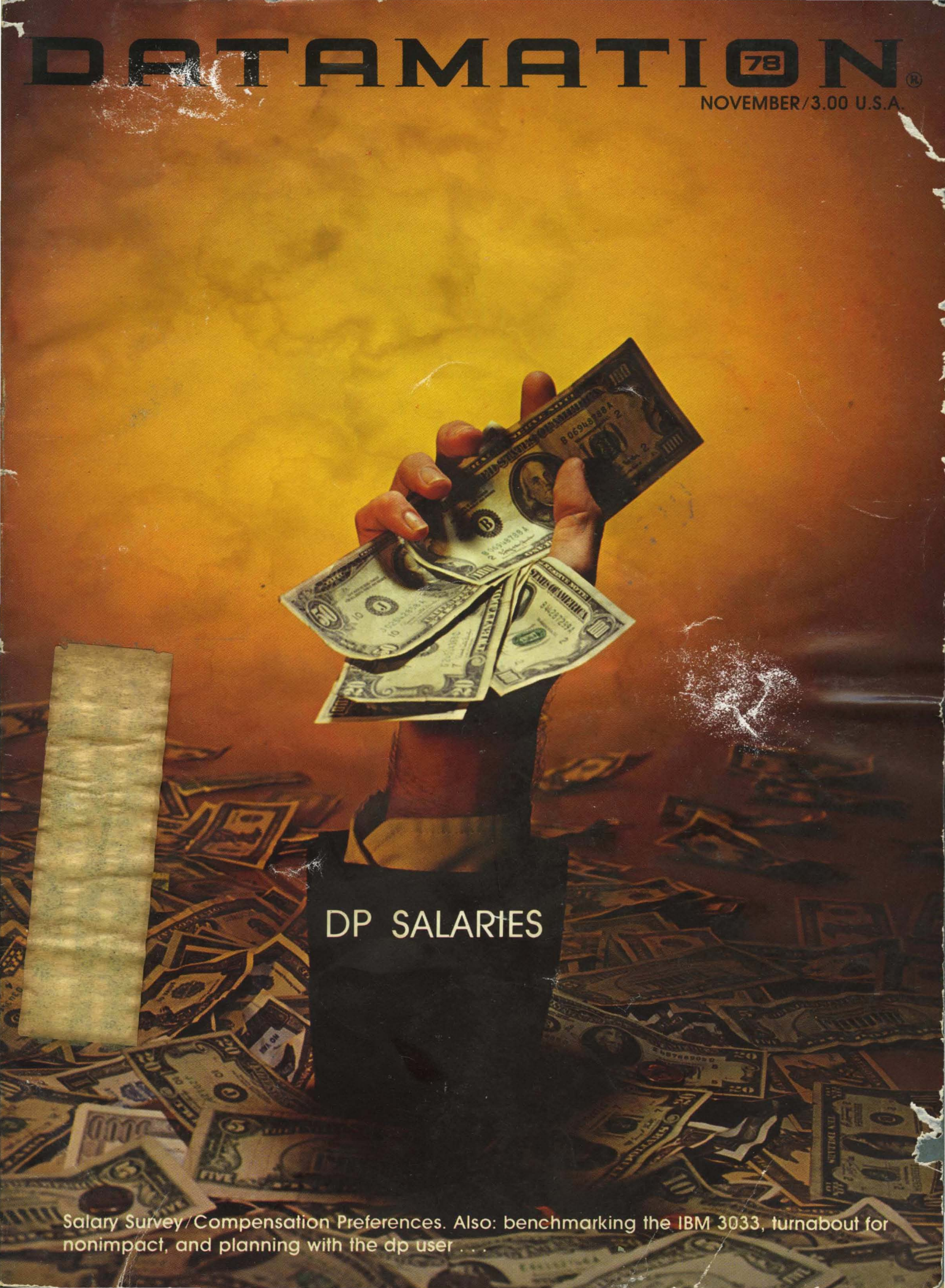
DATAMATION 78

NOVEMBER/3.00 U.S.A.



Salary Survey/Compensation Preferences. Also: benchmarking the IBM 3033, turnabout for nonimpact, and planning with the dp user . . .

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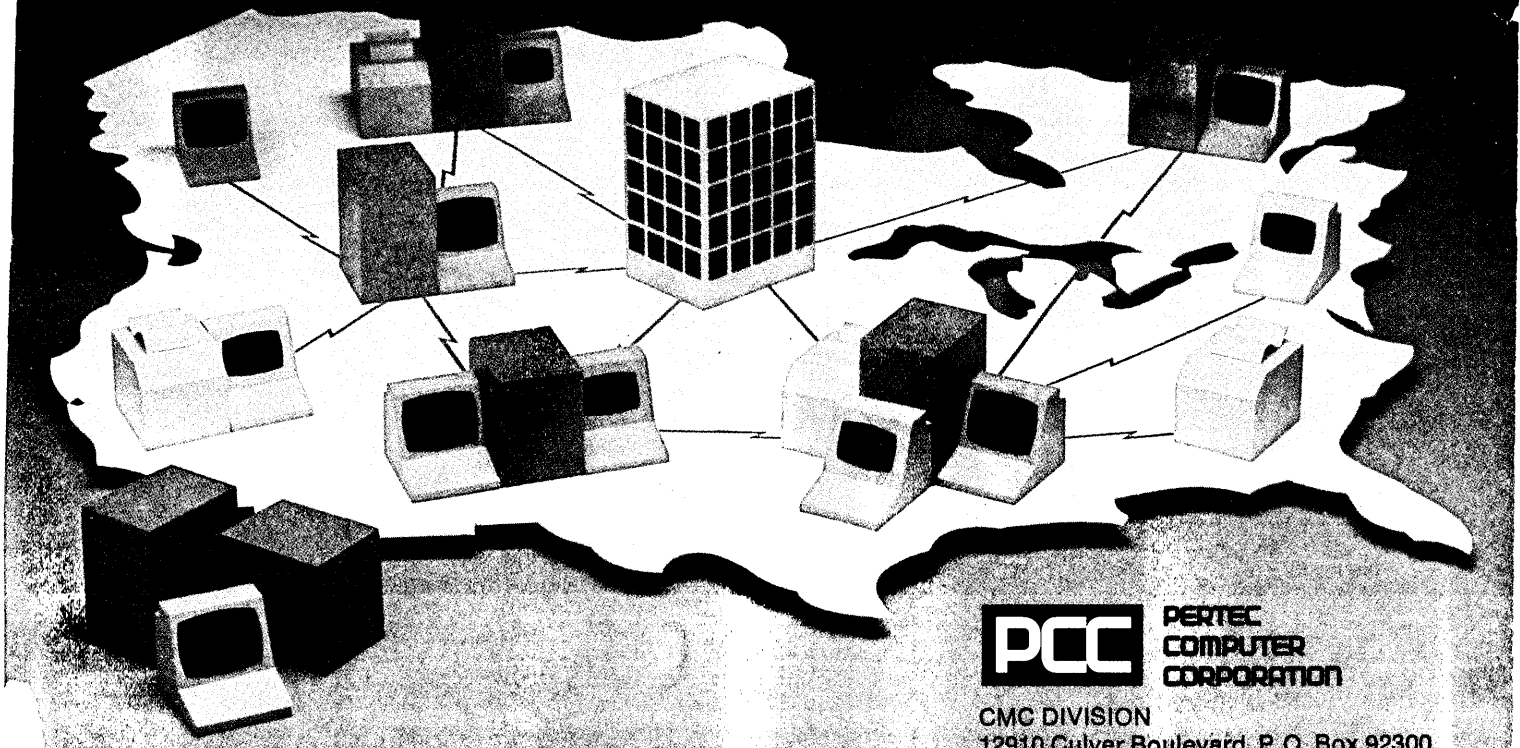

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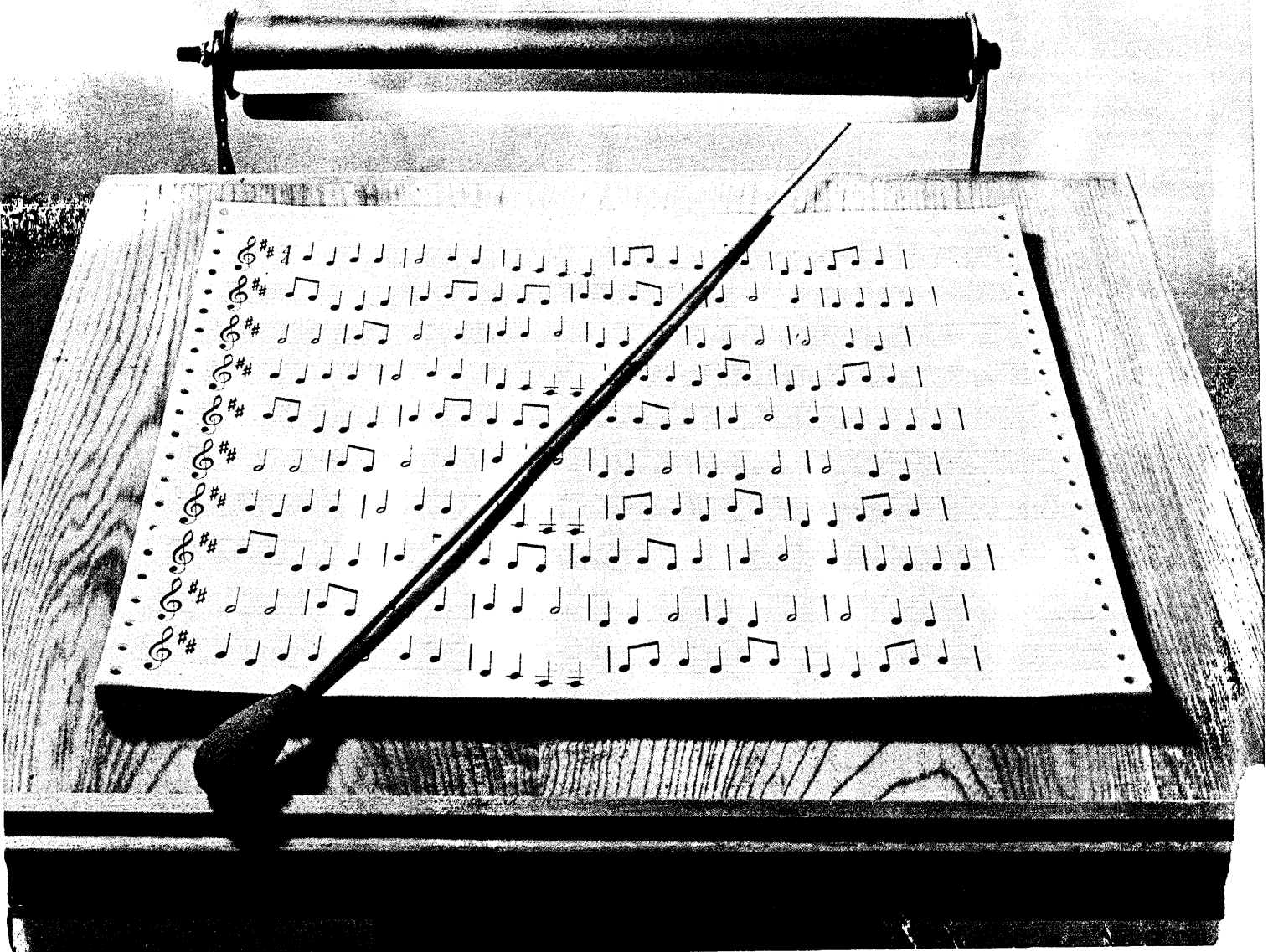

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Money is still the name of the game, as our salary survey shows. Design is by our art director; photo: © Holly Ahlberg 1978.

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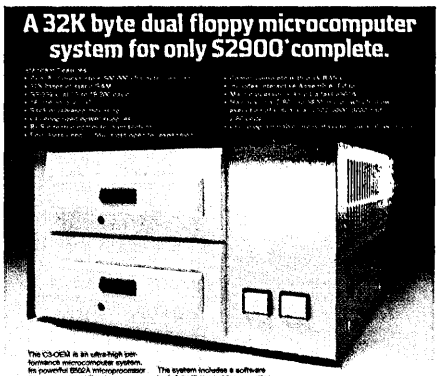

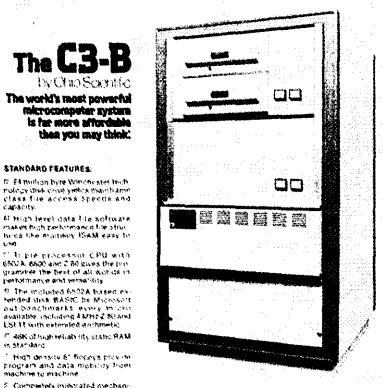

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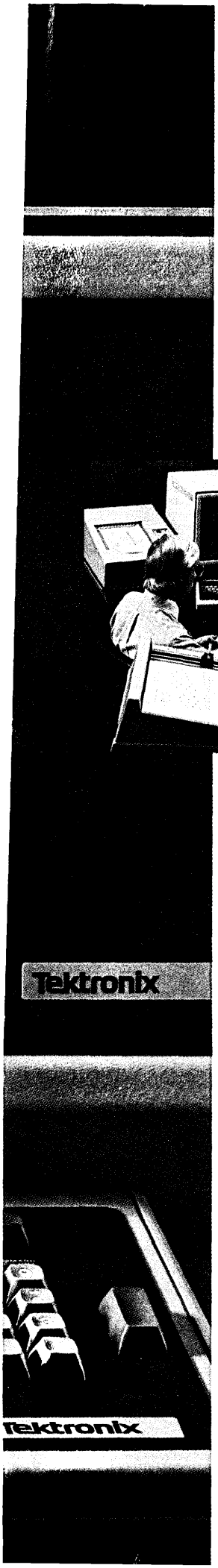

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LOOKING BACK

November/December 1958 EASTERN JOINT COMPUTER CONFERENCE

The data processing industry was preparing for the Eastern Joint Computer Conference, one of its major annual events at this time 20 years ago, and the November/December issue of DATAMATION previewed the show.

One of the keynote speakers, Dr. Frank M. Verzuh of MIT outlined some of the key issues he would address at the Philadelphia conference, prophetically asserting that many existing computers would soon become obsolete. Dr. Verzuh said he would also update his audience on such then "hot" new technologies as cryotrons, thin-film memories, and transistors.

Readers also got an advance peek at some of the new products to be introduced at the show. Among them was a mobile computer so compact it could be transported on the back of a trailer truck. Called—with apologies to Herman Melville—MOBIDIC and manufactured by Sylvania Electric Products, this all-transistorized mobile digital computer, the first of its kind, had an operating speed of 16 microseconds and a basic memory capacity of 4,096 38-bit words. The system was pegged for the military market and designed to solve problems ranging from battle strategy and tactics to logistics.

Additionally, a then little known company called Digital Equipment Corp. offered transistorized digital circuits to be used as system building blocks. And Royal McBee introduced a desktop computer that weighed only 800 pounds and required no special installation or external air conditioning equipment.

Registration fees for the conference came to $4, which may tell us more about inflation today than the computer industry in 1958.

November 1968 COMPUTER INDUSTRY

The computer industry was burgeoning by the end of 1968, and the November issue of DATAMATION mirrored these busy and optimistic times. A news item noted that 33-year-old Sam Wyly, head of University Computing Co., "the Dallas adolescent giant," had taken the first step toward establishing a common carrier with the acquisition of something called Microwave Transmission Co.

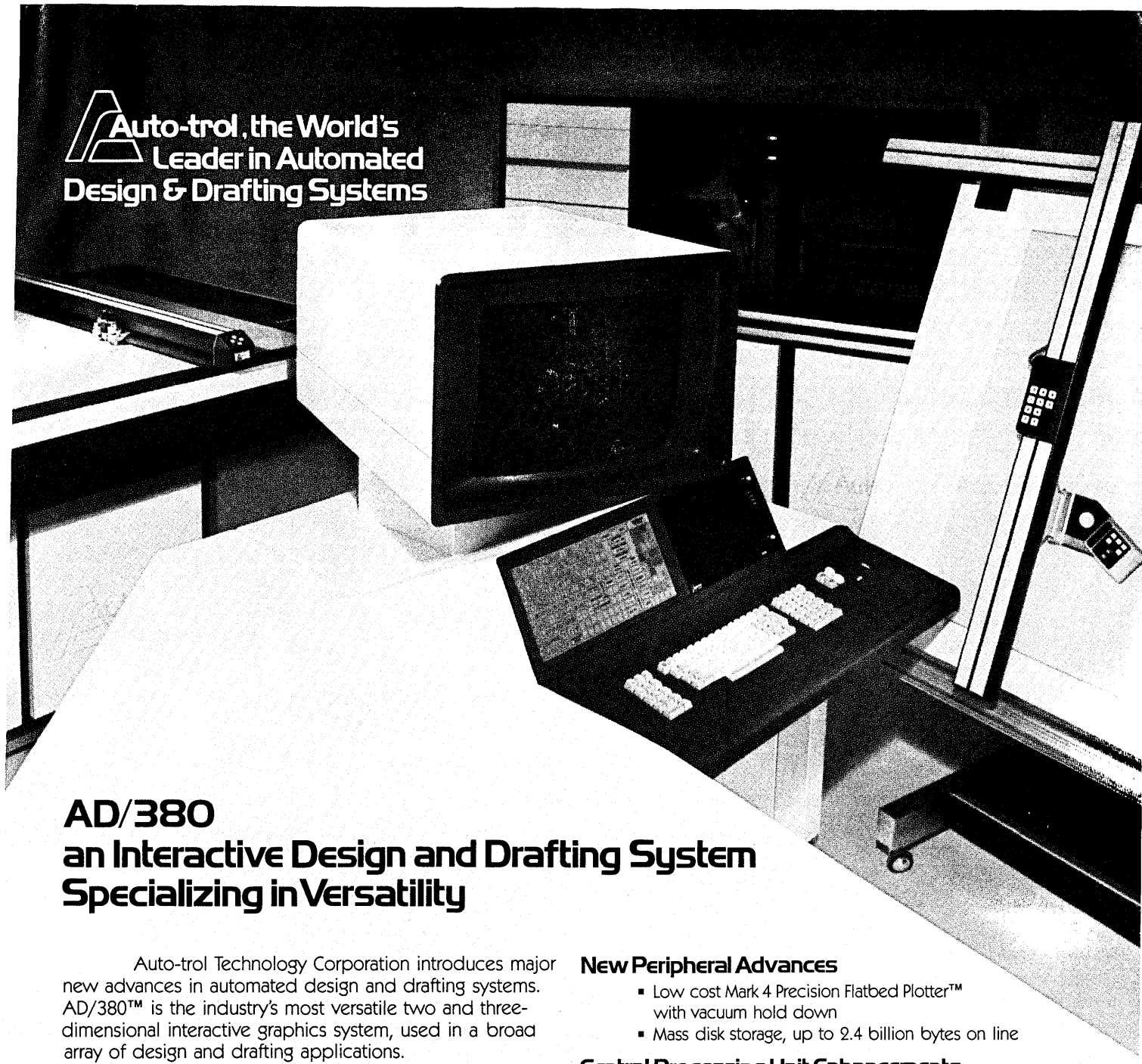
Later to be renamed Data Transmission Co. (Datran), the fledgling firm started out with a crew of 25 employees including ex-Univac super-salesman Sy Joffe as executive vice president and Charles Wyly as president. Even then, Wyly, who would later unsuccessfully take on—and lose out to—AT&T in going after the digital communications market, was thinking big. The UCC annual report talked about establishing a test satellite link between Dallas and London, removing geography as, "a restraint to serving customers," the story said.

At the same time a new boy in the computer industry, Edson de Castro, president of a seven-month-old firm called Data General, announced his company's first product, the Nova. The 4096 16-bit word memory machine went for only $7,950, complete with Teletype interface.

Additionally, Dr. Herbert S. Kleiman, an economist, reported that many noncomputer users had never even heard of the concept of time-sharing. In fact, on the basis of a study he'd completed, Dr. Kleiman concluded that less than 30% of a broad cross-section of business and professional groups questioned had any knowledge of time-sharing at all. Dr. Kleiman concluded that the time-sharing market should continue to grow, but only if vendors mounted major marketing efforts and sought to educate potential new users as to the benefits of the time-sharing approach.

Finally Tug Tamaru, a Los Angeles city data service department manager, paid a visit to several Japanese computer installations, noting then that the centers were especially clean and neat, and that at the time were using second generation hardware; systems intergration and management information systems concepts were just coming to the forefront in Japan, Tamaru said.

Tamaru surmised from his visit that the U.S. dp industry could play a much heavier role in this "far eastern industrial/commerical empire." "It will be interesting to see who has the last banzai," he concluded. ✲



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The CFSMTS program to activate the Multiple Transient Support requires either a virtual or a real partition of 32K in which to run. This program is executed only to activate Multiple Transient Support and to print the accumulated statistics.

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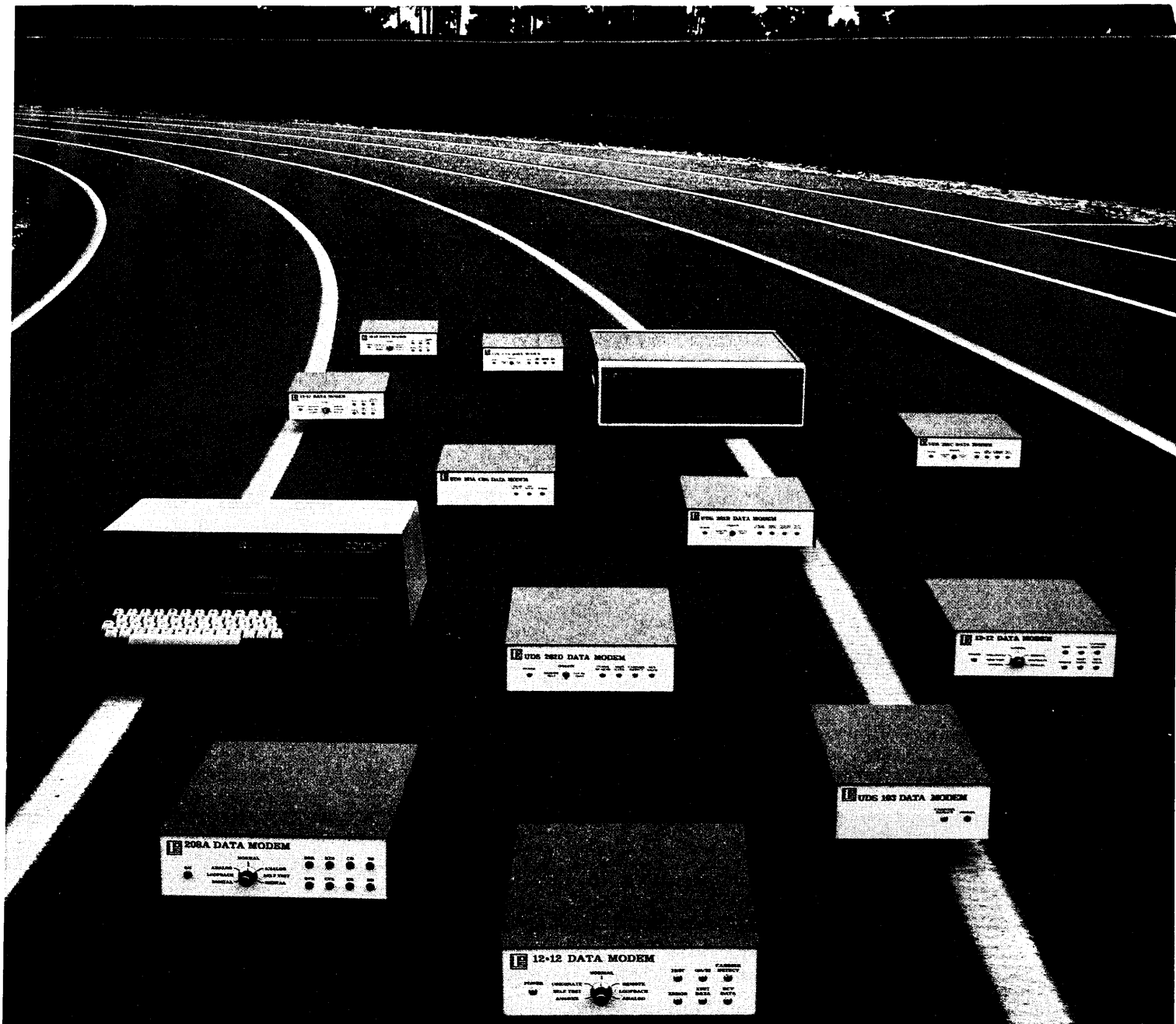

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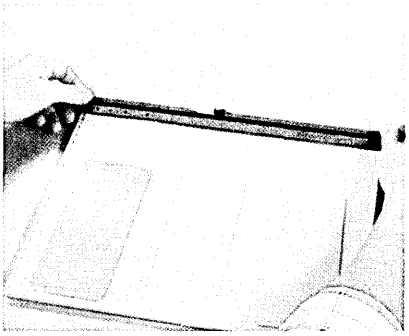
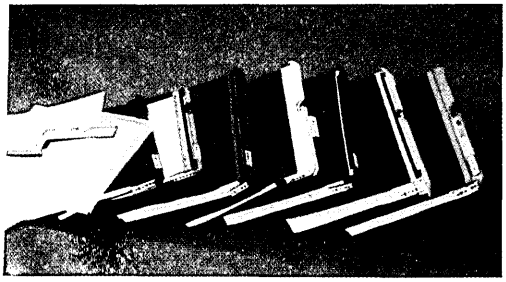
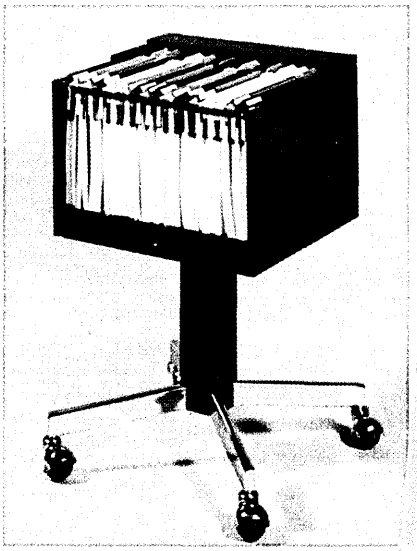




Along with other DOCU-MATE filing devices, cartridges fit compatibly into a wide variety of filing and referencing equipment that allows almost unlimited flexibility in the planning of central documentation libraries and development support libraries, and individual work stations.



The DOCU-MATE System is the key you are looking for to make your documentation library system work. It will help you to improve project control, increase systems and programming productivity, improve interdepartmental communications and reduce the cost of maintaining your documentation system. In less than two years since its introduction, it is now in use by over 3,000 companies in the U.S.

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A Subsidiary of Barry Wright Corp.

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CIRCLE 108 ON READER CARD

YOU SHOULDN'T HAVE TO SEE SIX DIFFERENT SUPPLIERS TO MAKE A NETWORK WORK.

Until now, putting together a distributed network for process control, experiment monitoring or test and inspection meant dealing with a lot of different companies. And you could still end up with a mish-mash of misfits.

Now, finally, there's an intelligent way to distribute intelligence. Because all the hardware and software you need is now available from a single company that specializes in systems for industrial and scientific applications: MODCOMP.

Classic 7810 — A new cost/performance leader for minis.

Designed specifically for use as a satellite in a distributed network, our new Classic 7810 minicomputer gives you MODCOMP's sophisticated hardware and software capabilities at microprocessor prices.

It has the largest directly-addressable memory of any 16-bit CPU — 128 K-bytes of solid state memory. This allows you to run larger memory-resident programs so you can do more work at the satellite level and free up the host for more complex tasks. As a result, the network will operate at maximum efficiency.

The 7810 is supported by a complete set of field-proven software including MAXNET III, our network operating system. And our MAX III Real-Time Operating System which enables the 7810 to be used as a stand-alone computer.

It's available as a computer-on-a-board for OEM's. As a fully packaged system. Or as an integral part of our new process I/O system, MODACS III.

MODACS III — Our new modular data acquisition and control subsystem.

MODACS III is designed to give you maximum flexibility in process control interface applications. Either as a local subsystem. Or, with the addition of the 7810, as a complete remote system in a network.

When used as a remote satellite, with our new HDLC/ADCCP/SDLC multi-drop communications link, MODACS III can be located right at the process you want to control.

This reduces your in-plant wiring requirements. The load on your host computer. And your risks as well. Because if the host goes down, the process that MODACS III is controlling doesn't have to.

For either the local or remote application it can contain up to 64 process I/O interface modules so you can hook up as many as 2,048 digital inputs or outputs; up to 1,024 wide range analog inputs; up to 256 analog outputs; a whole host of special functions; or any combination.

What does all this mean? It means that you can use MODACS III to control and monitor thermocouples, pressure transducers, strain gauges, meters, analyzers, amplifiers, potentiometers and hundreds of other analog or digital devices. In the harshest environmental conditions.

A complete family of real-time systems for the real world.

If you need more performance than the 7810 and MODACS III, we've got that, too.

The MODCOMP Classic 7860 and 7870 superminis have outperformed DEC's 11/70 and VAX. Interdata's 8/32. Prime's 400. And SEL's 32/75.

For more information, send for our MODCOMP Classic Family or MODACS III brochures.

After all, sending for one company's brochures is a lot easier than sending for brochures from a half dozen different companies.

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CIRCLE 73 ON READER CARD

LOOK AHEAD

SHOULD IBM SELL ITS SOFTWARE?

Deja vu. Are you old enough to remember when the courts told IBM they had to sell as well as rent their equipment? 1956. These days IBM rents almost all of its priced software products, under monthly license, and many software firms aren't happy about it. Organizations like ADAPSO are pushing IBM to treat software just like hardware. That mainly means sell it. We understand IBM's response so far is that there's no demand from users that it do so.

But user demand won't come unless they know it's available or possible, says one proponent of the software sale, Lee Keet, president of Turnkey Systems, Inc., Norwalk, Conn. Battling against rentals "constrains the ability of independent suppliers to price fairly," he maintains. So far the only IBM permanent licenses are on the Series 1, which shows a 60:1 purchase to lease multiplier, far greater than that on hardware. This is indicative of what some firms generally think is very low pricing on software rentals. One vendor complained that his product, already on the market, was hard hit when IBM announced its competitive offering at "low rentals."

FIRST ADD-ON FOR 3032

Despite reports that IBM might be slashing memory prices on its 303X line, independent memory makers continue to install foreign boxes. Intel Corp. recently installed four million bytes of add-on memory to a 3032 delivered by IBM to Texas Educational Services in Dallas early in October. The price was 30% below IBM's price of $110,000 per megabyte and Intel sources say the company's orders for add-on memories to IBM 3033s and 3032s now are running at about four to five a month. IBM probably has installed about 150 of its 303X line but appears to be slow on delivery of memory. The Intel order in Dallas, however, was attractive to the user who had already installed three megabytes of Intel memory on the 370/158 it replaced with the 3032 and would have had to pay a penalty if it had returned the memory to Intel.

A GRIPE OVER MAINTENANCE FEES

Announced in 1967, the Univac 9300 batch processor continues to earn high marks from users. Happy with the system software and support they've received from Univac, users' only gripe on 9300 is over the high maintenance fee which the company has continued to increase ever since it targeted the system for phase out some 18 months ago. "Univac is making a fortune on the maintenance," says one 9300 user, who also admits his company has been under "some pressure" from Univac to migrate over to its new 925 system which currently is being delivered.

STAR FALLS TO CYBER 203

Control Data Corp. has retired its STAR-100 computer line, of which it built four, including one it uses in its Cybernet network service. Its successor--the Cyber 203--unlike the STAR, which used core memory, has LSI components that enable the

LOOK AHEAD

scalar processor to operate six times faster than the STAR 100 processor. Both the STAR and Cyber 203 use the same technology in the Vector processor. STAR machines can be upgraded to the Cyber 203 level and the company so far has received an order for an upgrade. Price data is expected momentarily.

"FROM THE ASHES???"

When Xerox pulled out of the general purpose computer business in mid-1975, Samuel V. Edens wanted to buy the computer operation. As president of Telefile Computer Corp., he had turned that company around by positioning it firmly in the Xerox marketplace with Xerox-compatible disk systems, main memory and peripherals and, more recently, Sigma-like computers (August '78, p. 55). Now he's out as head of Telefile, reportedly because of pressure from the firm's number one money source, First National Bank of Chicago. Word is he's thinking of starting up another company. Edens was succeeded at Telefile by Hal Eden, formerly marketing vp and a longtime IBMer with, said one insider, "the kind of large systems experience we need now." Edens named Telefile's Sigma-like computer "Phoenix" for...rising from the ashes. Maybe his new company will bear the same name.

MICROSTAR ON THE HORIZON

Vincent A. Van Praag has started more computer companies than he can remember. The 63-year-old industry veteran has, as a consultant, registered probably as many. Now he has a new one, Microstar, headquartered in Lomita, Calif. Its product, a microprocessor, bears the same name. Van Praag describes himself as the "chief peddler" for the new firm which has had a prototype computer running "with no failures" for a year. It is producing its initial batch of five production models and will install the first this month. Robert Allen is president of Microstar. Architect of the computer is Robert Jackson, a one-time General Automation designer. The Microstar, a 64K byte machine, sells for $15,000.

AT&T'S ORLANDO WORKS

Word has it that the cushiest job in AT&T these days is in Orlando, Fla., site of the company's massive document facility where it is stashing discovery material to defend itself in the Justice Dept.'s antitrust suit. Puzzled by all the activity at AT&T's Florida compound, one antitruster admits the government "can't figure out what the hell all those people are doing down there." There just isn't enough work on the case at this point, he confides, "and furthermore, AT&T has asked us for nothing but junk and most of what they've gotten is junk."

RUMORS AND RAW RANDOM DATA

Rumor has been circulating for several months that Xerox, out to build its communications muscles, is eyeing Western Union as a likely takeover target, but neither company will comment. It comes in the wake of earlier reports that Xerox had been looking at packet switchers Tymnet and Telenet as candidates for acquisition...There were chuckles aplenty at the recent IBM SHARE users group meeting in Boston when a fearless femme walked into one of the nightly cocktail parties wearing an Amdahl T-shirt. When asked to remove it, she politely declined, which prompted a SHARE guru to quip: she can't take it off, it's all proprietary software under there.

"Thanks to MARK IV,® our users have beaten the computer room waiting line!"

Jennifer Thompson, Senior Computer Systems Analyst
Great-West Life Assurance Co., Winnipeg, Manitoba, Canada

Founded in 1892, Great-West employs 4,000 people, carries $43 billion in insurance annuities and has $3.3 billion in assets. It is Canada's largest life insurance company in terms of insurance income and the 14th largest life insurance company in North America in terms of total insurance in force.

"As the methods of storing and manipulating data become more varied and complex, the need for easy user access to this data has increased. Even though our 370/168 attached processor with MVS operating system gives us substantial computing power, and we have over 100 programmers and analysts, the company's demands on these resources are tremendous. User requests create an ever-extending queue because we simply could never do all they wanted us to do.

"With MARK IV, our users can get the information themselves, often in quite sophisticated ways. Thanks to MARK IV, they've learned how to avoid the programming waiting line. And from the feedback I'm getting, they're very pleased with this new environment!

"MARK IV has also had an impact in our Computer Systems area. We have developed some complete systems, using the many powerful capabilities of the language, such as transaction processing and file coordination. Even though the programmers were relatively inexperienced with MARK IV, they indicated the development times were considerably shorter with MARK IV than with PL/1.

"Most programmers show resistance to a new tool like MARK IV, but once they have used it, they come back to tell me how much they like it. It's the thrill of getting results!"

GET THE FACTS ON MARK IV. MARK IV is the most versatile and widely used software product in the world for application implementation, data management and information processing. Six powerful models (prices start at $12,000) are in daily use on IBM 360/370, Univac 70/90, Siemens 4004, Amdahl 470, and Itel Advanced System computers at over 1,300 installations in 44 countries. Programs in MARK IV require only about one-tenth the statement of Cobol, and users report 60 to 90% cost and time reductions on most MARK IV applications.

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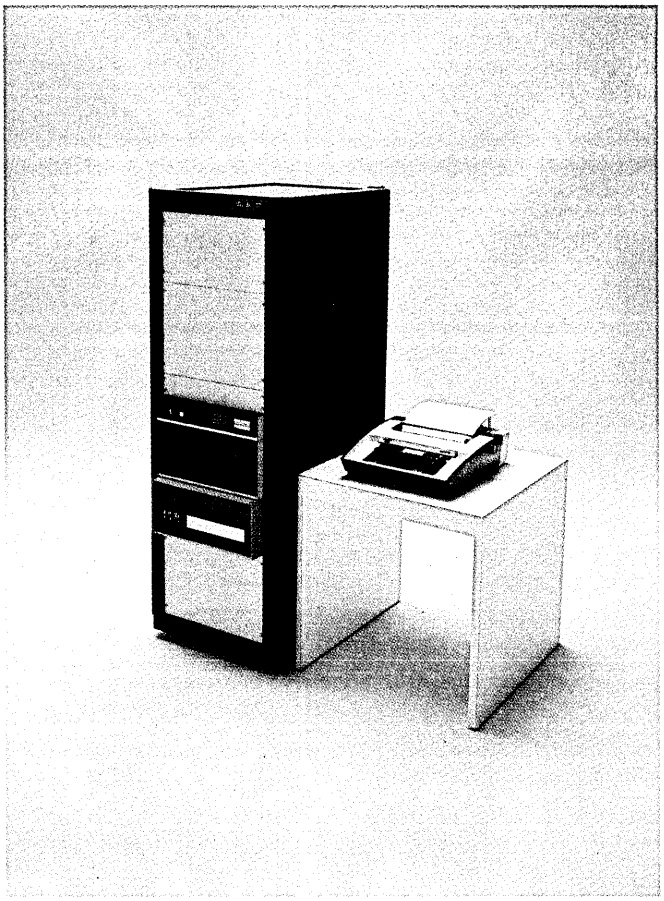
New Developments from SYSTEMS...

The New MOS



SEL 32/5720

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Until now, you've either had to forego 16-bit pricing to get 32-bit performance, or you've had to give up 32-bit performance just to keep the budget in line.

No longer. Now you can invest in a full-blown 32-bit computer system and pay no more than you would for a 16-bit computer. And not have to worry about insufficient power for future needs.

Here's why: value engineering. We've taken our high-performance 32-bit computers, and we've done some packaging that makes sense. We've added MOS memory. Expanded and fine-tuned our operationally-proven software. Made our systems more compact, more efficient. And we put it all together for a third less money.

The result? A broad family of 32-bit computer systems, perfect for jobs that require high thruputs like telemetry, seismic exploration, or research. Or for jobs that need lots of I/O; process control, simulation, or laboratory automation.

All are upward-compatible, so you can still grow, but start with a minimal investment.

If you'd like to have real performance, but can't overlook how effectively you use your budget, talk to us. We'll make sure that when you invest in SYSTEMS computers, more dollars will flow to your bottom line.

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SEL 32/5740

SEL 32/5750

SYSTEMS
ENGINEERING LABORATORIES

CIRCLE 67 ON READER CARD

A BREACH OF DATA SECURITY CAN CAUSE YOUR BUSINESS TO COLLAPSE

The information in your computer system is probably your company's most important asset.

If it were compromised in *any* way, you could end up without a business.

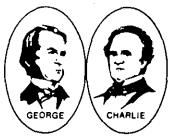
That's why SECURE™ is the way you want your data to be.

SECURE lets you protect your data from accidental or intentional alteration... unauthorized disclosure or theft... software vandalism.

SECURE provides protection without interfering with your users. It keeps track of not only authorized accesses but also unauthorized attempts.

The information in your IBM OS/360 or OS/VS computer is vital to your company's success. Don't invite a breach of data security. SECURE your business from collapse.

For complete information on how SECURE will help you protect your company, call or write us today.



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CIRCLE 41 ON READER CARD

Data Communications Problems? Meet The Portable Problem Solver

Spectron D-301 DATASCOPE

The Field Service Standard For Network Hardware and Software Monitoring

The fully microprocessor-based D-301 is designed for portability. It's a 5½" high x 16" wide x 17" deep, brief case size, and weighs only 25 lbs. It has a built-in ease and simplicity of operation, as do all DATASCOPES.

The time-correlated full-duplex CRT display allows maximum monitoring flexibility. Send and receive data are separately (and simultaneously) controlled for speed, language (i.e., HEX, ASCII, EBCDIC), synchronization, and number of bits per character.

The D-301 captures full duplex data at speeds up to 72,000 bits per second and stores it in its large 262,000 bit buffer for replay under operator control. A search feature with Auto-Stop (up to 4 selected characters) permits the rapid scanning of the entire buffer contents.

The D-301 provides for switch-selectable full duplex, half duplex and simplex operation; SDLC, Synchronous, Asynchronous, and Isochronous transmission; and 5, 6, 7, or 8 level codes. Right or left character justification, bit inversion and character reversal are independently controllable for each side. Complete interface breakout and L.E.D. display.

The DATASCOPE is the window into your communications network which shows every character sent or received. Hidden errors become visible; complex problems become solvable.

Portable, Inexpensive, Exceptionally Capable
The D-301 DATASCOPE
$4,900.

SPECTRON CORPORATION

For Information:

344 New Albany Rd.
P.O. Box 620
Moorestown, NJ 08057
(609) 234-5700

TWX: 710-897-1359
Telex: 83-1488

CIRCLE 131 ON READER CARD

CALENDAR

DEC.

TDCC FORUM, DEC. 5-6, WASHINGTON, D.C.

The 10th National Data Systems Forum and Exhibit, sponsored by the Transportation Data Coordinating Committee, expects to attract hundreds of transporation systems executives and technical experts from industry and government. Speaking at the conference will be the White House Special Assistant to the President for Information Management, Richard M. Harden, and the Deputy Under Secretary of Transporation, Dr. John J. Fearnsides. Also featured at the conference will be workshops on various aspects of computers in transportation, distribution, and business, including computer-to-computer transactions. Fee: $100. Contact: TDCC, 1101 17th St., N.W., Suite 309, Washington, DC 20036 (202) 293-5514.

CMG IX, DEC. 5-8, SAN FRANCISCO.

The ninth annual international conference of the Computer Measurement Group, Inc. will include both product displays and scheduled presentations by a small number of vendors whose products include hardware monitors, software monitors, simulation programs, and software performance anlayzers. Also featured will be tutorials and technical sessions presented by users. Some topics of technical sessions will be program behavior, performance management, workload management, system and subsystem models, and capacity planning techniques. Fee: Nonmembers $135 in advance, $155 at the door; $115 and $135 for members. Contacts: General Chairman, Robert J. Bishop, Ernst & Ernst, Two Peachtree St., N.W., Atlanta, GA 30303 (404) 658-9400; Registration, Richard L. Arnold, Crown Zellerbach, One Bush St., San Francisco, CA 94119 (415) 823-5802; Vendor Program, James A. Morris, Atlantic Richfield Co., 515 S. Flower St., Los Angeles, CA 90071 (213) 486-2128.

MIDCON/78 DEC. 12-14, DALLAS.

Nearly 300 exhibitors will be present, showing mini- and microcomputers and peripherals; instrumentation and control systems; production, packaging, and test equipment; components; microelectronics; and electro-optics. Fee: $50. Contact: Electronic Coventions, Inc., 999 N. Sepulveda Blvd., El Segundo, CA 90245 (213) 772-2965.

JAN.

COMPUTER LAW ASSN. MEETING, JAN. 25-26, LOS ANGELES.

Developments in computer law including contracts, software protection, taxes, and trade secret litigation will be discussed. Contact: Richard L. Bernacchi, Irell Manella, 1800 Avenue of the Stars, Los Angeles, CA 90067 (213) 277-1010.

COMMUNICATION NETWORKS, JAN. 30-FEB. 1, WASHINGTON, D.C.

There will be miniconferences on the proposed revision of the communications act; applications — voice, data, office of the future, and applications management; and technology. Also featured will be speakers and an equipment exposition. Fee: $295. Contact: The Conference Co., 60 Austin St., Newton, MA 02160 (617) 964-4550.

FEB.

NATIONAL OFFICE EXHIBITION AND CONFERENCE, FEB. 13-15, TORONTO.

100 exhibitors of furniture, word processing equipment, office computers, and office equipment are expected. The concurrent conference will feature discussion of records management, office environment, space planning, word processing, energy conservation, and more. Contact: Kimberly Coffman, 2 Bloor St. W., Suite 2504, Toronto, Ontario M4W 3E2 (416) 967-6200.

COMPUTER SCIENCE CONFERENCE, FEB. 20-22, DAYTON, OHIO.

Sponsored by the ACM. Speakers include Jeffrey D. Ullman, Professor of Computer Science at Princeton, on "Data Base Theory" and Maruice H. Halstead, Professor of Computer Science at Purdue Univ., on "Software Science." There will be an employment register, for which applicants and employers must file official forms (available from Orrin E. Taulbee, Dept. of Computer Science, Univ. of Pittsburgh, Pittsburgh, PA 15260). Contact: Conference Chairman Lawrence A. Jehn, Computer Science Dept., Univ. of Dayton, Dayton, OH 45469.

INTERNATIONAL COMPUTER EXPO, FEB. 28-MARCH 2, TOKYO.

Some topics to be discussed are: voice recognition systems, use of computer techniques in the management of large and complex projects, digital data communications, and peripheral devices for low cost computing systems. Attendance at the exhibition only is free. Contact Golden Gate Enterprises, Inc., 1307 S. Mary Ave., Suite 210, Sunnyvale, CA 94087 (408) 737-1100.

MARCH

IFAC/IFORS SYMPOSIUM, MARCH 6-8, TOULOUSE, FRANCE.

The theme is "Comparison of automatics and operation research techniques applied to large systems analysis and control." Methodologies and application will be discussed, with the applications segment covering production control, transportation network management and control, communication network

Q1 Corporation: Leader in Microcomputer Systems

- In 1972, Q1 Corporation developed, manufactured and delivered the world's first microcomputer system to Litcom, a division of Litton Industries.
- Q1 Corporation was the first to introduce microcomputer systems with flexible diskette drives for external storage, which are now becoming the industry standard.

  Q1 was the first to make available on a low-cost microcomputer system the powerful PL/1 programming language used on the far more expensive IBM 370 systems.
- Q1 Corporation set a fundamental new trend in the computer industry by introducing the multifunction microcomputer system, which cost-effectively replaces a wide variety of equipment including word-processing machines, accounting machines, desk-top programmable scientific calculators, and data-entry equipment.
- In 1977, Q1 delivered the world's first computer system utilizing magnetic bubble memory technology to the headquarters of the National Aeronautics and Space Administration.

Look to Q1 Corporation for the next major advance in microcomputer systems

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Sperry Univac minis are doing

In Portland, Oregon, Sperry Univac minis help the Police Bureau come to the rescue hundreds of times a day.

Because Boeing Computer Services has computerized all of Portland's emergency services with Sperry Univac Series 77 minis.

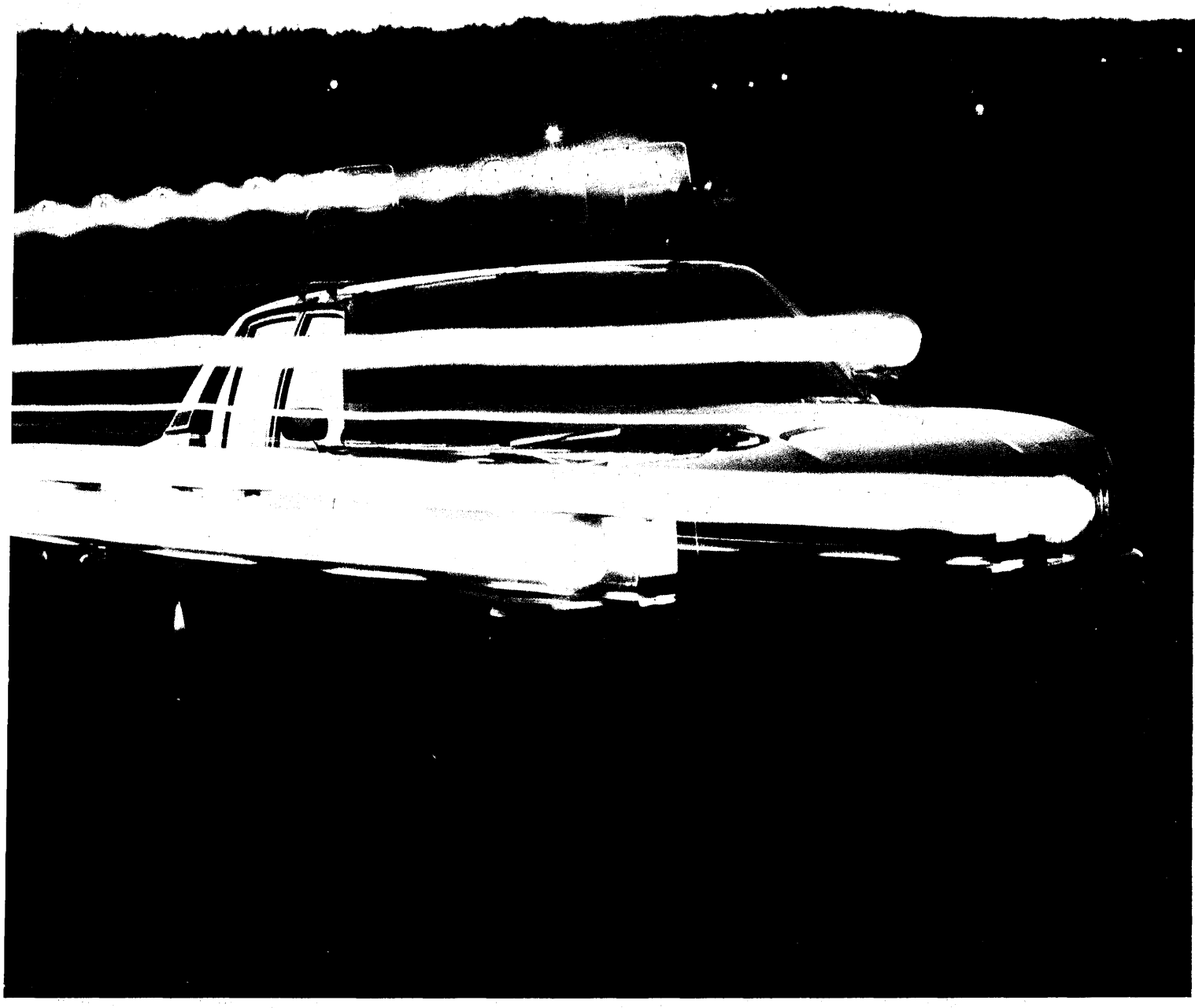
Now when a citizen reports a crime, our minis verify the address. Examine the surrounding area for similar calls, hazards, and temporary situations (such as streets under repair). And suggest which units should respond to the call.

This futuristic system coordinates dispatchers and officers and keeps them constantly updated. Much of the paperwork required of field officers is eliminated. And the data base it generates is used for uniform crime reporting and resource allocation.

Boeing Computer Services has found that our minis are cost effective and can handle the job efficiently and with real-time speed.

The Sperry Univac minis used in Portland are just part of our complete family of minis. One and all of them are supported by our powerful software.

If you have a system application, we undoubtedly have a mini that's just right for it. Whether it be business data process-



alarming things in Portland.

ing, scientific, instrument control, or data communications.

For more information, write to us at Sperry Univac Mini-Computer Operations, 2722 Michelson Drive, Irvine, California 92713. Or call (714) 833-2400.

In Europe, write Headquarters, Mini-Computer Operations, London NW10 8LS, England.

We'd like to hear from you. Even if your system application isn't as arresting as the one in Portland.

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control, and economical system management and control. Contact: AFCET, 156 Bld Pereire, 75017 Paris, France.

IECI 79, MARCH 19-21, PHILADELPHIA.

The 5th annual conference and exhibit on industrial and control applications of microprocessors. An equipment exhibition of over 100 booths is planned. Contact: Information Gatekeepers, Inc., 167 Corey Rd., Suite 212, Brookline, MA 02146 (617) 739-2022.

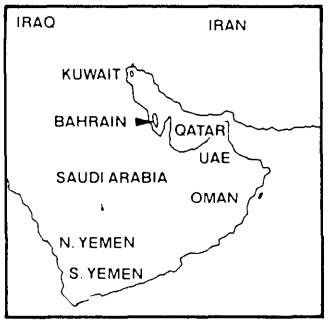
APRIL

TENTH SOUTHEASTERN CONFERENCE ON COMBINATORICS, GRAPH THEORY, AND COMPUTING, APRIL 2-6, BOCA RATON, FLA.

Speaking at the conference will be Professor Paul Erdos of the Hungarian Academy of Sciences, Dr. Ronald L. Graham of Bell Telephone Laboratories, Professor Marshall Hall, Jr. of California Institute of Technology, Dr. William H. Mills of the Institute for Defense Analyses, Professor Ronald C. Mullin of the Univ. of Waterloo, Professor Crispin St. J.A. Nash-Williams of the Univ. of Reading, Dr. John L. Selfridge of Mathematical Reviews, and Professor Ralph C. Stanton of the Univ. of Manitoba. Contact: Professor Frederick Hoffman, Dept. of Mathematics, Florida Atlantic Univ., Boca Raton, FL 33431 (305) 395-5100.

MECOM 79, APRIL 23-26, BAHRAIN.

The Middle East Electronic Commnications Show and Conference will include discussion of international communications networks, common carrier services in the '80s, office of the future technologies, and digital equipment and electronic PABX's. Contact: John Phillips, Arabian Exhibition Management, 11 Manchester Square, London W1M 5AB, U.K.



ELECTRO 79, APRIL 24-26, NEW YORK.

Sessions are being sought in vehicular electronics, memory, telecommunications, LSI, control systems, career planning, medical electronics, and others. Contact: Electronic Conventions, Inc., 999 North Sepulveda Blvd. El Segundo, CA 90245.

FIRST WORLD CONFERENCE ON CONTINUING ENGINEERING EDUCATION, APRIL 25-27, MEXICO CITY.

Alvin Toffler, author of *Future Shock,* will be the keynote speaker. Also featured will be speakers from 26 different countries, and case studies about experiences worldwide. Fee: $135 before Jan. 10, $160 thereafter. Substantially reduced air fare (group rates) from several major U.S. cities will be available through the conference organizers. Contact: John P. Klus, Univ. of Wisconsin Extension, Dept. of Engineering & Applied Science, 432 North Lake St., Madison, WI 53706 (608) 262-2061.

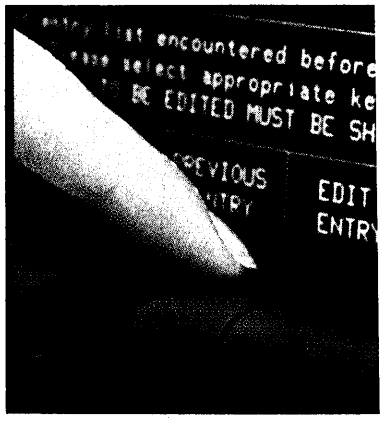
How do you make a flexible disc-based business computer with data base management, an inquiry language, forms and report writing software, up to 192K bytes of system memory and 64K bytes of user memory, built-in self-test features and a price of $24,500?

Simple.

Until now, the low-priced business computer was a pretty unsophisticated machine. That's because nobody had figured out how to make a powerful system work in a simple way. Not any longer.

The HP250 is simplicity itself to operate.

The eight soft keys built into our movable CRT are extremely helpful. They're captioned on the screen, prompting the operator in using a program or the programmer in writing one. It's very fast because the operating system is memory-based. And we added data base management (previously only available on much larger, more expensive systems) to handle complex business information problems. So you get all the benefits of a fast, sophisticated system without having to hire a computer expert to run it.



Our stylish computer is simple to program.

The HP250.

With HP Business BASIC, IMAGE/250 (the DBM software), QUERY/250, FORMS/250, and REPORT WRITER/250, you have a set of versatile tools to get the most out of the system in the least time.

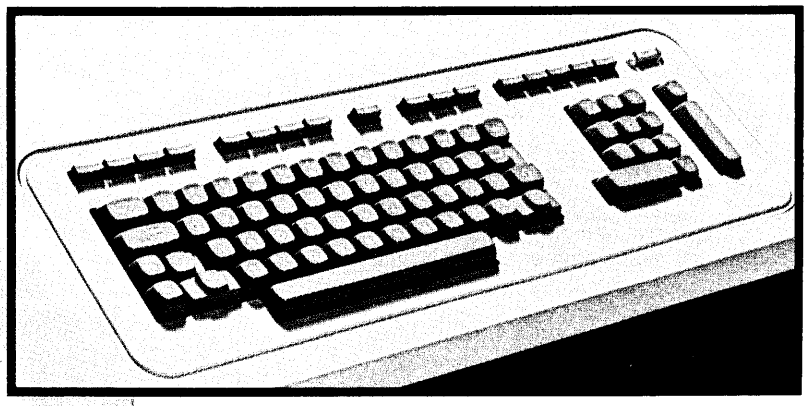
Tucked inside the desk is our high-speed processor and main memory. All the boards fit on to a chassis that rolls out for easy maintenance or expansion.

Under a sliding cover, you'll find our flexible disc drives. You can expand from one to three of these or add hard disc memory to extend your storage.

The HP 250 offers a choice of printers for hard copy output, and an optional sound reduction module makes the high-speed printer quieter than an office typewriter.

Designed to fit beautifully into your office decor.

Slim as a modern desk, the HP 250 was designed to fit beautifully into your office decor, and make life simple for the operator. The keyboard is laid out like a typewriter and the 10-key numeric pad like a standard adding machine. And, rather than the operator having to adjust to the CRT, it moves horizontally and vertically to provide the best viewing angle.



A powerful computer that takes care of itself.

The HP 250 also has self-test features which operate automatically as soon as you turn it on and let you know right away whether all systems are go. If they're not, it will help track down the source of the problem.

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CALENDAR

MAY

DATA 79, MAY 1-3, TORONTO.

Over 100 exhibitors of computer and communications equipment, products, and services are expected. Emphasis of the concurrent conference will be on user applications, problems and solutions of network technology, distributed dp, and data communications. Contact: Kimberly Coffman, Whitsed Publishing Ltd. 2 Bloor St. W., Suite 2504, Toronto, Ontario M4W 3E2 (416) 967-6200.

NMA CONFERENCE & EXPO, MAY 8-11, ATLANTA.

The National Micrographics Assn.'s 28th annual meeting will follow the theme "Confluence of Technologies." Sessions include: micropublishing, micrographics vs. competing technologies, retrieval systems, facsimile systems, relationship of micrographics to nonimpact printing, COM software, and data storage devices. Contact: NMA, 8728 Colesville Rd., Silver Spring, MD 20910 (310) 587-8444.

TELEINFORMATICS 79, MAY 28-30, PARIS.

The conference will aim to explore the applications of distributed systems and networks of all kinds, including social consequences, political issues, technological aspects, and the impact on industry and commerce. Contact AFCET, Secretariat, Conference Teleinformatics 70, 156 Bld Pereire, F 75017 Paris, France.

APL 79, MAY 30-JUNE 1, ROCHESTER, N.Y.

Sponsored by the ACM, the conference is devoted to all aspects of the programming language APL. Contact: Fletcher McTaggart, I.P. Sharp Associates, Suite 1150, 183 Main St. E., Rochester, NY 14604.

CALLS

INFOR, the Canadian Journal of Operational Research and Information Processing, is soliciting papers for a special issue on practice and implementation. Full length articles on any topic relevant to practice and implementation are sought. These may be case studies or research papers — not on new techniques, however, but on "how to better use what we've already got." Short articles are sought on analysis for social change, small scale information systems, and any other relevant topic. "Write the kind of article you would like to read," urge the editors. Dr. Alan L. Saipe, Editor, Special INFOR Issue of Practice, Stevenson & Kellogg, Management Consultants, 2300 Yonge St., Toronto, Ontario, Canada M4P 1G2 (416) 483-4313.

The IEEE International Symposium on Information Theory, to be held in Grignano, Italy, June 25-29, 1979, is seeking papers in the areas of communications systems, computational complexity in computer-communication networks, cryptography, data compression, detection and estimation, error-control coding, pattern recognition, stochastic processes, and Shannon Theory, among others. Deadline for submissions is Dec. 1, 1978. Professor M. B. Pursley, Coordinated Science Laboratory, Univ. of Illinois, Urbana, IL 61801. ✲

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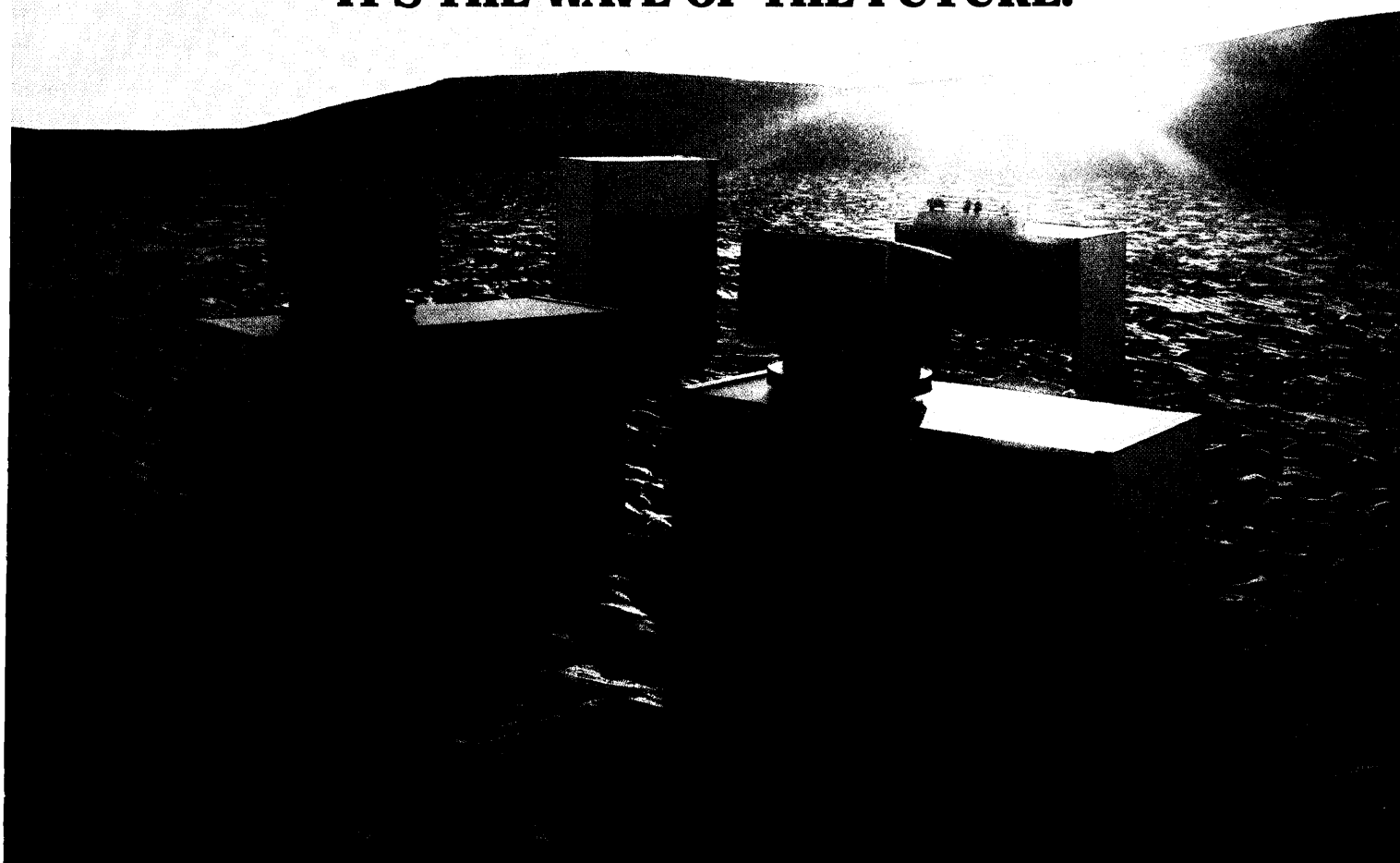

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CIRCLE 3 ON READER CARD

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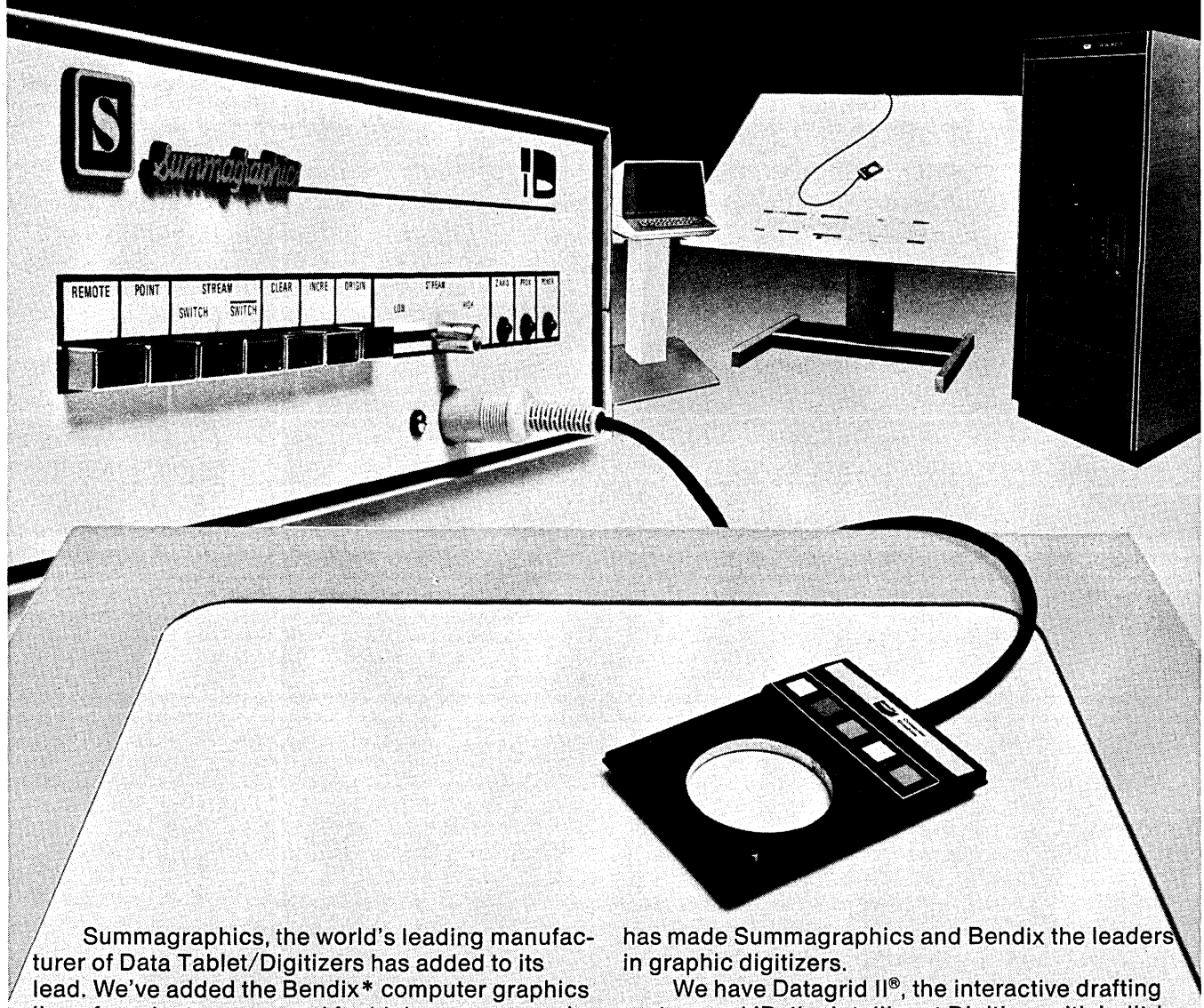

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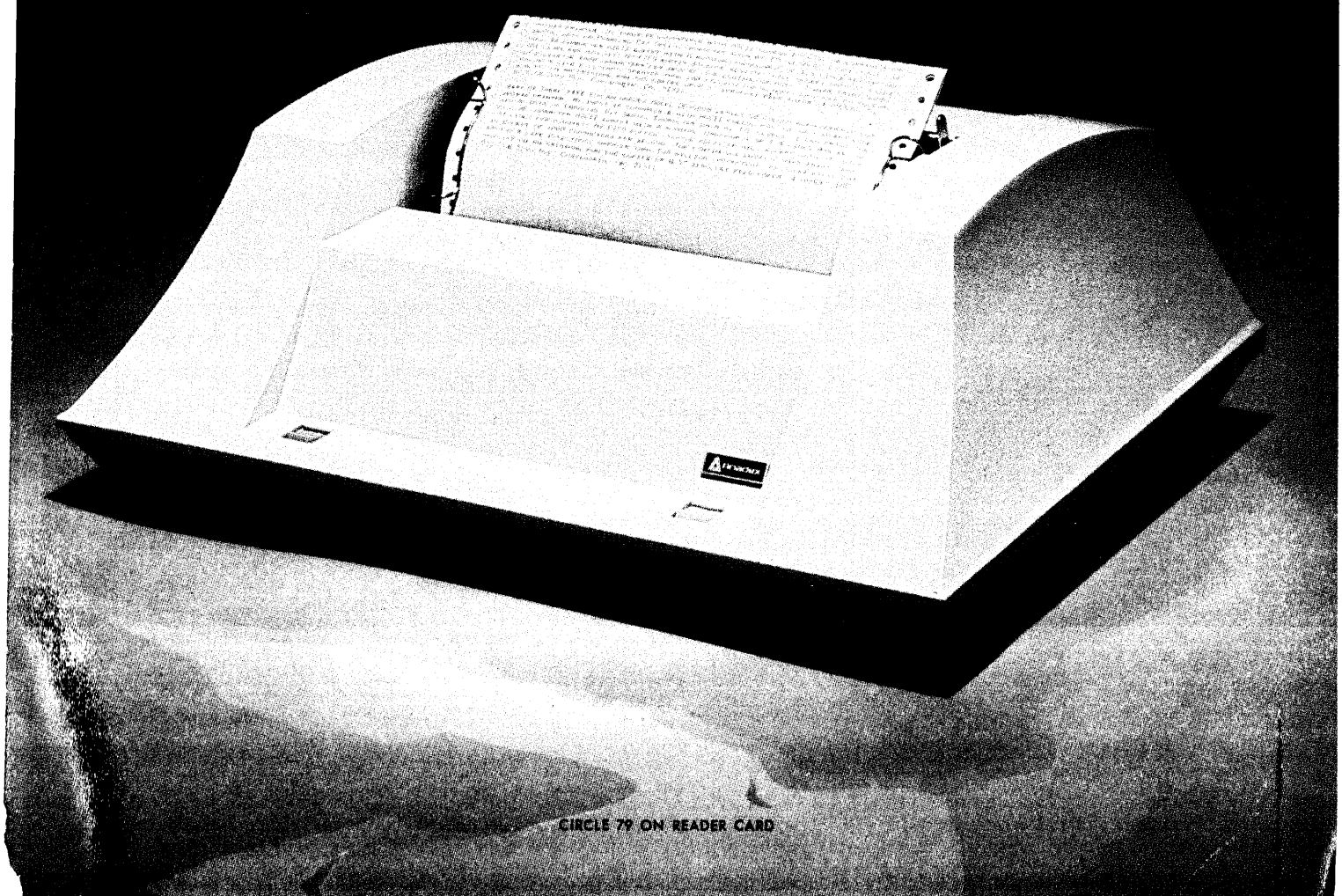

CIRCLE 79 ON READER CARD

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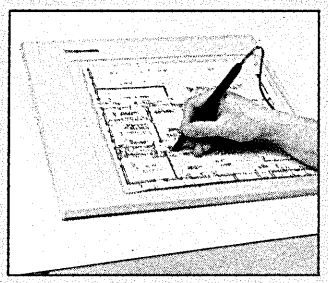

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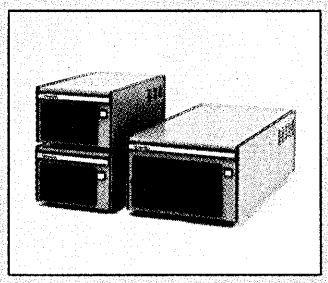

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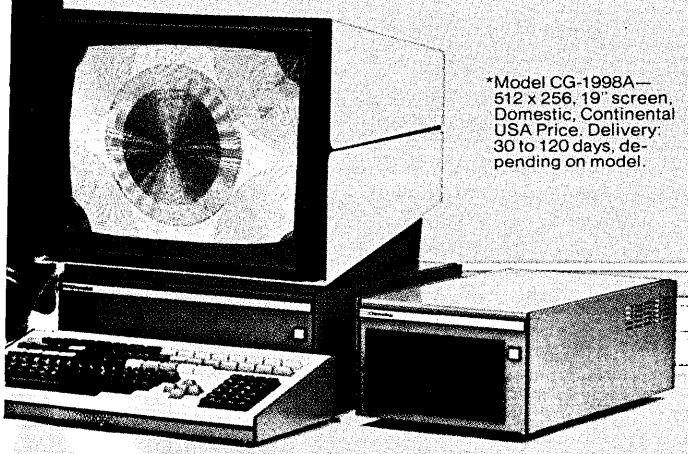

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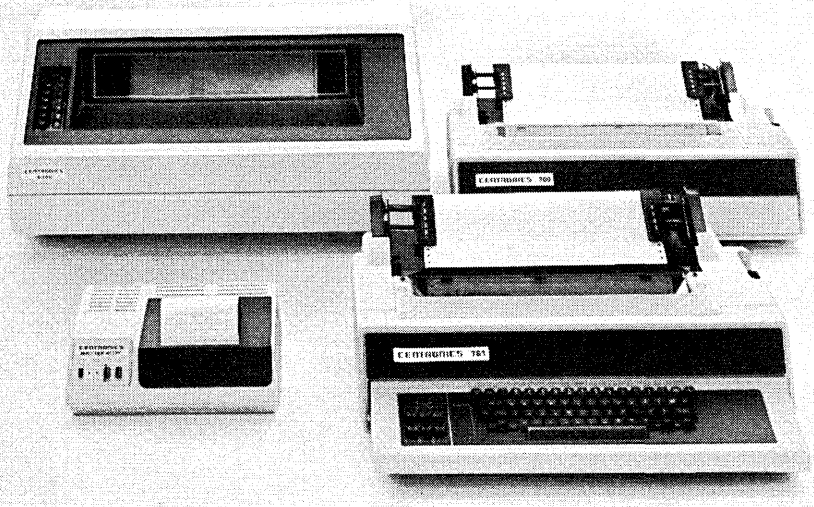

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CIRCLE 5 ON READER CARD

LETTERS

CONFIGURATION CONFUSION

I always read DATAMATION with great interest.

More than two years ago, after having read an ad in your magazine, I was the first in Europe to order and install controllers from Grumman Data Systems Div. for attaching IBM 1403 printers to medium-sized Burroughs systems. We are still very happy with that installation.

I am now writing to ask for help in finding a tool.

I have technical responsibility for quite a large IBM intallation: a 158 AP, a 168/3, two MSS A02s, 48 disk spindles and an additional 3033 to be installed in a few months.

We never have the same configuration for more than three weeks (because of the complexity, one tries to avoid installing many pieces of equipment at the same time).

We have one man drawing configuration charts almost full time. And these charts are complicated to work with, and are no good when we want to discuss changes and improvements because of tuning, alternate paths, and so on.

I have visited very large U.S. installations, such as Gulf in Houston and MCAUTO in St. Louis, and it seems that everywhere they are drawing their new configuration charts with a template and pencil (sometimes almost every day!).

What I should like to have is a three-dimensional "logical" model of my configuration on a wall, an easy-to-change model showing the paths of my configuration, *not* the physical place of the units in computer room(s). I want to be able to see every peripheral unit.

If somebody has written a computer program for drawing configurations, I would be interested in that, too, if the time needed to make up the parameters for the program doesn't exceed the time needed to work it out with template and pencil.

I don't know if you can help me, but I think DATAMATION is the best chance I have. I understand you are read by computer people all over the world, and somewhere I'm sure there is an answer to my need. Or somebody willing to start manufacturing it!

BENGT GLANTZBERG
Technical Manager
Product Dept.
Datema AB
Solna, Sweden

DATA BASE DESIGN DETAILS

I was very pleased to read the article by Dr. Tsichritzis and Dr. Lochovsky, "Designing the Data Base" (August, p. 147).

The authors described a very exact plan for the data base design process, which is the area where the user usually blunders. However, I would like to suggest some modification to their plan, with regard to the real conditions in the large-scale data base project.

When the user has completed the first and most important step, identification of the data organization, the enterprise description should be divided into parts; the rest of the steps can then be carried out successively in these parts rather than for the entire data base at once. Thus, the complete schema will be achieved with iteration, with details in given areas implemented gradually.

There are good reasons for this compromise, despite some problems linked to the approach.

The second step, identification of the dp requirements, would take a long time otherwise, and these requirements must be identified for the effective design.

Also, if the user tries to design the whole data base at one stroke, it is likely to take a pretty long time, without any running data base program. The management usually doesn't want to tolerate such a project schedule.

Finally, conversion to DBMS is quite a considerable change, and no one can guarantee positive results. Thus, it is useful to first verify the expected results and to gain skill in some partial area, rather than to try to implement the whole DBMS at once.

In my opinion the enterprise description as the first step is a good frame for the whole schema, and should help eliminate problems in later schema changes.

MIRO MEDEK
Athens, Greece

ASSESSING ASSESSMENTS

I was most encouraged by DATAMATION's interest in letting the facts be heard in the continuing efforts of our industry's fight against unfair sales taxes on software and data processing services ("Are Software Taxes Inevitable," September, p. 327). As national chairman of DPMA's sales tax subcommittee, I have had the opportunity to work closely with Mr. Sherin and others dedicated to defend our industry in the face of overwhelming government pressures—and I have seen the successes that have been achieved in halting these illegal assessments and (in 8 states) changing the laws and regulations. That still leaves 42 more states; the battle has just begun.

It is imperative that we as data processors understand that we have legal recourse and precedent in our favor; but before we bring these to bear we must clearly understand the issue and its effect upon ourselves and our companies. But we must also be aware that various industry-wide organizations, such as DPMA, *have* been involved, *have* the expertise, and *have* the desire to help in this issue.

STEVE A. VAJDA
Miami, Florida

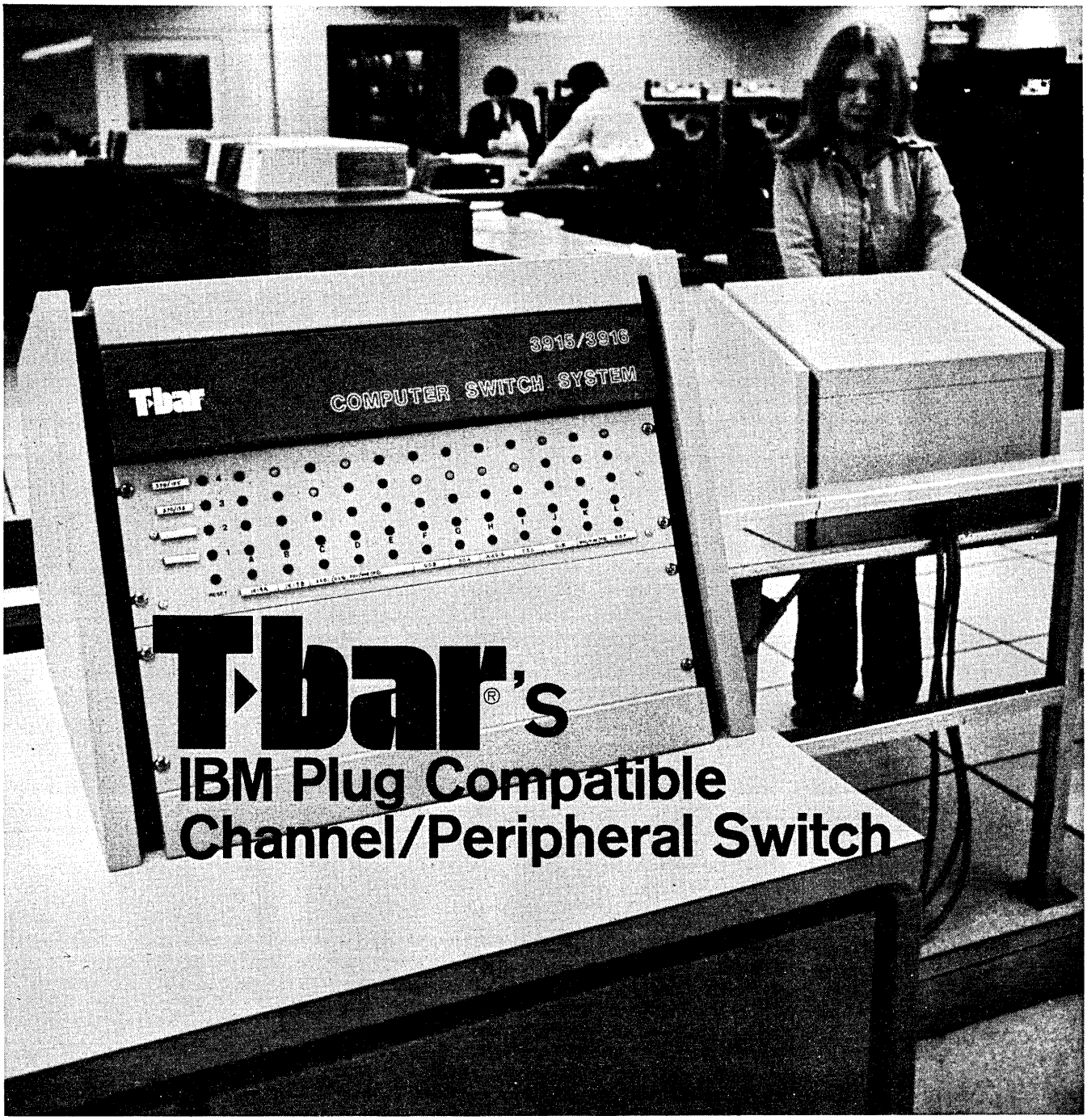
EARNINGS ERROR

The pretax profits shown for Computer Sciences in the ADAPSO report of financial performance (September, p. 83) are actually the company's net earnings. CSC's pretax income was $26.09 million (9.42% of revenues) in fiscal 1978, and $21.22 million (9.04% of revenues) in fiscal 1977. Pretax income grew 23% in 1977.

JAMES FURLONG
Manager, Corporate News Bureau
Computer Sciences Corp.
El Segundo, California

MICRO PITFALLS

The personal computer is NOT capable, at this time (nor are many of the new minis), of "doing many jobs within the large corporation," as Ms. Isaacson claims (Personal Computing, July, p. 218) because they are octal machines, using ASCII code, in most, if not all cases. A company already using EBCDIC files from an IBM computer could not use them on the new machines, without paying an overhead in



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D

CIRCLE 26 ON READER CARD

software resource utilization of 25%, to translate the files, every time they read them, according to some of the vendors I have recently talked to. Even if they could read them, they still would not be "home free," because many companies' EBCDIC files contain characters that simply do not exist in the ASCII code structure. Should we really have to go back to the old days of "non-printing characters"? That company would also have to convert all the programs it intended to put on the new machine, and that effort alone, in a "large" company, will be multiple calendar years, if the companies I have spoken with are any example.

Well-written standardized packaged software would not be nearly as plentiful, with such a variety of machines, so we could no longer opt to save our company a long-lead-time development cost on something like Payroll or a Fixed Assets system by "plugging in a package." And, the existing packages, so patiently developed over the last ten years, will not run on these machines because they were developed for binary EBCDIC machines.

The dependability of the new hardware, under normal business volume conditions, has yet to be proven. Should we really put the "new" personnel system up on a machine that goes down three times more often than comparable IBM machines of good old-fashioned power fluctuations? Or should we put it on one that is still having "parity problems"?

On top of everything else, the restart/recovery facilities are, shall we say, less than perfect. What is the user to do the next time we have a "Brown Out"?

The entire proposition of moving data out of a controlled environment (secretly, no less, if we listen to Ms. Isaacson!) flies in the face of what concerned individuals all over the world are trying to establish—some principles of security, and privacy of data. No way would I allow my personal records (if I had anything to say about it!) to be handled in the manner Ms. Isaacson recommends, nor would I every recommend such a haphazard and dangerous approach to my company. (Of course, my files might be safer in one of the new machines—there aren't too many octal programmers around who could break the minimal software protect codes.)

And, how could I explain to my company management, who are sharp enough to spot strange-looking cost estimates, that "I cannot use Charley's Order Entry Item Master File in my new inventory system because his is up on the 'Blinky' in FORTRAN II, and I'm using the 'Starlite 99' that is programmed in Pekingese, so please, guys, give me the money to put up a duplicate file—I'll make sure I get all Charley's items."

And let's try this one on for size: "See, boss, the reason we had such a horrendous phone bill that day was that we had a power failure, and we had to call 17 different mainframe vendors, 29 peripheral suppliers, and 3 communications companies."

And while we are at it, let us take up the plight of the users we have allegedly ignored over the years. Who has got the nerve to tell the Comptroller that the reason we cannot apply customer payments against the Receivable File is because the Receivable system is on the "Hotshot," with one set of customer numbers that somehow do not match the customer numbers on the invoices they got from the Order Entry/Billing system, which is on the "Eeny Meeny" computer because the newly created "File Synchronization Clerical Dept." (remember those 40 clerks we hired?) screwed up the Multiple-Customer-Files Maintenence run for the seventeenth time this month? And what do you say when he says to you, "What 'Eeny Meeny?' Who bought that one? What do you mean, you called it a 'lab instrument' on that purchase order you had me approve!"

And then, of course, you would have to set up 17 Data Base Administrators, instead of one, and pray that they got along together! And, of course, you would also have to get some real hotshots to do an MIS that needed data from 17 computers, to come up with a "Bottom Line" report.

This method will be the biggest make-work boondoggle we have ever seen in this industry. In the name of progress, we will just keep going back and doing it over and over and over, creating a whole new market for even more partially qualified programmers and keeping business data processing at a standstill for at least the next five or ten years!

Business data processing has come a long way in these last ten years, considering what "secretive, empire-building" degenerates we are being made out to be and how stupid corporate management was supposed to have been. And those of us who contributed to that progress intend to keep going forward, *not* backward, in the best interests of our companies. Whenever you can show us a machine that *really* (never mind the fancy brochures, buys, and the salesmen who cannot tell an ASCII machine from an EBCDIC one!) will make our job easier, we will go for it—in droves!!!

D. M. WOOD
Systems and Programming Manager
Company Name Withheld by Request

MORE MICRO PITFALLS

I thoroughly enjoyed the August issue. User education and analysis on micros and minis is surely past due. Mr. Patrick's article (p. 132) was most appreciated and puts the "hoopla" of micros and minis into their true perspective, although it is obvious his viewpoint is totally that of a consultant.

My purpose for writing is to note what I think of as the most important problem facing today's micro user—cost of peripherals and supporting software. It seems to be a recurring problem; as I remember, the initial minis, with input/output devices being papertape readers and teletypes, had the same problem.

I see today's buyers of micros as being confronted with an identical situation. Peripheral I/O equipment simply is not in line with an $800 microprocessor. Application software and user-oriented support software simply hasn't arrived. When it does, then I can also be a micro user.

CARL G. NASTAV
Senior Marketing Representative
Wang Laboratories, Inc.
Indianapolis, Indiana

ENGLISH AND USAGE

The last letter published in September's issue (p. 41), under the heading "Errors and Interpretations," complained of judging programmers incapable of using the English language correctly based on a single instance of an error message.

I submit that all four letters under that heading give further evidence, namely: "... programming and systems analyst professions" (rather than "... analysis ..." or "... programmer ..."); "Either that or a large journalism course for all programmers everywhere." (sentence fragment); "... who make assumptions and were wrong!" (mixed tenses); "... message length and content is defined ..." (plural subject, singular verb form).

GEORGE L. AUSLANDER
Manager Technical Services
Leesona Corp.
Warwick, Rhode Island

Could any of your readership detail the origin of the word "menu," as used in data processing as a synonym for the more properly and commonly used phrase, "a list of"?

We have a finicky client who is not in the restaurant business, but who wishes to maintain his Duncan Hines rating in the proper use of the English language.

DANIEL A. WEBB
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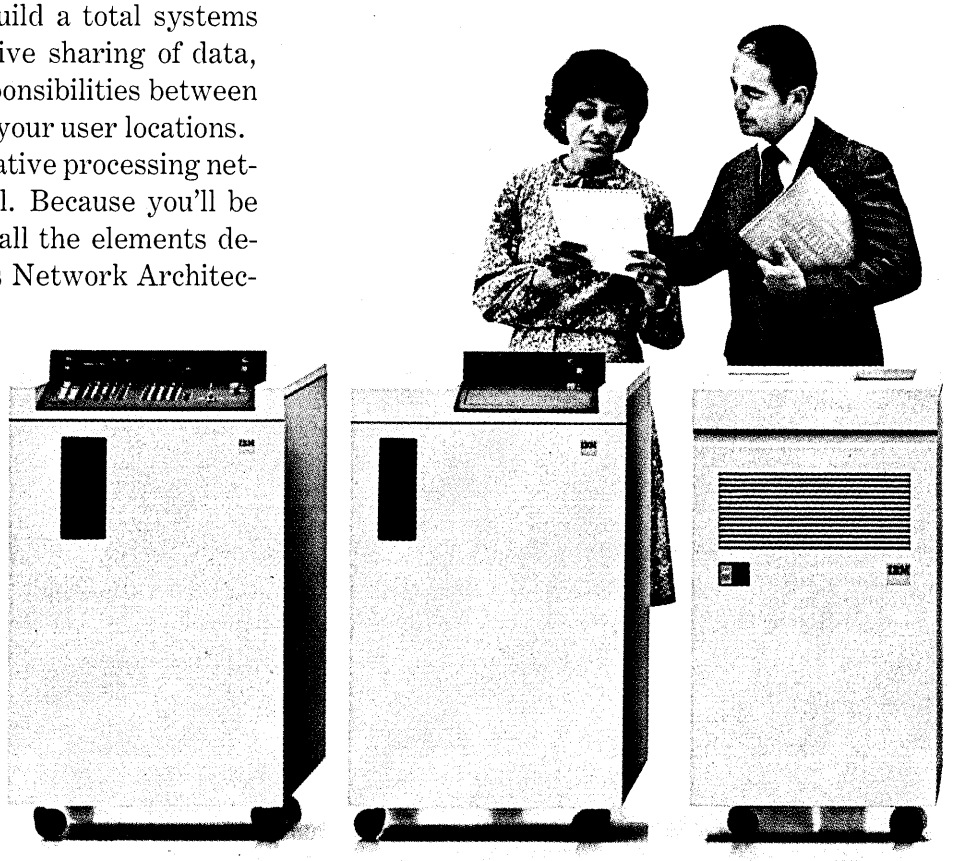
People can do what they do best

The 8100 and its programming were both care-



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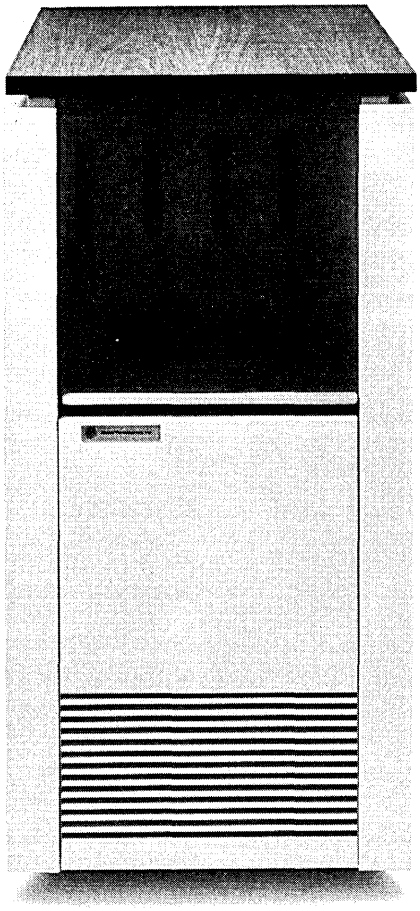

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CIRCLE 16 ON READER CARD

EDITOR'S READOUT

MELON AND THE DIGITAL DILEMMA

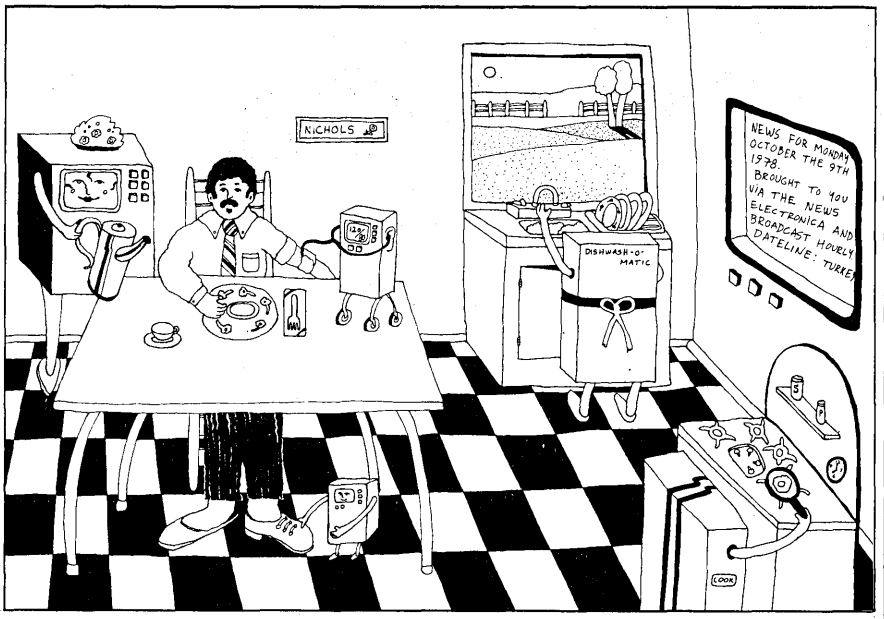

ILLUSTRATION: ©MIKE NICHOLS 1978

It was on Lexington Avenue one recent rainy New York day that we ran into our old friend, Persiflage Melon, noted management consultant and amateur meteorologist. He was scowling furiously into the window of a large electronics store.

"Look," he said, gesticulating wildly at the personal computer on prominent display. "Look at what you and your kind are doing!"

Taken aback by Melon's uncharacteristic vehemence, we asked what was the matter.

"Perhaps it's the weather," he said, "but today I'm feeling a touch paranoid. Everywhere I turn I see another example of your industry infiltrating the daily lives of our citizens. I even have it on good authority that your November issue will have a Christmas gift list of these computerized baubles...chess games, car computers, and the like. You too, sir," he said, waving a large knuckled finger in our face, "are contributing to the digital demoralization of this country!"

Melon, we asked, just what in the hell are you talking about.

"Well," he said, calming somewhat, "these microprocessors that you tout so highly are finding their way into every facet of our lives. They are strapped to our wrists, ticking away beneath the hoods of our cars, playing games with our children...and yet, their insidious penetration of our lives has just barely begun."

Why insidious? we inquired, pointing out that intelligent devices have proven to be extremely useful, what with providing inexpensive and efficient services that were never possible in the premicroprocessor days.

"You are forging chains of gold with silicon chips," growled Melon. "The crux of the matter is our ability to make decisions. Consider what lies ahead in the not too distant future. The computer in our home, having awakened us and turned on the coffee and the central heating system, will then print out our biorhythm chart. Now that we know how we are supposed to feel, think, and act for the rest of the day, we can read our electronically dispatched newspaper, pre-edited, of course, to reflect our personal interests. Our 3.675-minute egg will be part of the day's food intake, which has already been computed—a digital diet that will reduce cholesterol and improve our basal metabolism.

"A computerized transportation system," he continued, "will deliver us to our office where electronic mail will be waiting on our office terminal. Computer simulations will tell us what decisions to make. Our lives will march to a binary beat, where all is predictable, prepackaged, processed pap. We will not evolve into R2D2s, as that nonsensical *Time* article predicted, nor will we be enslaved by our machines in best 'R.U.R.' fashion. No, the danger is that our ability to think and make decisions will atrophy like the vermiform appendix and the little toe. The efficiency of our systems may turn us into live versions of those insipid happy faces that were so popular a short time ago."

Sounds grim, we commented, noticing the rain had stopped.

"But be of good cheer," said Melon, his mood lightening. "There is hope. We humans are incredibly inefficient...witness the underutilization of this magnificent instrument, our brain," he said, fondly patting his pate.

"And remember Murphy's Law. Even though those microprocessors of yours are infesting our society like Japanese beetles, the human race's natural insouciance will keep them at bay.

"Nothing" cried Melon exuberantly, "can keep people from screwing things up. So, may I wish you a premature, but cheerful Merry Christmas," he said.

But before we could reply, he had snapped his umbrella shut, hailed a passing cab, and was gone. ✲

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**Datamation* Reader Preference Studies, 1978, 1977, 1976, 1975
***Data Communications* Reader Preference Study, 1978

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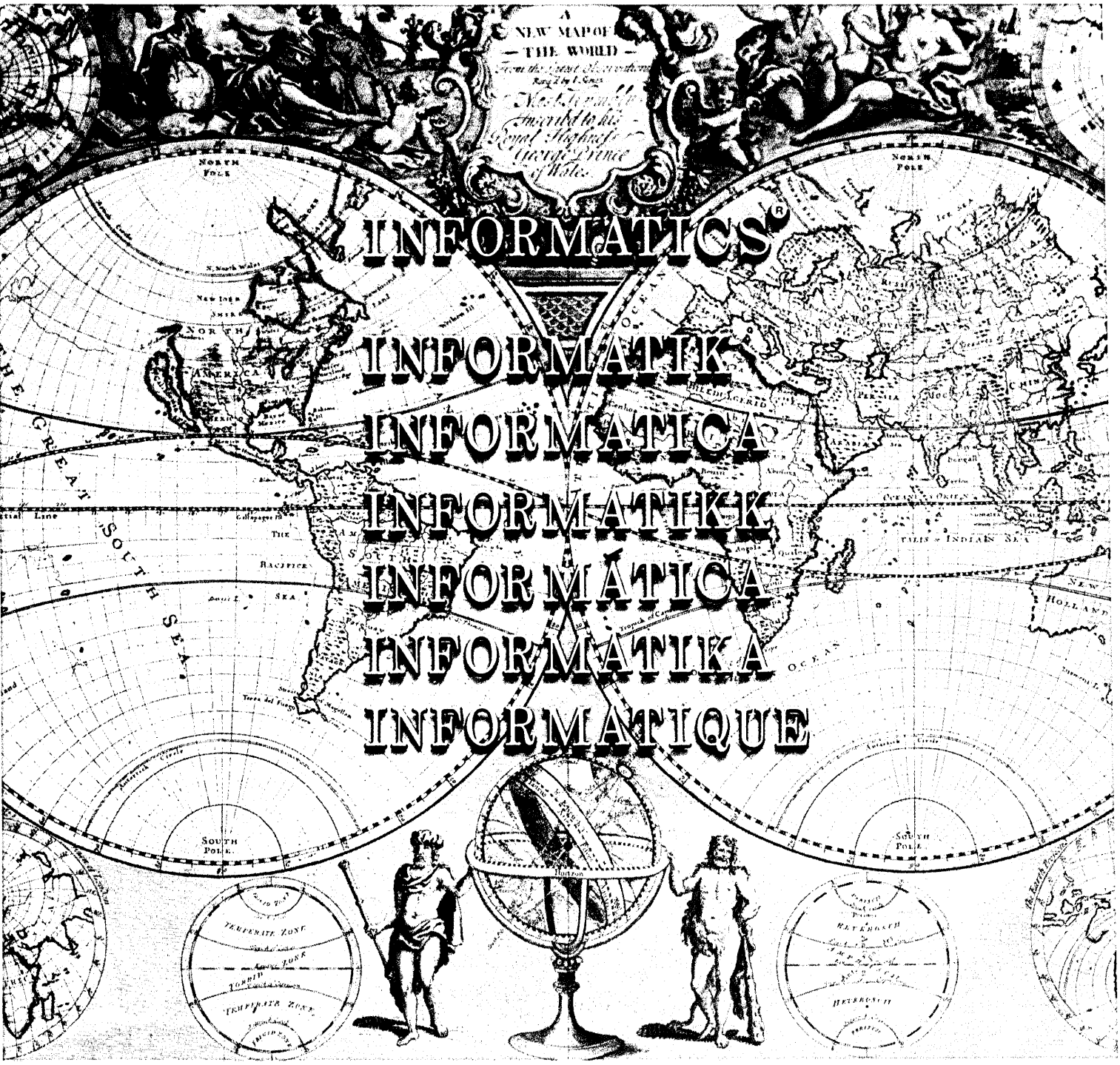

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CIRCLE 22 ON READER CARD

16,999 FOR INFO IN CHICAGO

Record attendance pleases vendors, cab drivers.

It was billed as Info '78 but the talk was of the '80s.

It was the fifth annual Information Management Conference and Exposition held last month at Chicago's McCormick Place. A record attendance of 16,999 vied for cabs and for eating room with crowds from three other conferences being held simultaneously. Waits in cab queues ran to 45 minutes. Similar waits were experienced for a shuttle bus service serving all four conferences. The 1978 Info attendance was up from 14,800 last year when it was held in New York and from 11,300 in 1976, the first time it was held in Chicago.

Vendors displaying their wares generally seemed pleased with the quality and quantity of the attendance. "Interest is great and the quality is high," said Douglas McVeigh, marketing manager of Durango Systems Inc., feeling guilty about taking time away from his booth to eat lunch.

"On a cultural level, computers are widely accepted and desired."

A spokesman for Sycor Corp., manufacturer of end user data entry terminals, said the Info '78 show produced at least 40 new leads for his company a day. "We're hoping to double our space next year."

The conference part of Info, which drew 2,550 persons, quite often confused attendees who attended sessions with ambiguous titles. "I found myself in sessions that turned out to be different in content than I expected," said a marketing representative from AT&T. "I agree that some of these charges are true," said program organizer Edward Block. Most of the sessions were well attended.

There was something of a threshold feeling in many hinting at the beginning of a new era in data processing. Larry D. Woods, manager, distributed computing, Deere & Co., called it a period of "data control, the age of the user."

"On a cultural level, computers are widely accepted and desired," said Harry Friedman, manager of marketing systems, Data General Corp. "Now we must begin to tap non-dp resources and get away from purely technical thinking. A technical thinker creates a kind of chauvinism."

David R. Cornwell, on special assignment in data administration for United Airlines, talked about foundations. "If the experts are right, business will be served up incredible amounts of raw computing power. As costs plunge, demands will skyrocket. If we fail to prepare the foundation now for the house we will inherit, our business will collapse upon itself," he said. "The message for top management is this: We're going to be building computerized corporations in the 1980s. Those who do will pull ahead of the competition."

William J. Mueller, a conference keynoter and vice-chairman, Arthur Anderson & Co., believes that in spite of a "general public consciousness of computers," few managers and users can fully comprehend "the magnitude or the significance of new technological developments." He would have the "information manager" exercise "direction and leadership, of an insightful and responsive nature, in the systems planning and development process."

Another kind of result of advancing technology was mentioned by Cornelius Peterson, president, Distribution Management Systems, Inc. "At a time when personal computers for every home are being advertised, the computer professional is going to have to get used to the fact that his mystique is eroding. This can work to his advantage if he analyzes the fundamental structure of his organization and the basic architecture of distributed computing."

The employee working with a minicomputer, Peterson said, "is acquiring new skills, expanding his or her horizons—beginning to see the job in its relation to the whole, rather than performing perfunctory tasks without end. The employee now feels closer to the technology revolution that is inescapably part of our world. This intimacy with the computer brings the data base to the remote location and with it, a sense of mastery and control over the technology. The computer talks back, questions and guides, and ultimately obeys. The computer is no longer a threatening, overpowering, intangible but a useful, friendly, and understandable servant."

Peterson was one of a host of conference speakers who touched on distributed data processing. Kenneth R. Marks, Boeing Computer Services, listed lessons he'd learned in implementing DDP at Boeing: develop a formal organizational structure, get smart, publicize, stress people and procedures, establish guidelines, act as a central vendor interface, get experience in-house, develop a long-range plan, and provide for information exchange and education.

"Keep it simple," stressed Woods of

NEWS IN PERSPECTIVE

Deere. "Give a single mini a single function then leave it alone and it'll stay up."

Larry C. Melton, manager of professional services, Office of Management Information and Communications, state of Illinois, talked about distributed data bases. He called a data dictionary a "prerequisite to successful data distribution" and warned against use of a complicated data management system. "We distribute to simplify. A complicated DBMS negates simplification."

The importance of a data dictionary was underscored by Maurice Blackman of Arthur Andersen & Co., who added, "you have to get users involved in definitions." At Arthur Andersen, he said, "our definitions are much more centralized than our data is."

H. George Connell, Bangor Punta

Seasoned business generalists should be brought in.

Corp., said a big problem is one of support for minis. "Vendor personnel do not understand their own products. Vendors are experimenting at the cost of the user."

Asked to comment on this problem, Friedman of Data General said, "It's true. I as a user have the same problem. We grow at 40% a year. Everything behaves at that clip . . . We introduce a new product every 15 days . . . At any given time half of our sales force has been with us for less than a year."

User expectations also can pose problems. "He's like a kid at Christmas. He wants the world," said Richard C. Williams of a first time user of a mini on a distributed system.

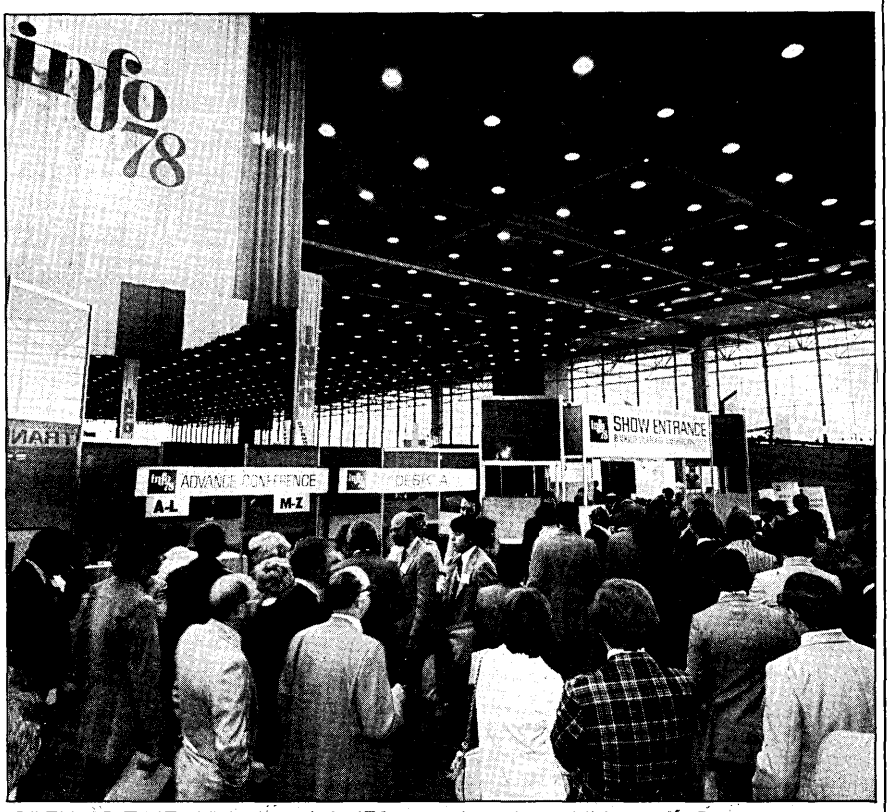
Edward W. Schmitt, assistant professor, School of Commerce and Finance, Villanova Univ., made a similar comment about a first time user of an in-house small business computer. "He gets hooked and so do his employees. It's like a toy."

Schmitt advised small businessmen considering getting a computer, "if you have to hire a programmer, get him half a day. He'll do as much work as if he were full time and it'll cost you less."

Personnel costs also were a concern of Connell of Bangor. In putting in distributed processing at subsidiaries which had had no data processing before, he found that existing salary structures made it difficult to get good people.

Stephen J. Hulshizer, manager of Resource and Operation Engineering, Merck, Sharp & Dohme, sees salary structure as a deterrent to the pushing together of data processing and word processing. "What happens when you make a secretary a data entry specialist?"

Tim Vauthier, manager, systems analysis, Labatt Breweries of Canada Ltd.,



OPENING TIME—Visitors to Info '78 move into the exhibit arena. Preregistration of many eliminated long lines at registration desks.

would like to see word processing and data processing integrated. He believes it will happen in his distributed data processing system and that when it does "we'll see the payback for our communications network and we'll move into office automation."

The so-called office of the 1980s received attention at the conference in several sessions, including a keynote address by Vincent Byrne, director of management and administrative sciences at Xerox Corp. in Stamford, Conn., who said

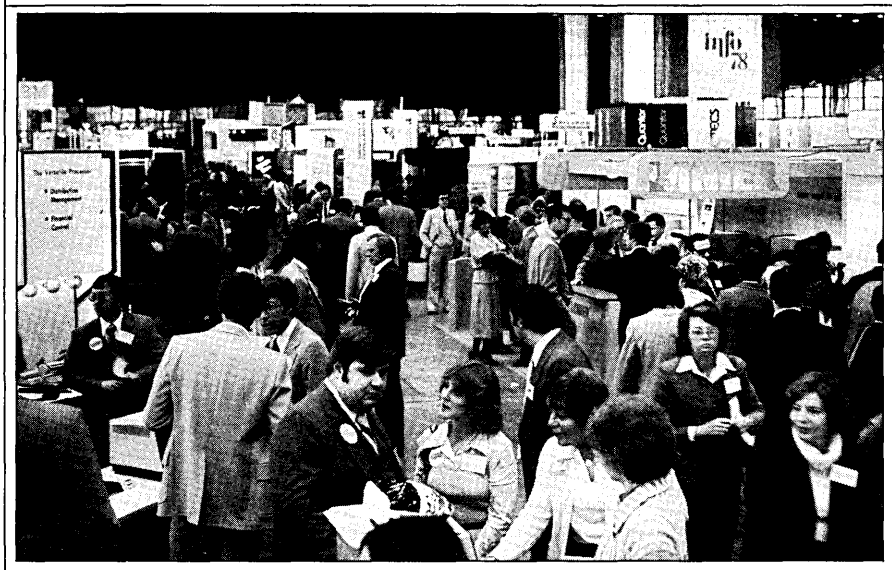
"Vendor personnel do not understand their own products."

he felt "seasoned business generalists" should be brought in to manage the function.

Robert L. Fronk of the consulting firm of Arthur D. Little, Inc., Cambridge, Mass., seemed to feel the same way about who will run the office of the future. Fronk said the office manager will be given much more control over how business systems function because the products of the new office will give him a broader look at the company. No longer, said Fronk, will a single product dominate. In recent years, data processing was separated from the general operations of a company because of the complexity of dp systems. In the future, the dp operation should act as a component, probably doing number crunching, handling the main information files of a company, doing the paper work and switching of information. But there also will be more processing at the various work stations that are manned by former secretaries. There will be the smart copier, one that can copy documents automatically without removing them from files. The office in a briefcase will be available, enabling salesmen to store data on bubble memories and then transmit the data to a central site for such information as quotes on contracts.

And Fronk expects that one day a manager, sitting at a terminal and talking into a computer that will translate his talk into digital form, will be considerably more informed than today's manager who must read reports.

Said Dr. Stanley M. Welland of Exxon Corp, "a manager who doesn't have a terminal at his desk, could cut himself out of half of the components of tomorrow's business communications systems department." Welland defined the business communications systems department (BCS) as one using creation, capture of data, keyboarding, expansion, distribution, storage and retrieval, and disposal of data as elements of today's and tomorrow's offices. One is automated, the



INFO '78—Vendors called the record number of attendees, "quality prospects."

other is in various stages of automation.

Welland said that standards, as in the data processing field, are different and sloppy. The same applied for offices of the future. "There will be no single best automated office," he said. "It's all different according to your needs and your organization."

But what most speakers agreed upon was the need to sell their management and their users. "Management must invest in the human factors element if they're going to have a significant interface with office automation," said Xerox's Byrne.

The person who will be in charge of the office of the future will be the one who has engaged in a "subtle education of people in his company, one who has an information campaign to sell office automation," said Fronk of A.D. Little.

Said Kenneth Wilkinson of Commercial Union Leasing Corp. of New York, "If you can get the president (of your company) to use office automation systems, everyone else will use it."

Fronk believes more pizzazz should be introduced into automated systems to make them fun. "There are too many processing centers today where people get bored to death and want to quit."

One speaker told of a word processing system where people who pressed the wrong key could correct their error with a key that bore the word "oops." Another told of a system where a person who keyed in wrong statements got back a statement on the crt that said, "A rose is a rose is a rose." That was a subtle inference that an error had been made.

And IBM in the '80s was not neglected. Bob Fertig, vice president, Advanced Computer Techniques, called IBM, "a company in transition," moving into the office market, satellites, small business, and even home computers (with a product expected in 18-24 months). There will be less emphasis on the "old mainframe market," he said.

He also predicted that by 1980-81, "we'll see the formation of the IBM holding company, similar to the General Motors structure, with each subsidiary lean and mean and often competing with each other."

At Info, IBM made an apparently hasty introduction of its system 8100 (see p. ?).

Durango Systems showed its F-85 desktop computer which it bills as the "world's smallest big computer."

Nixdorf Computer Corp. introduced a V.P., a product not a person. It basically is a Nixdorf 8871 computer with COMET, a parameterized software system the company says dramatically reduces installation time and expense and initially is aimed primarily at manufacturing and distribution businesses.

Datapoint was there with a new 1800 "dispersed processor" it describes as a low-cost, multifunction system for business applications.

Infoton of Burlington, Mass., showed a new smart terminal designed to emulate ADDS Consul 520, Lear Siegler's ADM-3A, Hazeltine's 1400/1500, Perkin-Elmer's Fox and DEC's VT-52, all for $849.

A new key-to-diskette system designed for distributed data entry, was demonstrated by Sperry Univac.

Xerox introduced an 850 display typing system component that allows word processing users to mix Xerox and competitive equipment.

More pizzazz should be introduced into automated systems.

Basic Four Corp. chose Info for the introduction of its DataWord (see p. 56) system permitting simultaneous word processing and data processing with the same data base.

Even doodles had their place at Info—face doodles. Lawrence A. Bruckner, Los Alamos Scientific Laboratory, said face doodles can combine 20 different stories. He demonstrated how faces were drawn by a computer from actual figures of offshore oil and gas drilling in 1977. "The width of the mouth indicates total revenue, the level of the ears measures oil production, and the angle of the eyebrows tells how much gas was produced."

Faces, he said, are ideal for comparing and analyzing data. "People like to look at faces."

—Edith Myers

BACK DOOR COMPUTERS

Computers apparently are finding their way into a number of companies through the back door—that is they're being acquired by employees on their own for their own uses.

The practice is being met with mixed reactions. An Info '78 speaker on distributed data processing deplored the "back door microcomputers." To him they represented loss of control. There were applications "out there" that he didn't know about, over which he had no control.

Another with similar feelings didn't limit the problem to micros. "They're buying minis board by board and putting it on their expense accounts."

But to Larry D. Woods, manager of distributed computing, Deere & Co., they can be a good thing. "Don't overlook the personal computer," he said in an Info '78 talk. We have three." The three microcomputers, one from Hewlett-Packard, one a Commodore PETS, and the third from Radio Shack, were independently acquired by three employees. Woods said they are being put to good use in stock market analysis, warehouse and distribution planning, and in marketing projections. He said he only regrets the fact that the woman who brought the computer for stock market work has to share it with teenagers at home.

CANADIANS IN A NEW MARKET

Northern Telecom acquired Data 100 and Sycor as nucleus of move into office of the future market.

"I don't think I'll put up curtains," said Edward D. Orenstein as he admired the scenery outside the spacious corner office he'd just occupied in the brand new corporate headquarters of Data 100. The view in late September in the rural Minneapolis suburb of Minnetonka was of green rolling hills, trees tinted with the coloring of early fall and a pond with a newly built boat dock that an aide suggested should be named "Lake Edward."

The three-story headquarters building had just been completed. With its campus-like atmosphere it was a fitting tribute to Orenstein, who left Control Data in his mid-thirties with an idea and in fewer than 10 years as its president and chairman has built Data 100 from nothing to a $140 million international computer company with 4,000 employees, 1,600 of whom are in Minneapolis.

Two weeks later, Orenstein had left the office. Its new occupant: John C. Lobb, chairman and president of Northern Telecom Systems Corp., a newly formed unit of Canada's Northern Telecom Ltd., which formally acquired Data 100 this month. Data 100 and Sycor Corp., of Ann Arbor, Mich., which was acquired earlier this year by Northern Telecom, will become the nucleus of the Canadian company's penetration of the office of the future. It's a market that Robert C. Scrivener, Northern's chairman and chief executive officer, says will become a multibillion dollar market in the early '80s in North America and Europe.

The Montreal-based manufacturer of telecommunications equipment isn't what you'd call a household word in the U.S. computer market, although in recent years it's made an aggressive push, mostly through acquisitions, to acquire a base as a telecommunications supplier to the nation's independent telephone companies and to some large industries. It has some 300 telecommunications systems installed around the U.S. and last year its U.S. sales reached around $200 million. It has 20 manufacturing plants and about 9,500 employees in the U.S. Yet, until 1971 it didn't even have a sales office here.

Its moves into the U.S. reflect changing times in the telecommunications business. Computer technology has hastened the introduction of new equipment and caused the cost of R&D to soar. Northern Telecom and other manufacturers worldwide have been forced to seek larger markets for their products. For instance, Northern, which is 55% owned by Bell of Canada, said its sales of $190 million in the first half of this year represented 28% of total sales, compared with 23.6% for all of 1977. Scrivener says that around 1983, Canada will account for less than half of the company's total sales.

As Bell Canada's manufacturing arm, Northern Telecom, once called Northern Electric, was 43.6% owned by AT&T's Western Electric until 1957 when Bell Canada started to acquire total control of the company. Later, investors began to buy interests in the company and in 1971 Northern Telecom formed a subsidiary in Nashville, called Northern Telecom, Inc., or NTI, to enter the U.S. market.

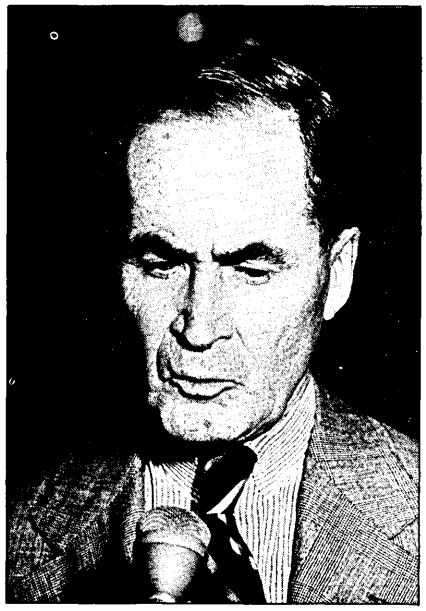
A flurry of U.S. acquisitions followed. Since December of 1976, it has acquired five companies: Cook Electric; Danray, Inc.; Telecommunications Systems of America; Sycor, and Data 100. In addition, it owns a 24% interest in Intersil, Inc., the semiconductor manufacturer, and recently was negotiating to acquire

Since December of 1976, Northern Telecom has acquired five companies and has an interest in a semiconductor firm.

Eastern Data Industries, Inc., Moorestown, N.J., whose principal operating subsidiary, Spectron Corp., makes data transmission test and control equipment.

In addition, it operates an R&D facility in Palo Alto, called BNR, Inc. (for Bell Northern Research), that eventually will be moved to Santa Clara where the company is building a 135,000 sq. ft. plant to manufacture digital switching devices. Among the functions of the BNR group is to plan for the office of the future. It describes the principal products, technologies, and resources that Scrivener says "has helped us identify desirable potential acquisition candidates as an alternative to developing all of the products in-house."

As Scrivener sees it, the electronic office or office of the future will begin with terminals that at first will be (and are) installed on a standalone basis for a unique purpose, but increasingly "they are moving to the point where they are going to be plugged into the information networks of the corporations that will be using them." So, he says, the intelligent terminal will become part of the total information system.



ROBERT C. SCRIVENER—Changing times in the telecommunications business.

Thus, the formation of Northern Telecom Systems Corp., under John Lobb, 65, who retired recently as chairman of Northern Telecom, Inc. to become chairman of Modular Computer Systems, Inc. in Ft. Lauderdale, Fla., a post he said he'll continue to hold. Lobb, who was born and educated in Minnesota, will guide the company into the electronic office equipment business as well as preside over the reorganization of Sycor and Data 100.

He'll head a planning group that includes Orenstein and Samuel N. Irwin, who founded Sycor and until recently was its president and chairman. Other members of the group are representatives of Northern Telecom, its R&D unit, and Bell Canada. Sycor with its intelligent terminals and Data 100 with its multifunction communications related products will have a key role in a business that will rely heavily on software development, use of semiconductors (from Intersil), communications switching devices (Northern Telecom), word processing equipment (Data 100 or an acquisition), facsimile devices (probably through a licensing agreement with a Japanese firm), and copying equipment (which still is undecided).

The acquisition is a blessing for both Sycor and Data 100, although somewhat hard to take for the two entrepreneurs. Irwin was replaced as president and chairman by Donald P. Moffet, hired only a year ago as Sycor's executive vice president. Orenstein, in effect, has been replaced at Data 100 by Thomas G. Herschbach, the company's former

group vice president for manufacturing who was named Data 100's chief operating officer. But the two companies are in desperate need of R&D funding and look with justifiable hunger at Northern Telecom's $75 million R&D budget.

Said Orenstein: "It would be a shame to let such growth potential go by." Much of Data 100's product innovations are in response to what IBM offers. "Our goal now is not to be cheaper than IBM, but to offer something of our own."

"It would be a shame to let such a growth potential go by."

The company, which in recent years has been investing about 4% of revenues in R&D, hopes to boost this to 7% as a result of the acquisition.

For Northern Telecom, it's an excellent investment—and not only because it fits in with the Canadian company's plans for the office of the future. Both companies are profitable and reported revenues of $215 million last year. They have a total of 6,000 employees in nine plants. Both have good service installations and Data 100 has a strong position in overseas markets.

Both companies very likely will lose their identities as separate entities as their product elements are redistributed, a fact that Orenstein is very much aware of, but without misgivings. Asked recently if he felt a twinge of sadness losing the company he founded and nurtured, he replied, "I initiated it (the acquisition)."

He added, however: "If we don't do something smashing within the next five years, we've blown it."

—Tom McCusker

DDP

THE 8100: GOOD FOR BUSINESS

With its 8100 announcement, IBM now confirms that decentralization is the answer after all.

Orbit, the widely rumored minicomputer system from IBM, finally came into view early last month, although it won't begin arriving at customer sites until the third quarter of next year. Formally named the IBM 8100 Information System, Orbit is, in the words of one dp manager, "what the 3790 should have been."

The system seemed to have been announced in haste. It was the highlight of the IBM exhibit at Info '78 in Chicago in late October, but users and competitive vendors said the IBM salesmen manning the booth were very vague about the 8100 system's features. Some observers said the computer colossus announced the product as a hedge against an anticipated announcement from a competitor.

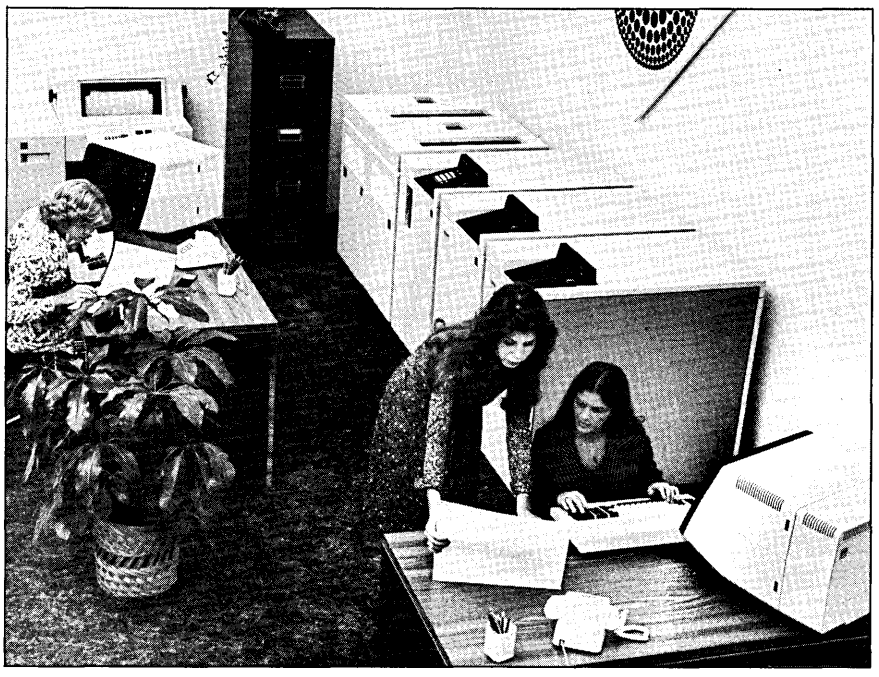
"The 8100 is the most significant product IBM has announced in the past three or four years," comments Ed McCracken, general manager of the General Systems Div. at Hewlett-Packard Co. Demonstrating IBM's acceptance of distributed processing, Orbit marks a deviation from IBM's historical concentration on big mainframes and a centralized approach to dp. "It's a tremendous announcement for the industry," says McCracken. "It's significant that the 8100 comes from the Data Processing Div., which has argued for centralized processing over the years. Users had problems reconciling the centralization stories from DPD with the decentralization story we present. Now IBM has come out and said decentralization may be the answer after all."

Within DPD, employees were told the 8100 carries significance on a par with the initial System/360 announcement.

"Three years ago, we would have been hard pressed to compete with the 8100," says Victor Poor, senior vp for R&D at Datapoint Corp. But by today's standards, he continues, Datapoint feels its ARC systems are more than competitive. And, with IBM deliveries still a year off, established distributed processing vendors may experience an increase in orders akin to that felt by Amdahl after IBM brought out the 3033.

With the 8100, IBM announced more flexibility than is its common practice at a processor's initial announcement. Users can start by installing the new systems as

THE IBM 8100—Counterclockwise from lower right: new display terminal, two storage input/output units; processor, two tape units and a line printer. IBM also announced the model 8775 display terminal with the 8100. Its screen can be divided into eight separate areas so that an operator can work on one area while keeping another set of data in view.



standalone units or as nodes in a 370-dominated SNA network. The 8100s also can communicate among each other as peers or in a master/slave relationship. Additionally, 8100s can work with "systems supplied by other manufacturers."

The 8100 can satisfy "user requirements that range from self-contained, small remote systems, to large networks," according to a statement issued by DPD president C. Michael Armstrong. "What's equally important is that users can manage that flexibility within an IBM framework that provides for orderly growth and control of their distributed processing networks." Evidently, the IBM blueprint leads to a 370-controlled SNA network. Comments Datapoint's Poor, "IBM would like to give you distributed processing, but not too much."

With unbundled software, customers have the choice of two operating systems. Those seeking a growth path from their 3790s can use distributed processing control executive (DPCX), which allows execution of programs written for the 3790, but at a faster rate. On the other hand, distributed processing programming executive (DPPX) supports standalone systems, as well as those configured in networks. Under DPPX, users can develop programs in COBOL or FORTRAN; a preprocessor allows development of COBOL programs in a free-form, English-like conversational session.

Orbit hardware includes several notable features. With certain models of the 8100-series processing units, IBM has jumped to the use of 64K-bit chips. A 256KB memory increment built of 64K-bit chips sells for the impressively low figure of $4,500. But these increments are offered only for the low end models of the family, the four configurations of the 8130 processor, which have storage cycle times of 1.2usec. Looking to the faster (800nsec) 8140 processors (offered in 12 configurations, four of which include floating-point hardware), there's a healthy $12,480 price difference between models A34 and A54. So far as we can tell from our reading, the two models differ only in main memory capacity; our price comparison represents 256KB. As one observer commented, "You don't build the biggest computer company in the world by giving away the store."

Another memory development which may well be a first, is the use of an 18K-bit chip in the 8775 intelligent terminal announced for use with the 8100. We're not certain of the reasons behind or the actual application of such an oddball size, though several industry observers say they suspect there may be more than memory on this chip.

Terminals and printers attach to 8100 systems via loops of two twisted pairs; Frederic G. Withington, a consultant at Arthur D. Little, comments that this organization is quite applicable to automated office and office-of-the-future arrangements.

Installing an 8100 system will be a little different than many users have come to expect with IBM systems. In its product announcement, IBM states that "portions of the system can be installed by users—with a set of easy-to-follow directions—in much the same way as a basic household stereo system might be set up." One insider said he'd rephrase that to, "must be installed by users." It's expected that most of the systems will be installed by the customer, with IBM assisting only when things don't work. Our insider comments that this makes a lot of sense because the 8100 is intended for far-flung outposts within an organization.

Most of the systems will be installed by the customer, with IBM assisting only when things don't work.

As for pricing, IBM says a small system with 384KB of memory, integral 58MB fixed disk, three printers, communications link, and six terminals, will sell for $91,815. The same system would lease for $2,537 per month on a two year plan, or rent for $2,981 per month. For a shade less than twice that amount, a user could get a 512KB system, with 58MB of disk, mag tape, five printers, communications links, and 18 terminals. The 8775 display, with a 2,560-character screen, sells for $3,645, rents for $95 per month, or leases for $81 per month on a two year plan. Software licenses go for $150 per month (DPPX) and $215 per month (DPCX). A discount plan for DPPX users provides savings for multiple 8100 users.

—Bill Musgrave

THE CPU AS A WASHING MACHINE

New Basic Four division will sell "solutions and function."

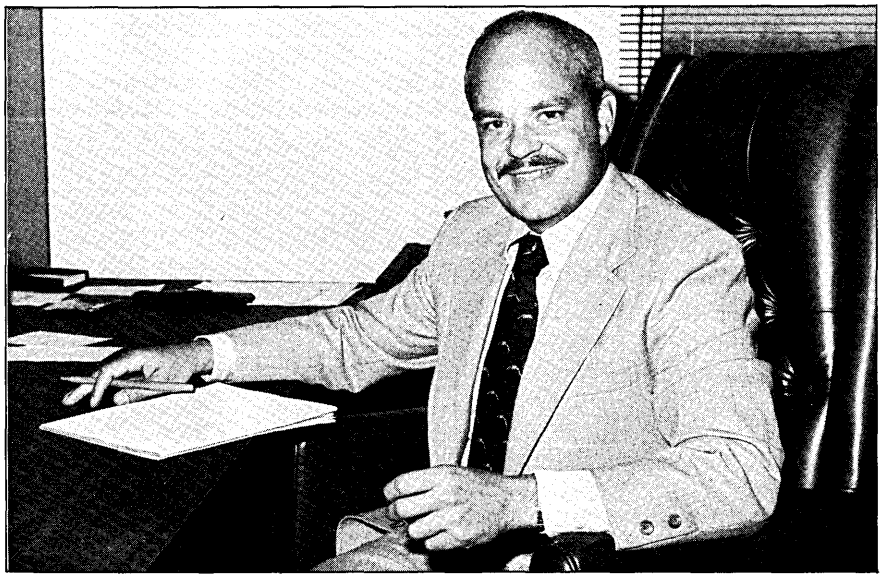
Dave Seigle likes to think of computers as office appliances.

"It would be nice if they could be sold like washing machines where the user doesn't have to know what makes the machine work, only which buttons to push to make it do what is needed."

Seigle is a new Basic Four Corp. vice president, named in August to head the firm's Distributed Data Processing Div., formed in July. He used the washing machine analogy to push home the fact that his division will sell "solutions and function."

The former vice president of product planning and program management at Sycor, Inc. was recruited into Basic Four by another Sycor alumnus, Ted Smith, who became the firm's president in December 1975. Smith had been executive vice president of Sycor. And one of Seigle's first acts in his new job was to appoint Fred Lewis, formerly director of terminal systems development at Sycor as director of DDP systems development.

Basic Four began offering a distributed data processing capability in September 1977. Since that time, said Smith, "we have found a great deal of interest in the concept. By creating a new



DAVE SEIGLE—Heads new Basic Four division.

division we will be able to reinforce our position in the DDP marketplace."

He wasn't always so anxious to do that. Basic Four had tried marketing its systems to large companies in early 1975 for what it then termed "dispersed data processing."

Smith abandoned this effort two months after he took over as president. He said at the time that he wanted to put this off until he was satisfied that the company had the product development to support such an effort and that its manufacturing operation was on its feet.

Evidently he is now satisfied. The new DDP Div. is gearing for growth. Seigle in October said the division had 12 salesmen and he expected this to double in a year. Recruiting was high on his list of priorities.

And the company as a whole is growing. It occupied new $5 million manufacturing and administrative facilities on a 25 acre site in Tustin, Calif. in December

"The transitional companies understand us and we understand them."

1977 and rapidly outgrew them. Last month ground was broken for an additional two facilities on the site.

Seigle said Basic Four will focus on the "low end" of the distributed processing market. "This is the market in which we plug our strength, the selling of solutions."

Al Davis, director of sales for the division, said marketing will be targeted toward "transitional companies. They understand us and we understand them. We can grow with them." By transitional, he said he meant the single system user who had grown to the point where he could benefit from distributed systems. He said this involves concept selling. "The entrepreneurial type with his first system doesn't want to give up control, so we give him control."

The DDP Div. will offer Basic Four's new DataWord word processing enhancement which permits a user of a Basic Four System 610 or 730 to do data processing and word processing simultaneously using the same data base. Seigle sees this as leading ultimately to the offering of an electronic mail capability.

Priced at $12,500, the minimum word processing components of the enhancement include one text display terminal, one word processing printer, memory, controllers, and software. Domestic delivery is scheduled for February 1979.

Walter Schramm, vice president of product marketing for DataWord, said the enhancement has been under development for "a couple of years." He said negotiations were being conducted last month for installation in two beta sites, "one an existing customer and one a new customer."

Seigle likes to look to the future. Although they can't do it now, he feels Basic Four distributed processing networks one day will be able to hook onto value-added networks. And maybe someday they will be able to be sold like refrigerators and washing machines.

–E.M.

TECHNOLOGY

SOFTWARE THEN HARDWARE

Reversing the usual procedure, a software firm introduces a mini.

Many a computer hardware company has found its way into the software business, but it's a rare software house that moves into the hardware arena.

Educational Data Systems of Irvine, Calif. has done just that. The company got started in 1969 developing software for minicomputers. It is on its eleventh major iteration of its IRIS (Interactive Real Time Information System) operating system for Nova type minis which it licenses to Royal Business Systems Div. of Litton Industries, Nixdorf Computer, Ampex, and Randal Data System among others. IRIS is running on an estimated 3,000 computers in the U.S. and abroad.

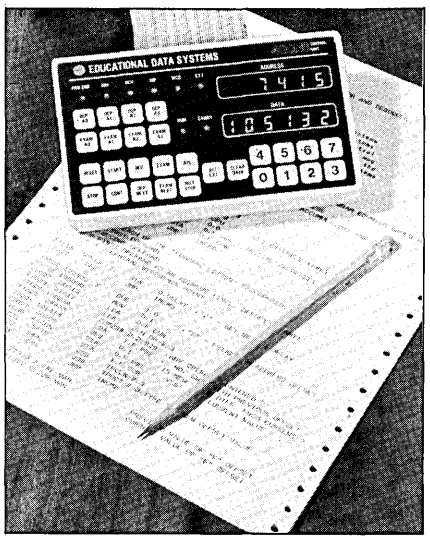
Then came data communications products, including its line of Multi Mux multiplexors. And now EDS has a computer, the Point 4, a 16-bit general purpose minicomputer which performs a complete arithmetic or branch instruction including instruction access in, appropriately enough, .4 microseconds (400 nanoseconds) which the company claims is substantially faster than the performance of the Digital Equipment Corp. PDP 11/45 or Data General's Eclipse.

"We see it as ideal for the guy who is burning out on a Nova 3," said George M. Colon, Jr., vice president of marketing. "We can give him a more powerful machine for two-thirds the price."

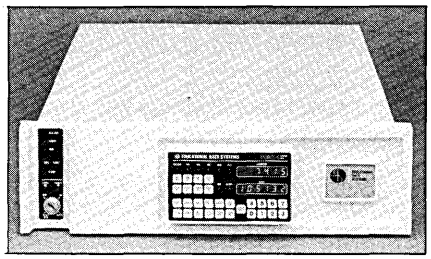
He said a 64K word configuration of the Point 4 will list for under $10,000, less than half the price of Data General's Nova 3D equipped with 64K words. Price for the 64K Point 4 in quantities will be $4,500.

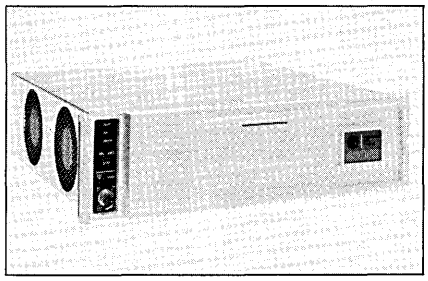
"Educational Data Systems views the minicomputer from a different perspective than do other mini manufacturers," said Paul Davies, EDS president. "Almost invariably, they have built a computer first and then struggled over a period of years to develop compatible software. Our extensive experience in writing software for existing computers has disclosed hardware deficiencies and motivated us to produce our own equipment designs, better suited to the requirements of operating systems, data base, and data communications software."

Davies said Educational Data Systems is "neither a systems house nor a computer manufacturer in the traditional sense. We normally do not sell to the end user. Instead, the company sees itself as a



HAND HELD—A control panel for the Point 4 can be placed away from the chassis at the end of a flexible cable.





THE POINT 4—With or without a control panel, EDS says it's equally powerful.

tool builder for the minicomputer industry. We develop software and hardware products to enhance the performance of small business computers, distributed processing systems, data communications systems, and data management systems. We then license or sell these products on an oem basis to systems houses, government agencies and other oem customers, and provide support services, including hardware and software maintenance and training."

EDS has two Point 4 computers up and running at its Irvine headquarters. One has been running IRIS since early August. Colon said production will start in January. He said Point 4 will be followed by Point 5 (500 nanosecond cycle time) and Point 7 (700 nanoseconds) later next year. He said the firm considered about 100 names before settling on Point, discarding such goodies as Flash 400 and the Dynamic Duo (because two processors can be coresident in one chassis and talk to each other at a one megabyte rate).

"We see it as ideal for a guy who is burning out on a Nova 3."

The cpu plus memory of up to 64K words is contained on a single 15 × 15 in. board which will be made available naked. Or it can be packaged in a 5¼in., seven-slot chassis. Colon explained that a built-in interprocessor bus makes it possible to put two of these boards in a single chassis which, when tied together, give two times the memory and two times the processing power.

In a chassis using one slot for the cpu and memory board and a second for an eight-port multiplexor, he said, the five additional slots are available for multiplexor expansion and controllers. Under IRIS, Davies said, such a configuration can support up to 32 time-sharing terminals and synchronous communication to a host computer.

Steve Gibson, director of sales, explained that the chassis has a "jumper-free back plane. You don't have to jumper around empty slots." A modular power supply is set into the side of the unit.

The standard Point 4 is equipped with a mini-panel with controls sufficient to turn the computer on and off, indicate operating status, and perform an Automatic Program Load (APL) which loads either an octal debugger or a diagnostic program from PROM's on the cpu board. The octal debugger permits a master terminal to perform all console functions plus others. The diagnostic is a self-test for either go/no-go or reliability testing of both the cpu and memory. An optional hand-held control panel with octal readout also is available. This can be placed away from the chassis at the end of a flexible cable at a distance of up to 12ft.

EDS' IRIS supports Business BASIC, assembler, editor, a data base management system called Infotrieve/Informat, and a set of on-line business application packages written in business BASIC. And, said Colon, for the last year and one-half "we have had a strong customer support group. We're changing the company image now to show that our level of commitment is absolute."

They feel they're in a different position from others in the Nova look-alike market vis-a-vis Data General. "If Data General follows its usual course in the market," said Gibson, "it will file suit. It has against all the others. But we've got proprietary software. Past complaints have been directed at competitors' use of Data General Software." He may have a Point.

—Edith Myers

LITIGATION

AT&T CASE: A TRIAL BY 1980?

New judge has given floundering four-year-old case a shot of adrenalin.

This month the government's ambitious antitrust suit against giant AT&T moves into its fourth year. Bogged down by a series of frustrating delays, the beleaguered case now shows signs of picking up steam. The breakthrough came in September when new judicial overseer, U.S. District Judge Harold H. Greene, gave the floundering case a long-overdue shot of adrenalin which could speed it on to trial by 1980.

"Taking charge and setting limits" was the way one group of antitrust buffs characterized Judge Greene's no-nonsense approach to the massive suit which charges AT&T with illegal monopolization of the telecommunications services and equipment markets.

Appointed U.S. District Judge at the end of June, Greene inherited the AT&T suit from District Court Judge Joseph C. Waddy, who ironically died one day after his retirement from the bench last August. Described as "very bright and energetic," the 55-year-old jurist has impressive legal credentials. Working closely with the late Attorney General Robert Kennedy, Greene was the "principal draftsman" of the 1964 Civil Rights Act and the 1965 Voting Rights Act.

Antitrusters feel Judge Greene won't tolerate AT&T's stalling maneuvers in the case.

After spending eight years at the Justice Department (mostly in the civil rights division), he moved on to a series of judgeships which led to his current court appointment.

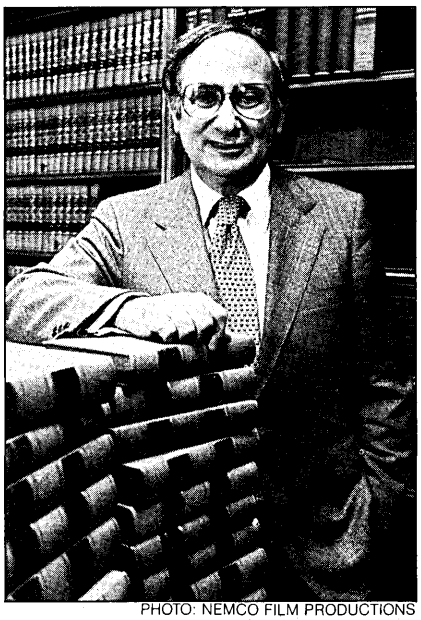


PHOTO: NEMCO FILM PRODUCTIONS

HAROLD H. GREENE—New U.S. District Judge on AT&T antitrust case is characterized as "taking charge and setting limits."

Legal experts point out that Greene's inside knowledge of Justice should stand him in good stead in dealing with the suit. Unlike his predecessor Waddy, Greene seems anxious to get the case moving.

And this anxiousness shows. Very shortly after the suit was thrown into his lap, Judge Greene issued a whole string of far-reaching opinions and orders aimed at expediting things and settling the persistent disputes that have cropped up in the case over the last several years. One of the biggest bones of contention all along has been the sticky jurisdiction question.

On this issue Judge Greene unequivocally declared the court "has jurisdiction of this action and that no part of this case is within the exclusive jurisdiction of the (Federal Communications Commission)." Conceding that this regulatory agency may have to play some

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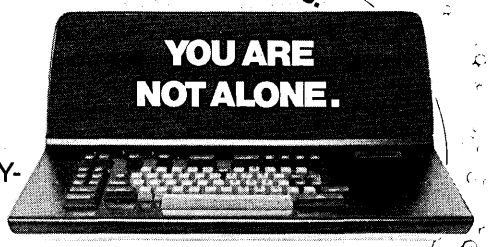

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role in the case, he also added that "this court is fully prepared to refer appropriate issues to the FCC . . ."

Judge Greene's firm stand on the jurisdiction question has delighted government antitrusters who hope the issue is finally settled. AT&Ters on the other hand are naturally dismayed at the decision—even more dismayed than they were with Judge Waddy's original and far less comprehensive decision giving the court the right to hear "at least some" aspects of the government's case. AT&T has repeatedly maintained its court immunity to antitrust laws because of its regulated status.

One of Greene's key pretrial orders on discovery in the case also favors the Feds.

AT&T's discovery troops could total 3,000, compared with Justice Department team of eight full-time lawyers and seven paralegals.

Under that order, AT&T would have to hand over to the government by Nov. 1 microfilm copies of approximately 2.5 million documents from the MCI Communications Corp. and Litton Systems Inc. antitrust cases. Justice attorneys have been trying to get their hands on this material for a long time, so Greene's order, if it stands, clearly gives them a victory—a victory they claim will greatly help in streamlining and speeding up their laborious discovery efforts in the mammoth case.

The government's right to these private antitrust suit documents has been supported by U.S. District Judge John F. Grady, who is handling the MCI litigation. As further evidence of this support, Judge Grady last month came out with a strong jurisdictional ruling which paralleled Judge Greene's. In that ruling, Grady came down hard against AT&T and declared his Chicago court did indeed have jurisdiction over the MCI case. The suit, also in its fourth year, charges Ma Bell with predatory and anticompetitive tactics.

Judge Grady, who ordered the case to trial last month, is expected to start hearing it this fall. (An expected AT&T appeal, however, could slow things up.) The Grady decision coupled with the federal wins have dealt a severe blow to AT&T's antitrust defenders. On the Grady ruling, the company maintained: "We believe this decision was in error in several respects . . . Judge Grady did not rule on the merits of MCI's allegations, which we believe have no foundation in fact."

Bell feels the Feds are on equally shaky ground in their antitrust action. But Justice insiders claim if Bell really believed that it wouldn't resort to all its stalling maneuvers. The antitrusters also believe the company won't be able to use these tactics much longer because they feel Judge Greene won't tolerate any unnecessary delays.

His 1980 trial timetable means discovery in the case would be cut off on April 1, 1980. AT&T, objecting to his "severely compressed discovery schedule," has claimed its discovery drive could take 10 years and cost over $300 million.

One Justice lawyer labels AT&T's 10-year discovery timetable "preposterous." He also thinks a 1980 trial date is "quite possible if Judge Greene rides herd on both parties. I don't think any of us here at Justice feel particularly apprehensive about that timetable," he says. "It's just going to mean a lot of work."

What may make that work harder is another pretrial order in which Judge Greene pinpointed the plaintiffs in the complex case. Those plaintiffs, according to Greene, are all parts of the government's executive branch, except the FCC and the U.S. Postal Service. One federal attorney admitted this would "somewhat increase the logistical burden on us." Another antitruster was more candid. "Frankly," he confides, "it's going to be a pain in the ass."

AT&T, acutely aware of this, did win this concession from Greene. The Feds worry that the plaintiff ruling will give the company still another excuse to "spend years rummaging around" in government files. Instead they'd like to see Bell "make an honest effort to obtain only those documents which it needs to prepare its defense and abandon its transparent effort to use discovery against government agencies as a means of protracting the discovery phase."

But realistically the antitrusters know AT&T will use this ruling as well as other things as an excuse to "drag their feet." And there could be plenty of foot dragging on the case if the company opts to appeal Greene's jurisdictional decision, a move which could lead them back to the Supreme Court once again. Some type of appeal by the company is more than likely on this issue as well as on Greene's order calling for the MCI and Litton documents.

Justice sources, however, feel confident they'll eventually get this valuable material. They also feel Greene's jurisdictional opinion will be upheld. Certainly the judge himself is not likely to overturn his own rulings, despite the fact AT&T asked him to do just that last month when it filed a reconsideration plea on almost all of Greene's initial orders.

AT&T also objected to another of Greene's pretrial orders requiring the company and Justice to file four successive statements of contentions and proof over the next 18 months. Bell protested this "unprecedented" request and asked for clarification. Meanwhile government lawyers see no problem with this request, believing it will help them narrow the issues and specify the evidence they need in the case.

The Feds first "installment" of this statement of contentions and proof was due Nov. 1. (AT&T's first filing is due Jan. 1, 1979.) In it, they review their monopolization charges against Bell in the telecommunications equipment and services areas. To support their claims, the antitrusters spell out the evidence, suggesting that further discovery will bolster their case.

In addition, this filing will also touch on relief, the Western Electric divestiture being the one relief action the government is strongly committed to. Other Bell subsidiaries targeted for spin-off under the suit include Long Lines and some or all of the operating companies.

A lot of what turns up in this filing and in the subsequently more specific submissions will hinge on what Justice can get out of its discovery efforts. So far the government's discovery campaign hasn't yielded much, mainly because there hasn't really been any meaningful discovery due to all the stays in the case.

AT&T, gearing up for its paper chase, has lined up its discovery troops which could total 3,000, according to the company's own extravagant estimates. Spearheading its defense will be the powerful Chicago law firm of Sidley & Austin, which will be bolstered by Dewey Ballantine, the "very blue chip" Wall Street law partnership that's also defending AT&T on the Litton case.

The antitrusters prosecuting ranks are pathetically thinner and far less glamorous. The Justice Department currently has eight full time lawyers and seven paralegals toiling on the case. "We're getting to a point," admits one government attorney, "where the imbalance of resources could really be a factor."

Justice expects soon to boost the workforce on the case. Initial estimates were that Uncle Sam would need 20 to 25 people to prepare the suit. This staffing level could then be cut to 10 or 12 when the case was ready for trial. The government also plans on some help from a soon-to-be-ready computer system. But their real help on the case, the Feds feel, will come from Judge Harold H. Greene.

Impressed by the judge's speedy rulemaking on the case, the government's AT&T lawyers welcome this new change of pace. "The case has never looked better," declares one optimistic antitruster who believes the late Judge Waddy's inertia has taken its toll. "I had nothing personal against Judge Waddy. Nonetheless," he confides, "I think we paid a hell of a price for his inactivity."

—Linda Flato

MINUTES NOT WEEKS

New kind of "computer peripheral" simplifies computer room moves.

"It was minutes versus weeks," said George Carey, assistant director of the computer center at Wadsworth Veterans Administration Hospital in Los Angeles. He was talking about a reconfiguration this year of equipment in the center.

"We saved $10,000 and were able to do it in a few hours," said John Cool, a principal in Image Resources Inc. and former president of ValComp, Westlake Village, Calif., a computer refurbishing firm which now is a division of Tymshare, Inc. Cool was referring to a move of ValComp's computer center across the street back in 1976.

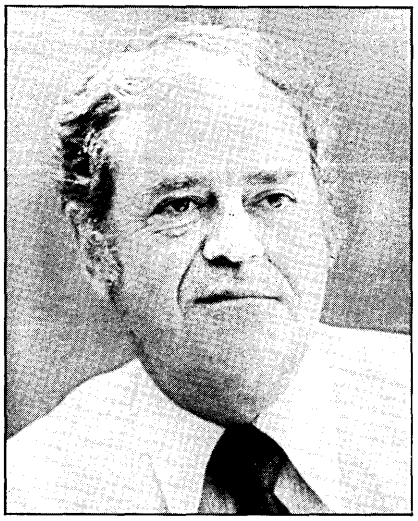
Both men gave credit for the time savings to a type of equipment which is just beginning to proliferate in computer rooms although it has been around since 1973. "An idea who's time has come," proclaims the literature of one supplier, Computer Power Systems Corp., Long Beach, Calif.

There are three companies in the field, all in Southern California. Their systems have different names but all are designed to provide clean power to computer room equipment and incorporate flexible wiring which eliminates the need for re-installation of rigid conduit in the case of a reconfiguration or a move.

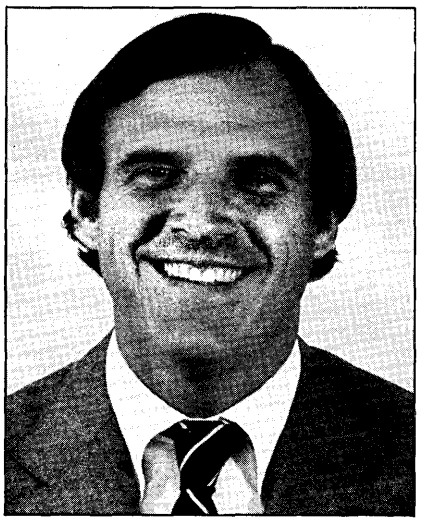
Computer Power Systems calls its units computer power distribution systems. Data Processing Power of Los Angeles manufactures Powermobile systems and Emergency Power Engineering, Inc. of Costa Mesa produces Computer Power Centers.

Wadsworth hospital has been using three of Computer Power Systems' units for more than three months. Cool was the first customer for DPP's Powermobile, the first such system to reach the market, back in 1974. "We probably paid 10% to 15% more than for standard wiring initially," he said, "but the move made it well worthwhile." ValComp is still using the system.

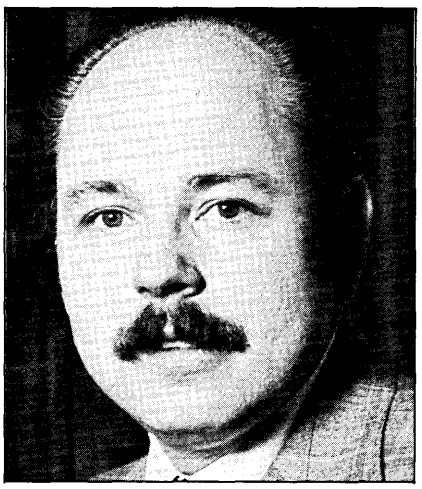
Carey of Wadsworth said flexibility was the prime reason for his buying the Computer Power Systems equipment. "Central office designed our computer room and when we looked at it, we decided we wanted to place some equipment in different locations. It was easy—we just unplugged a plug and lifted and replaced the floor." He also cited as an advantage the fact that computer technicians and operators can monitor power and foresee problems right in the computer room on the ninth floor. "Before this only could have been done in the basement."



LOUIS B. PERILLO—". . . an evolution toward more emphasis on clean power."



WILLIAM R. LENNARTZ—". . . $25 million within two years."



WARREN LEWIS—Helped form two companies.

Both Computer Power Systems and Data Processing Power reported more than 200 systems installed worldwide in September. Emergency Processing Engineering's marketing manager, Warren Caves, said his firm had installed more than 80 in mid-October and in late October was to have installed 14 for Southern New England Telephone Company to provide power for nine large IBM and Amdahl computers. He said this is the largest installation of such equipment in the world.

Emergency Power Engineering is the newest in the field, although it is the oldest company, having been formed in 1971 by Hans Imhof and Alois Krickl to develop custom power products and portable AC and DC load banks. Imhof and Krickl have backgrounds in uninterruptible power supplies. Both developed UPS products for General Electric and Emerson Electric. Their Computer Power Center was developed and introduced last year.

The presidents of the other two companies have computer backgrounds. William R. Lennartz, a founder of Computer Power Systems and president since last April, has been in the computer industry since he joined IBM in 1963. In 1968 he helped form Lencor International. When Lencor acquired CFI Memories, a disk cartridge manufacturer, he became its president, a position he held until CFI became a wholly owned subsidiary of Memorex in April of 1977.

Louis B. Perillo, president and chief executive officer of Data Processing Power since last February, came from Xerox Corp. He had been vice president, international for Xerox Data Products, managing director of Xerox/Middle East and managing director of Rank Xerox Data Systems. Earlier he held technical, marketing, and management positions at Standard Oil Co., Arthur G. McKee and Co., Ralph M. Parson Co., and TRW.

The concept of power distributions systems and flexible wiring probably got its start at Xerox Data Systems. Norman B. Conwill, Computer Power Systems' vp of marketing, was a manufacturers' representative in Long Beach in 1973. "Three guys I knew from XDS, all in field enginering, asked me to sell a product they had developed. They called it a new kind of computer peripheral. It was a power distribution system for computer centers."

The "three guys" were Warren Lewis, now vice president of engineering for Computer Power Systems, Max A. McCollough, now vice president of marketing for Data Processing Power, and Frank Laughery, who left DPP in early 1977 to pursue other interests but continues to be a major shareholder.

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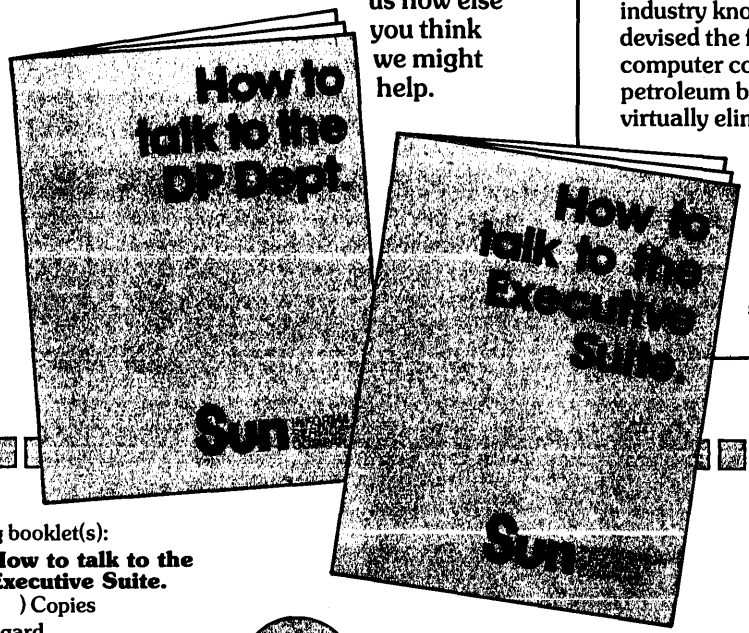

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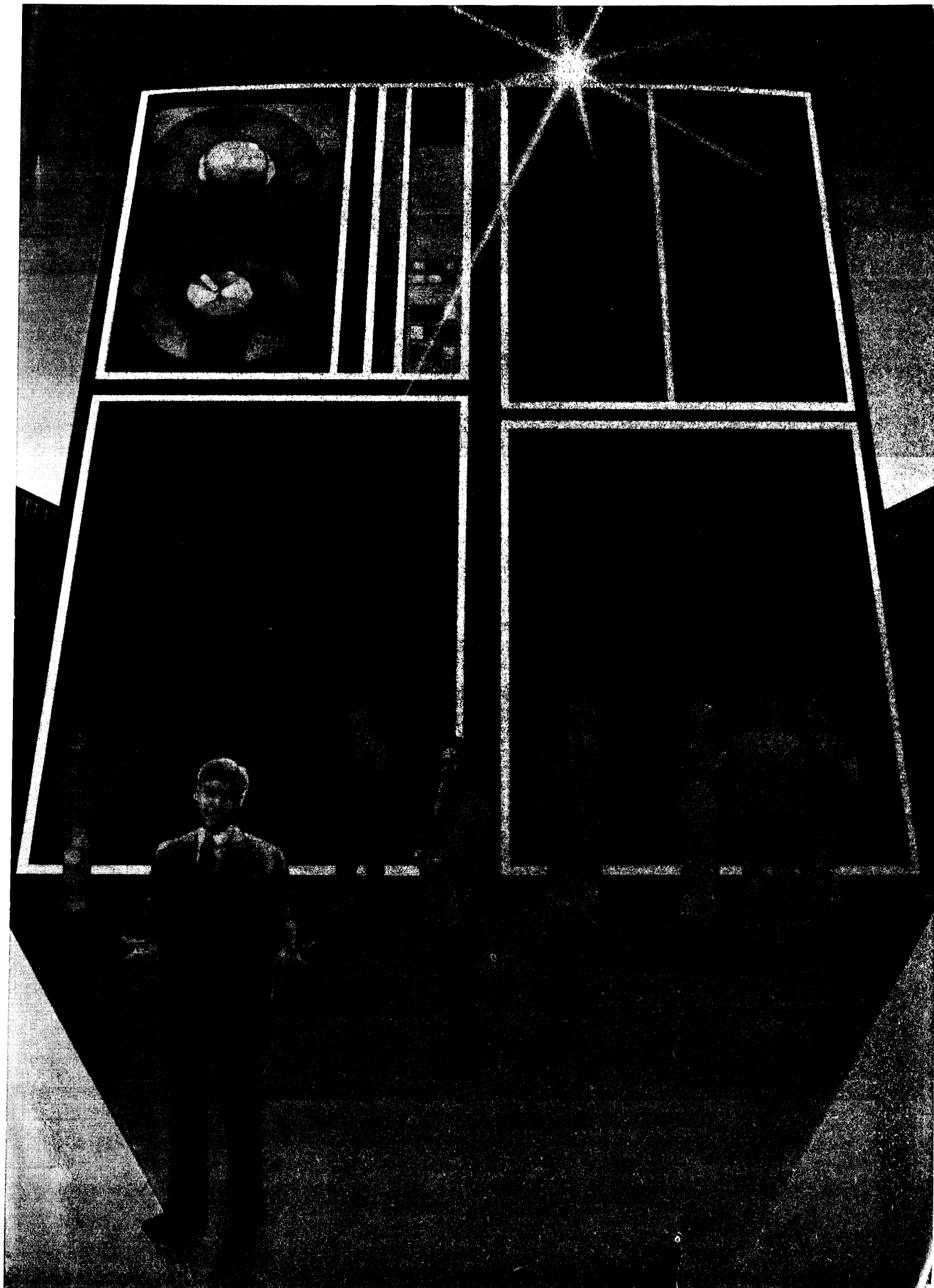

The three formed Data Processing Power in 1974. Conwill, as a rep, sold their systems. Lewis bowed out of DPP in 1976 and approached Conwill about joining him in a new company. Conwill said he would if financing could be arranged. He, in turn, approached Lennartz who arranged the financing and Computer Power Systems got going in May 1976.

"There has been a technical divergence between the computer industry and the electrical industry as the computer industry moved to solid state devices," said Conwill. "In the days of vacuum tubes, vendors would stick with customers through every part of an installation, including the power distribution aspects. Then, with vacuum tubes gone, they (vendors) adopted a hands-off policy toward electrical problems." He feels CPS is filling a gap.

"When you plug computer equipment right into a power system that is handling all sorts of other requirements, most of which exceed in demand those of the computer center," Conwill said, "you don't get clean power." He said computer centers generally account for less than one percent of a company's electrical use. "But the computer center is voltage sensitive. Transients can cause unexplained halts and garbage." The CPS system locks into a building's power but isolates the computer center from variations caused by other users. "It catches the power, protects it from outside interference, and distributes it within the computer center," Conwill said.

"It was easy—we just unplugged a plug and lifted and replaced the floor."

While the initial emphasis was on the flexibility afforded by the systems, the fact that they permitted expansion and even moves with little disruption, Perillo of DPP sees an "evolution toward more emphasis on the clean power. More and more demands are being made on utility companies and computer systems are becoming more and more sensitive to power."

In appearance, the CPS and DPP systems are similar. Caves of Emergency Power Engineering describes his product as "more vertically upright. Theirs (DPP and CPS) look more like disk drives and ours look like tape drives."

All three firms report accelerating growth. Perillo said DPP became profitable in February 1978 and has remained profitable since. He said the growth rate in both orders and shipments is holding steady at 5% minimum per month. The projected revenue for this year is $2 million compared to total revenues of $800,000 in 1977. "The company anticipates increased inventory to augment this growth in manufacturing, along with comparable increases in manufacturing employees." DPP's manufacturing operation is housed in an 18,000 sq. ft. facility.

Emergency Power Engineering has a 20,000 sq. ft. manufacturing facility. The company does not break out sales and revenues figures for its Computer Power Center line.

CPS occupies a 17,000 sq. ft. facility its officers say it has outgrown. The company was bidding in October on a nearby 80,000 sq. ft. facility it hoped to be able to occupy by year-end. It also was planning to establish a facility on the East Coast.

CPS' annual sales rate is $2 million. Lennartz believes this could go to $6 million this year and to $25 million in two years.

—Edith Myers

COMMUNICATIONS

WEATHER BY TV

Feds explore Viewdata-type system to provide weather, market, and other information to the nation's farms.

Starting next year the federal government will launch a pilot test of a tv-based system which promises to be the first U.S. application of the Viewdata-type technology that's currently sweeping Europe and Canada. The Feds believe this system, the centerpiece of their bold new "green thumb" project, will open up the Viewdata marketplace throughout the country.

Computer and communciations vendors, anxious to grab a piece of this potential boom market, have listened with interest to the government's plans. Several larger companies have even done preliminary marketing surveys to get an inkling of the demand for these at-home and business data base services. All of which leads an industry observer to predict that "most households will have a Viewdata-type capability for all sorts of applications within a few years."

And that vendor-nurtured capability, claims one government source, will be based on design concepts and specifications from the green thumb project. Run by the Department of Agriculture and the Department of Commerce's National Weather Service, the pioneering project is designed to provide a system for doling out weather, market and other information to farms and agribusinesses.

The major system component is the "green thumb box," which includes a modem, microprocessor, storage capabilities, a read-only memory for internal programming, and character and RF generators. Linked to a user's tv and telephone, the green thumb box would be connected via phone lines to a microcomputer in the county extension service office.

Under the setup, a user dialing a special number in the extension service office would be provided with a list of available information on the tv screen. Then, by pushing the appropriate key on the green thumb box, a user would select the desired data which would be loaded into the microprocessor for replay on the tv screen. Once the microprocessor is loaded, 4,000 characters being the load limit, the phone line would be disconnected.

The system data base, tailored to a township or county, would also cover adjacent agricultural growing and market areas. Much of this information is already computerized and available through a USDA network and an NWS weather information system which is a low-speed Teletype operation. However, this data currently is availably only on a state or national basis. Farmers are at a further disadvantage since no dial-up weather reporting service is provided in rural areas.

To meet these information needs, the Feds last spring came up with their green thumb strategy, the brainchild of Agriculture Secretary Bob Berglund and Richard Frank, head of DOC's National Oceanic & Atmospheric Administration. So far the project has won strong political support that goes all the way to the White House. Early Capitol Hill clout principally came from Sen. Walter Huddleston who was instrumental, along with Berglund and Frank, in the plan's initial development.

"Everybody associated with the project," confides one government insider, "is euphoric over it and pushing it. The skeptics are few and far between."

Skeptics are at the Office of Management & Budget and inside USDA itself. One of their overriding concerns is cost—the amount of taxpayer dollars that would have to be poured into the project as a result of nationwide deployment of the system. "The question is," says one federal dper, "should the government be getting into a big project like this in this time of austerity and Proposition 13 philosophy?"

More specific potshots also have been aimed at the way the system is going to be implemented and at its overall design

concept. Critics also fault project leaders for not conducting any type of attitude survey to determine first if there's indeed a need for such a data base service, and second, if there is a need, how many potential subscribers in what areas would sign up.

If this were done, they argue, then end points could be fixed and a data communications network designed. Opting for a different methodology, green thumb planners have decided at first to have one extension office microcomputer per county—a decision that they undoubtedly will have to reconsider due to size differences among counties.

All of this flak over the proposal has slowed down the project's pace but it hasn't dimmed the enthusiasm of government green thumbers. Wanting to get a go-ahead last summer for a 150-county test in five states, project leaders had to settle instead for a pilot in two Kentucky counties.

Due to start sometime next year, the delayed trial is expected to run into 1981. The Univ. of Kentucky, which is in charge of the test, will also do the initial systems work on the project. That should take around six months, after which the pilot will go on for a full year at a targeted cost of $300,000, which includes software development.

Under the test, each of the two Kentucky counties will receive 100 green thumb boxes that will cost around $100 apiece. Project pushers have pegged microcomputer costs at $5,000.

To get the Kentucky trial going and to satisfy curious vendors, a seminar-type briefing was held late last month at the Univ. of Kentucky. Approximately 100 prospective suppliers turned out for the all day meeting, designed to fill vendors in on pilot system requirements.

The State of Kentucky is expected to release a request for proposals (RFP) within the next two to five months to get the green thumb boxes, microcomputers, and system software. Bidding is expected to be heavy, especially among microprocessor makers. Some of the big industry guns eyeing the proposition include IBM, ITT, Radio Shack, Texas Instruments, National Semiconductor, Grumman, and, of course, all the telephone companies including giant AT&T.

Sources close to the project speculate that Kentucky may opt to buy off-the-shelf microprocessors. And if there's enough vendor interest, the state might be able to get a particular company to provide one or more prototypes of the green thumb box for the pilot.

AT&T as well as other companies might be interested in such a deal. But one project worker says the government has been "very careful on the system specifications so that nobody will get the whole thing."

After the Kentucky trial gets underway, project leaders are hoping they can get approval to gradually add other states to the test. The potential green thumb subscriber base could be well over three million if every farm and agribusiness in the U.S. signs up for the service. That would mean a green thumb box for every one of those three million or so subscribers.

Vendors are well aware of these figures and are anxious to cash in on this potential business. If expanded nationwide, some 3,000 microcomputers, one for each U.S. county, would also be needed. But so far, vendors haven't shown much enthusiasm for the microcomputer side of the project.

"Nobody seems to be interested," reveals one project insider, "in the 3,000 microcomputers. That's not the big cookie. What they're interested in is all those green thumb boxes that will be sold all over the country."

With OMB opposition, the green thumb could turn black and blue before it's all over.

And vendors aren't the only ones acutely interested in those green thumb devices. OMB, which has been wary all along about the venture, has insisted that if the project expands beyond the limited Kentucky pilot that the whole service be put up for commerical bid. What it doesn't want is the federal government becoming involved in engineering and in running such a huge system—one that the private sector could easily handle.

Most Feds agree with this, but claim things would have to be restructured to give companies a chance to make money on the green thumb deals. Right now the project is heavily subsidized by Uncle Sam, the money coming out of USDA's extension funds.

But despite these qualifications, project boosters are confident of success. They know they still have to pacify OMB skeptics—the same ones that put the kibosh last summer on their plans for the five state trial run. But they don't seem to be too worried since they have a growing number of green thumb groupies in such high places as the White House and Congress.

Gushes one enthusiastic government green thumber: "Once the pilot gets started in Kentucky, it's going to go like a fireworks." But maybe it won't go quite as fast as that, counters another government guru. Predicting further battles with OMB, he quips, "That green thumb may turn black and blue before it's all over."

—Linda Flato

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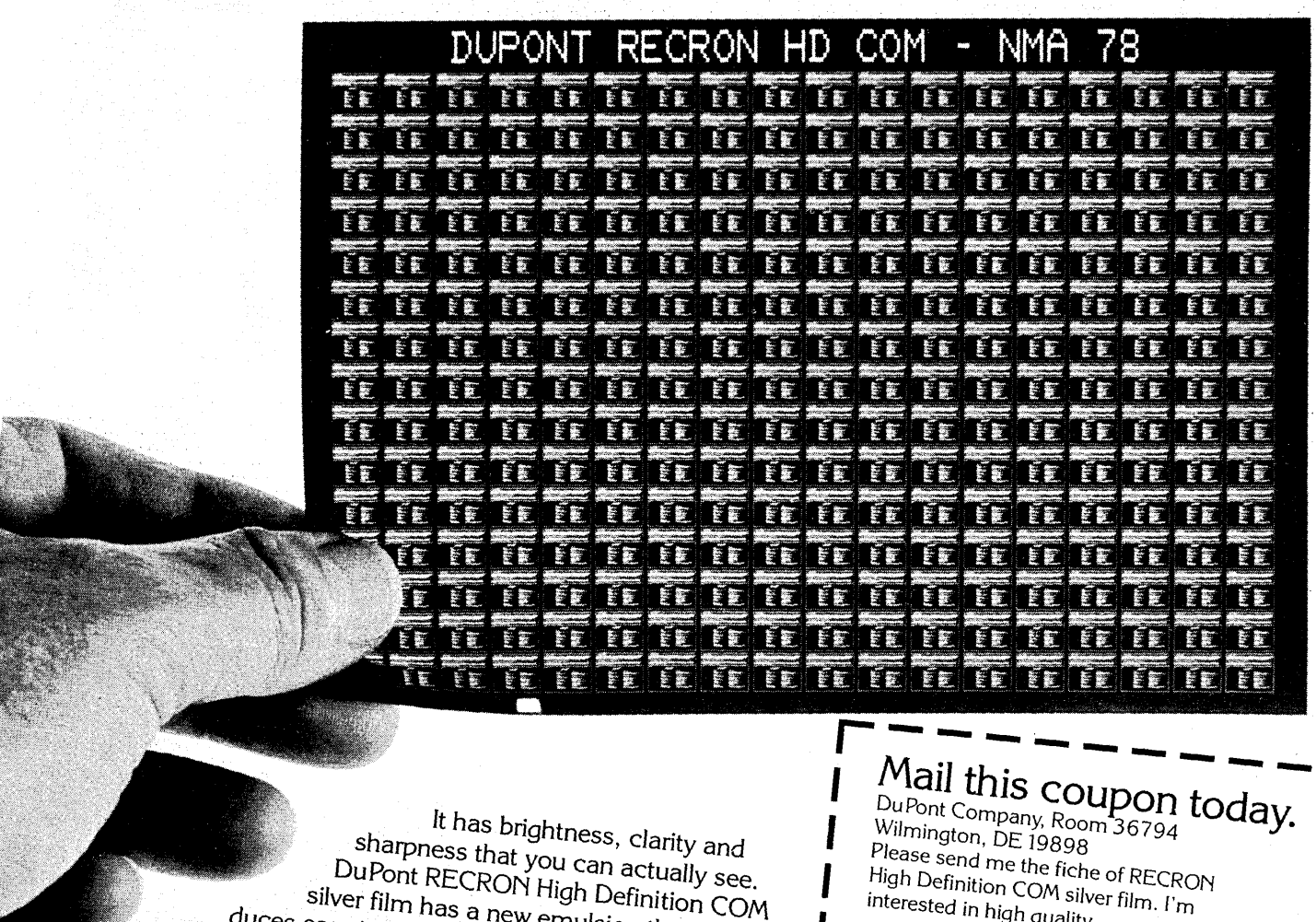

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PERSONAL COMPUTERS

VISIT FROM THE FCC

Commission taking a tough position on improper TV-computer hookups.

Not long ago an owner of a personal computer who had attached his system to a color tv set got an unexpected visit from a Federal Communications Commission field engineer.

The computer owner was told that his system was improperly attached to his tv set and that he would have to cease using it until the situation was rectified.

While instances of this sort still are unusual, the FCC is beginning to take a tough position on improper tv-computer hookups, one that could affect personal computer manufacturers and owners alike.

An inadequate tv-computer or tv-peripheral hookup can cause serious transmission interference problems, says the Laurel, Md. based laboratory division of the FCC, which regulates such interconnections. Moreover, at this time the FCC says only two personal computer companies—VideoBrain and Interact—have obtained approval from the FCC for what are called RF modulators, devices that permit interconnect and minimize the interference hazard.

As a result the FCC now is talking about imposing marketing sanctions on those companies that fail to meet interconnect qualifications. Particularly vulnerable are manufacturers that rely on color sets to display the various games they sell. Also, personal computer owners who create interference problems with a tv hookup can be served with a cease and desist order, the FCC says.

FCC officials liken the proliferation of personal computers to the citizens band radio craze which also caused transmission interference problems. "We can't let this become another CB problem," an FCC source said.

—L.M.

INTERNATIONAL

CANADA'S ECONOMIC CONCERNS

Economics emerged as main Canadian concern in talks with U.S. representatives on transborder computer flows.

"It isn't the manufacturers who want it. It isn't the services industry. It certainly isn't the common carrier. We came to the conclusion that the only people in Canada who are really pushing for regulation of data flow across borders happen to be in the government . . . What you can't control, you can't tax. And, if you can't regulate it, there's no need for a bureaucracy."

Seventy Canadians and Americans collapsed in laughter when George Fierheller of Systems Dimensions Ltd. made those comments at the recent "Conference/Workshop on Issues in Canadian/U.S. Transborder Computer Flows." At the invitation of the Institute for Research on Public Policy, government officials, multinational managers, and computer industry representatives gathered in Montreal in September to examine this most boggling of all international issues. They did more than examine it.

Led by the Canadians, they jabbed and poked it. They turned it upside down. They stripped away all the privacy and sovereignty rhetoric that has clouded such meetings, and came up with their real concerns. Economics.

The Canadians suffer from severe dominance of foreign industry on their soil, and many corporations do ship their data for processing abroad, mainly south to the U.S. This has a serious impact on their development, in the computer industry and out. But this group of Canadians did not really look down the transmission line for the cause of their problems.

They turned inward, shunning the idea of regulation and whipping the government for blocking their own economic development through restrictive policies. They looked for solutions and even came up with an idea that would be anathema to the Europeans. Someone suggested that Canada could become a data haven, a free port for processing and transmitting data without the restrictions other nations are creating.

What was the impetus for this meeting? Certainly, all the data laws and treaties developing around the world have brought the data flow issue to the fore. Canada alone has 92 provincial and 23 federal laws that apply in various sectors to data storage and transmission. (See accompanying story.)

But the real impetus was the Institute's own research of data flow problems articulated by the government last year. In 1977, publicized results from a confidential government report asserted that 7,500 data processing jobs and about $300 million in revenue were being lost because so much Canadian processing is done abroad. More astounding were projections that in 1985 the losses would be 23,000 jobs and $1.5 billion in revenue.

This led then-Minister of Science and Technology Hugh Faulkner to proclaim that Canada also faced the potential loss of access to vital information and "the danger that industrial and social development will largely be governed by the decisions of interest groups residing in another country."

TRANSBORDER ISSUES—Some participants in recent Canadian workshop: Brendan McShane, U.S. consulting specialist on information services; Andrew McMahon, vice president of Bell Computer Communications, Montreal; George Fierheller, president of Systems Dimensions Ltd., Ottawa; and Peter Robinson, chairman of interdepartmental committee for computer/communications with the Dept. of Communications, Ottawa.

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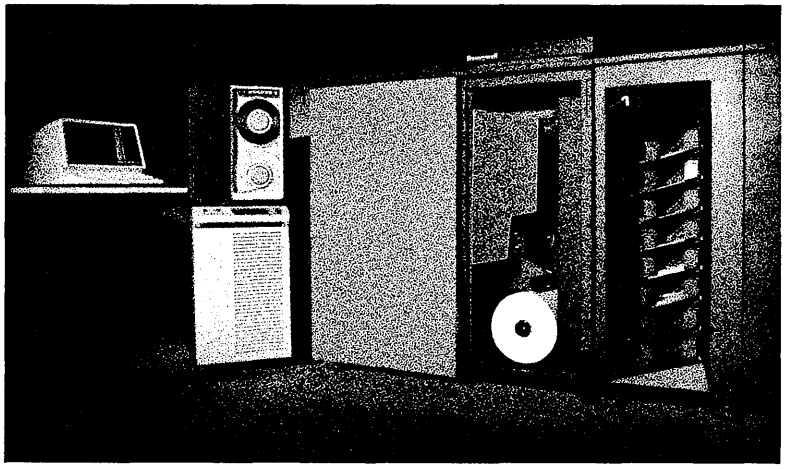

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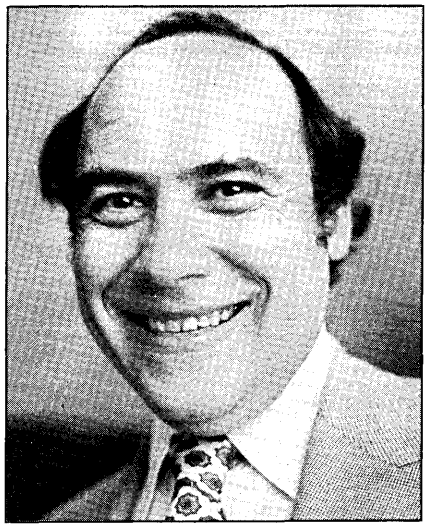

OSWALD GANLEY—talking about important economic and cultural questions.

Those were the problems the Institute keyed on, and the resulting report, presented at the meeting by staff scientist Willian Cundiff, makes a valuable, readable effort to put the issues in perspective. Cundiff's first conclusion was that not enough is known about the data flows to base policy on—what Americans have been shouting for some time—but in view of rapidly developing events in Canada and elsewhere, the time for analyses is now.

As a major step in that direction, the Institute brought together two key countries and the "five key stakeholders" for this meeting: government, multinationals, computer manufacturers, communications carriers, and service bureaus.

"Will a terminal tucked into foreign central computer facilities lead Canada into a terminal economy?" asked Canadian government panelist Peter Robinson, chairman of the Department of Communications committee on computer/communications. Because of technological advances, he noted, many multinationals have or are considering consolidation of Canadian computing activities in their foreign headquarters. This may be the best system design, he said, but "national borders do exist" and corporations, as well as governments, must take them into account in their planning. Robinson indicated that too many companies just are not aware of these national concerns. Others emphasized that the first step is to educate firms on those concerns, but warned against "counterproductive" regulations.

J.C. Grant, systems development executive at the Royal Bank of Canada, put his finger on the main impact of that data exodus. "I believe the key type of data flow and the key issue is the data flow associated with planning, design, and control of enterprises . . . The control of the actual process, as manufacturing, could very well remain in Canada, but the higher types of job opportunities, the challenges, could be carried out at a remote distance."

Grant was talking about high level management jobs so vital to all industry, not just data processing. But he was not anxious for legislation to control this loss, except as a last resort. As did so many attendees, he laid the blame on the high cost of doing business in Canada, "which tends to make us less competitive." The major cause is government economic and social policies. He called on the government to decrease these costs and create a program of targets and compromise. Should legislation become necessary, it would have to be carefully devised to avoid re-creating "upward cost pressures."

The Canadian computer industry representatives were not at all anxious to be protected against American competition. George Fierheller noted that the Canadian Association of Data Processing Service Organizations (CADAPSO) has put in a brief to the federal government saying this would be counterproductive in the long run. "The computer services industry helps other companies to be more productive. If you do anything that's going to stop Canadian companies from being as productive as they can possibly be . . . you are likely to worsen the balance of payments problem."

Fierheller, whose company does 20% of its business in the U.S., added, "If you want to help, for heaven's sake reduce the duties on computer equipment used in Canada to try to make us more competitive with the Americans." He and other service executives complained loudly that government policies had done more to drive out the entrepreneur than anything—through taxation, duties, and other federal revenue-producing schemes. Further, even if there is a loss of data processing jobs, "we haven't enough qualified people to fill the jobs available," said one.

Fierheller said, "There's a good possibility that we could develop a very fine export industry built not around computer hardware . . . but rather expertise," and called for incentives that would help.

Communications was another pivotal issue in the discussion. Cundiff noted that the greatest frustration for Canadian communication carriers has been that U.S.-owned subsidiaries link into U.S. networks for international transmission—robbing them of international revenues. The total situation domestically and internationally is likely to worsen, according to Andrew McMahon, vice president of Bell Computer Communication in Canada.

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CANADA ADDS TO PRIVACY LAWS

Canada has 92 provincial and 23 federal laws affecting the storage or transmission of data. At least two more are in the works.

An amendment to the Bank Act, now pending, puts an end to off-shore data processing by Canadian banks. (Branches abroad and foreign bank subsidiarys are not affected.) The amendment reads "A bank shall not process, store, or otherwise maintain any of its corporate or clients' records at a location outside Canada or transmit data relating to any such record to a point outside Canada with the object of having that data processed, stored, or maintained outside Canada." Penalty: $5,000 and/or six months in jail.

The other legislation is an amendment to the Combines Investigation Act. The government auditors apparently want to be able to get their hands on business records no matter where they are processed or stored. So the amendment required that everyone who stores data in a computer, "wherever situated," on business carried on in Canada has to keep the following on Canadian premises: a description of the data and of the forms in which the data can be received and copies of the access codes to retrieve the data. A description also will have to be kept on how the data can be retrieved in Canada, whether through a terminal or not. The auditor will not actually come in and retrieve the data, according to the amendment. He will only ask for printouts retrieved in the message shown in the descriptions. Neither of these amendments have anything to do with privacy or protection of the individual's records.

Within weeks of the Montreal meeting, the Canadian government proved that it was going to protect its computer service companies whether they want it or not. Comshare, Inc., Ann Arbor, Mich., was denied permission to increase ownership in its Canadian affiliate, Comshare, Ltd., to 79% from its present 11%. Comshare had agreed to increase employment and research in Canada.

Richard Crandall, the Comshare president who also is president of the Association of Data Processing Service Organizations (ADAPSO), issued a press release to blast the nationalistic moves he said were occurring in Canada, Japan, France, and elsewhere. "Those countries are attempting to close the free enterprise system to us, but expect to be able to enter the U.S. market without restriction.

"ADAPSO and its largest member firms are working with various departments in the U.S. federal government to explore alternate means of dealing with this problem . . . We cannot stand idly by . . ." ✻

In the 1980s, with major development of U.S. satellites, Canada may find excess U.S. satellite capacity dumped on its shores, offloaded "at greatly discounted rates." McMahon foresaw that the U.S. satellites could link into privately owned earth stations in Canada, which will "probably mean the death of the Canadian domestic satellite industry."

He called for legislation mandating: that all Canada-to-Canada transmission be carried on Canadian facilities; that U.S. signals not be licensed to land in Canada and vice versa, except under reciprocal agreements; and that ground stations be owned by regulated Canadian common carriers.

The audience was not about to let McMahon go unquestioned. How is protecting Canadian communications, more than likely to be higher priced, going to "benefit the Canadian consumer?" McMahon's answer was that the Canadian communications market is only 8% of that in the U.S. Given the investment required for satellites—$100 million plus every seven years to launch a new satellite—Canadian carriers must be protected if they are to survive in such a small market.

Why does Canada need a domestic satellite? The nation has two problems in this regard. One is that Canada's northern territories can only be served by satellite, which was why the Canadian government decided to pursue domestic development. The other is the strong desire to maintain domestic expertise in this technology. The country already has a worldwide reputation in communications, and is not about to let it slide. The Canadians even poked at this, wondering "whose technology are we trying to protect? Hughes Aircraft builds the satellite and it's launched from Cape Canaveral."

Americans at the Montreal meeting were not silent, although they were delighted to sit back and listen to the honest debate among the Canadians and their positive reaction to the U.S.-Canadian dialog.

The Department of State's Morris Crawford, a spokesman for the U.S. on the subject, made it clear that the U.S.

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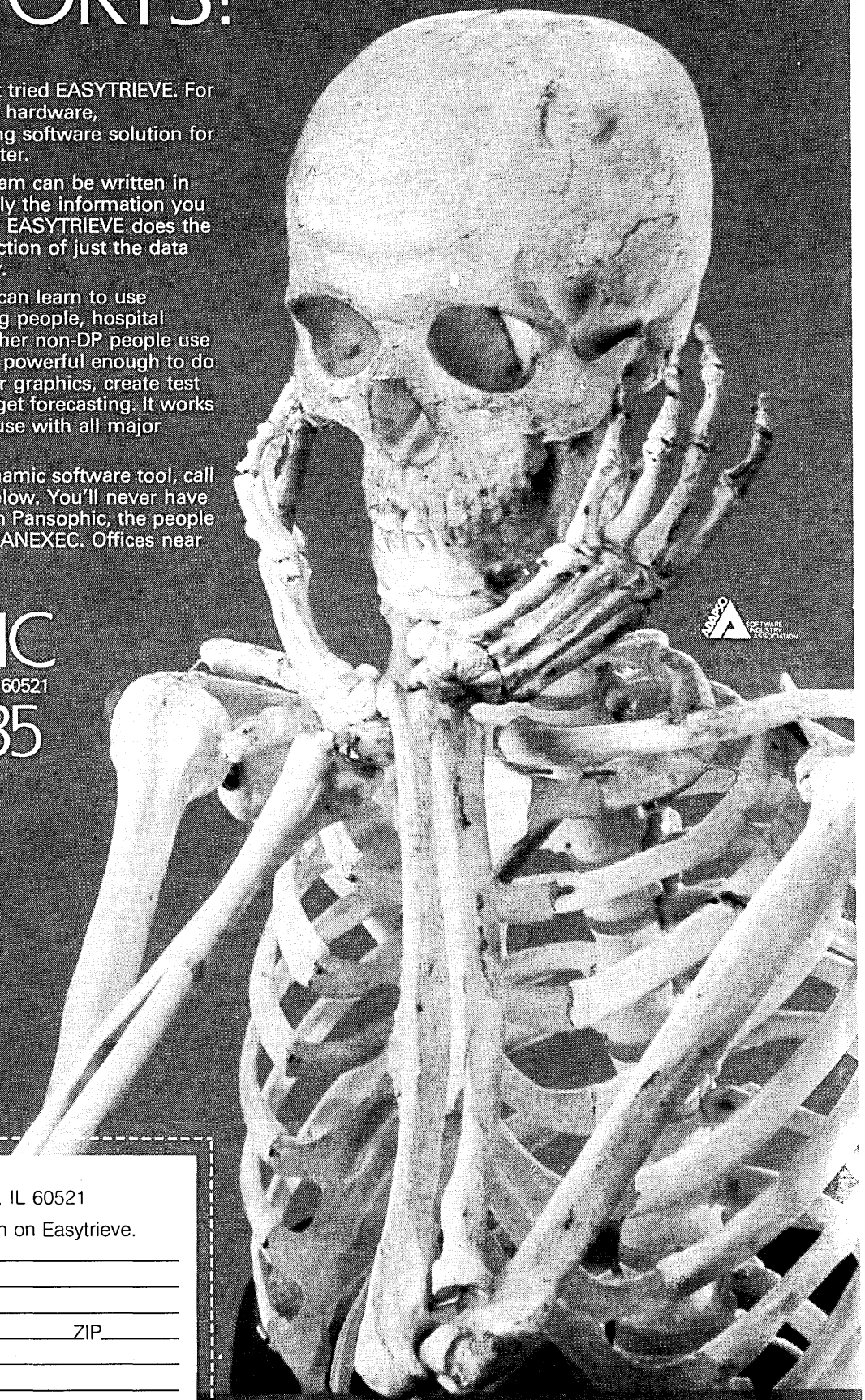

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NEWS IN PERSPECTIVE

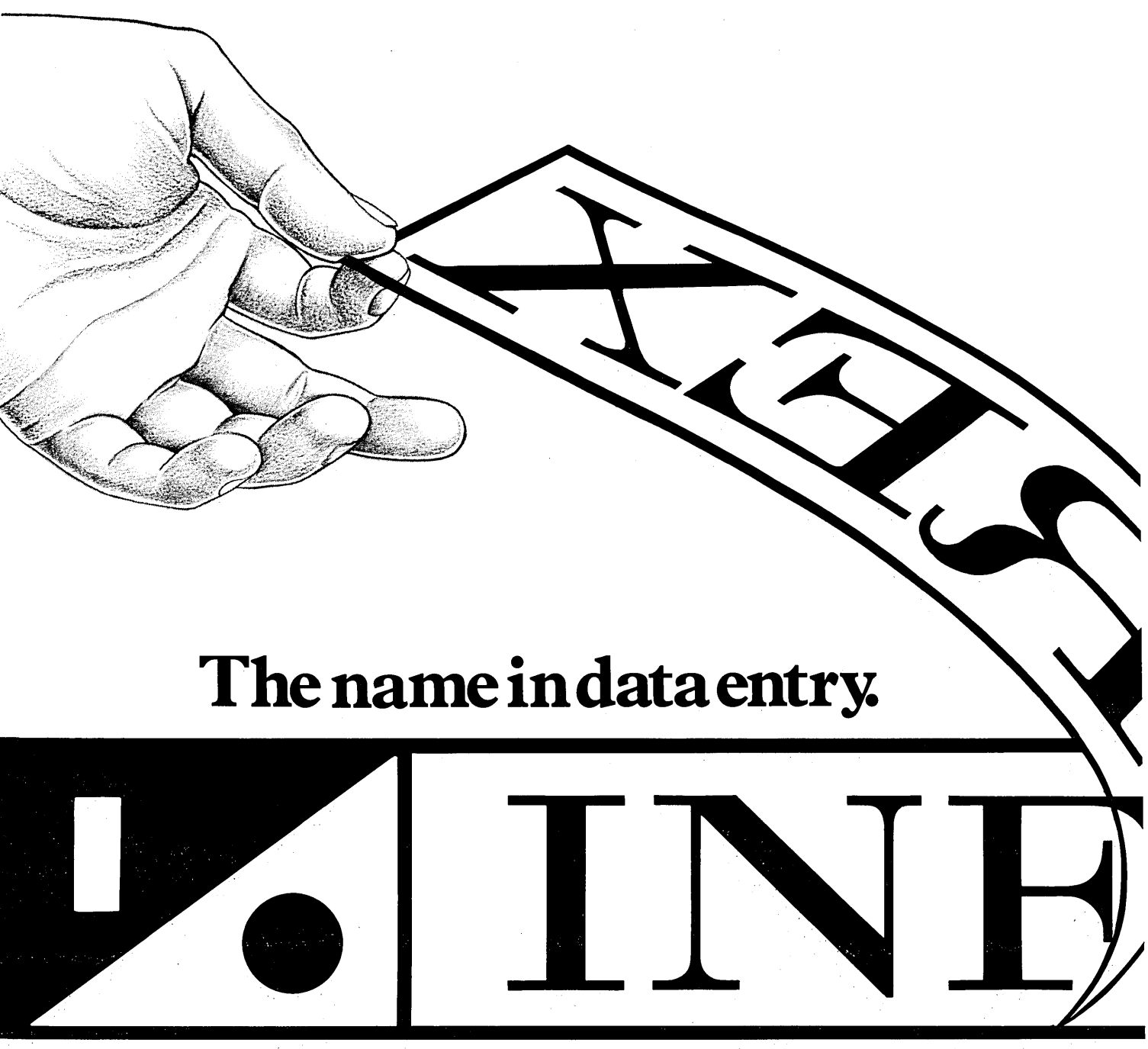
recognizes transborder data flow as a serious international issue. "There are many," he smiled, "who assert that the real problem is those who are asserting there is a problem—like John Eger, Brendan McShane, Oswald Ganley, and myself." (All are government or industry experts in this area.)

But Crawford is not for entering into international, legally binding agreements yet—by implication the Council of Europe's pending treaty: "Voluntary and nonbinding guidelines are essential today in particular, because of the uncertainty . . . as to what kind of social and economic problems are going to arise as this technology is exploited." Despite all the studies done in the U.S. to date on computers and communications, on electronic funds transfer, and on electronic mail, "We have not been able to arrive at a uniformly accepted conclusion regarding the social and economic consequences of the computerization of society . . . It is too soon to write in concrete, to write on the stone tablets the way society of the world will operate in the coming 50 or 100 years . . ."

Oswald Ganley, former Deputy Secretary of State in charge of the government tax force on transborder data flow, is now at Harvard Univ. doing a study on this issue and focusing on the U.S. and Canada. Out from under the yoke of government propriety, he felt free to applaud the attendees: "This is the first meeting where we have cast away the screen of privacy that has been hanging over these discussions during the last two years . . . We are frankly facing the facts that what we are really talking about are important economic and cultural questions . . . I was always uncomfortable when testifying, for instance, before congressional committees. I had to say, 'I have the suspicion' or 'We have a high index of suspicion that perhaps behind that privacy something else might be lurking' "

The Canadians indeed exposed many of the issues that are "lurking." Peter Robinson, in summarizing the discussion of the workshop, noted that "Transborder data flow is a compendium of interrelated issues, very few of which can merely be solved by legislation . . . What is needed, if anything is needed from government, is a tailor-made approach to dealing with the different issues involved . . . Canada—and the United States—need an information infrastructure which will emphasize the positive in moving impediments and looking at opportunities." Robinson added, "as an aside, I think I should emphasize that most of my working group were very much concerned about the government getting its cotton-picking fingers on anything."

—Angeline Pantages



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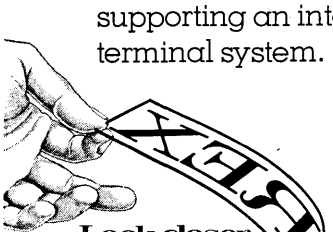

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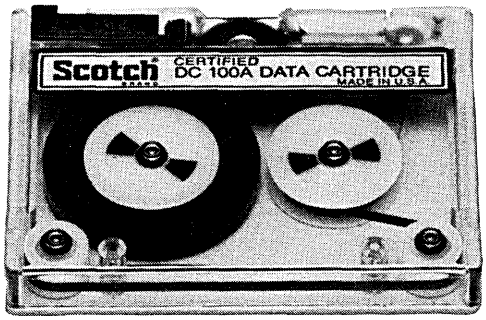

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BENCHMARKS

IBM SAYS NO: IBM, which in July said it was studying the possibility of establishing its General Business Group as a wholly owned subsidiary on a worldwide basis (August, p. 76), last month decided not to. The $5 billion GBG consists of the General Systems Div., the Office Products Div., the Information Records Div., General Technology Div., and the General Business Group/International Div. The July announcement of the study led some to think that IBM was moving toward a corporate structure similar to that of General Motors and AT&T. Speculation on the no-go decision was that the giant could have determined that establishment of GBG subsidiaries in 22 countries would be extremely complex or that there was opposition from within the General Systems Div. because of a reluctance to be more closely tied to Office Products, which it would be in a subsidiary.

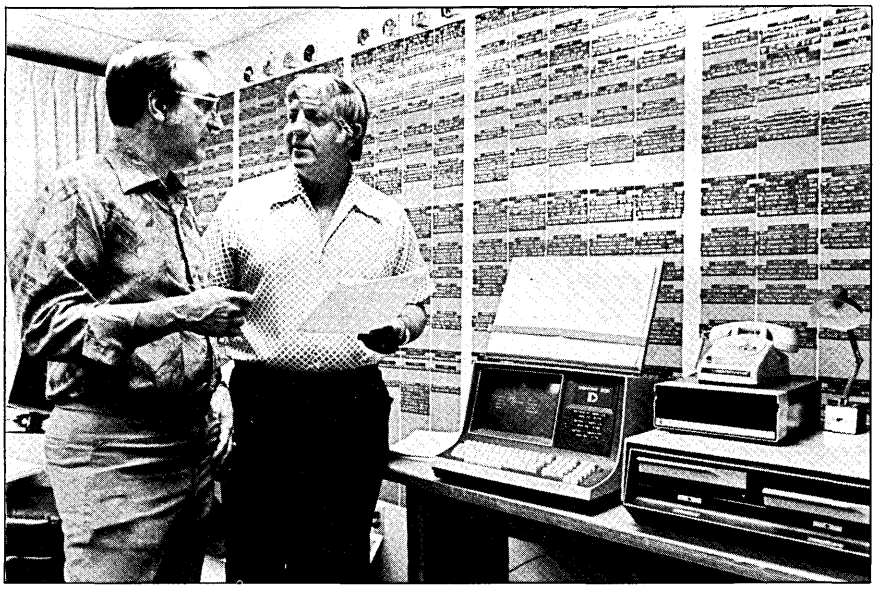
NEWEST IN COMPATIBLES: Nanodata Corp. of Williamsville, N.Y. has begun marketing systems at the 370/138 and 148 levels to end users and oem's. The systems, VMX-200 and 400 will be sold as full systems with small computer peripherals rather than as plug compatible cpu's aimed at replacing 370s, but both will be upgradable with 370 compatible I/O channels, the firm said. First deliveries are scheduled for late first or early second quarter of next year. Purchase prices range from $185,000 for a half-megabyte model 200, with peripherals configured for batch processing, to $500,000 for a two-megabyte Model 400 supporting multiuser time-sharing under VM/370.

TWO MORE FOR ITT: International Telephone & Telegraph Corp. is on its way to acquiring Qume Corp., Hayward, Calif. printer manufacturer, and Jacquard Systems, Santa Monica producer of intelligent terminal systems. ITT has agreed in principle to acquire Qume for $148 million in securities and is negotiating to acquire Jacquard for a reported $14 million. The two would bring ITT's total acquisitions for the year to four. North Electric Co., a former United Telecommunications Inc. unit which makes electronic switching equipment, and Boothe Courier Corp., a display terminal producer, were acquired earlier. ITT also has agreed to market personal computers manufactured by Apple Computer Inc. in overseas markets.

NEW THRUSTS FOR ITEL: Itel Corp. has established a Systems Development Div. and a software marketing unit within its Data Products Group. The new division grew out of a system development facility set up in Palo Alto earlier this year. This will be moved to a 100,000 sq. ft. facility under construction near San Diego. John Bock, vice president of systems development, said the division will work on "joint development projects" with Itel's three suppliers—National Semiconductor, Hitachi, and Siemens.

The new software unit has begun marketing a new interactive program development system through an agreement with SOFTLAB GmbH of Munich, Germany, which gives Itel exclusive worldwide marketing rights to the system outside of Eastern and Western Europe. Through an OEM agreement for Four Phase Systems, Inc. of Cupertino, Calif. to provide hardware, Itel will market the system, called Maestro, under its own name and will provide all sales and technical support. Four Phase Systems engineers will handle hardware installation and maintenance. James P. Gafke, president of the Computer Products Div., said the system integrates advanced hardware and software technology and helps programmers eliminate repetitive, time-consuming chores.

ROCKET POWER: Cincom Systems Inc. president Tom Nies called his company's newest software offering, Total Information Systems (TIS), the rocket power of the computer industry. Nies made the comparison on Cincom's 10th anniversary as a company, the occasion they chose to introduce TIS, a software system he described as "a redefinition of existing data organization employing a new concept: logical views." TIS is built around and is an extension of Cincom's Total, a data base management system. Nies said TIS allows data processing to look at data from the same perspective as that of the end user. It "not only identifies an organization's data items in terms of the end user, but also determines how to manage and store data so it might be obtained in the most efficient manner." And, he said, it is, in itself, a data dictionary. ✲



WHAT IF?—Eighteen NFL football clubs and a number of major college teams use a Datapoint 1500 computer to preprocess data from game films of the teams they'll play the following Saturday or Sunday. Computer printouts then will give them statistical information on what their opponent is likely to do in any given game situation, such as what the Chicago Bears, behind 3–7 against the Detroit Lions with a first down at Detroit's 25 yard line early in the third quarter, likely would do based on what they've usually done. Coaches will enter data on plays run during their opponents last three games on data input sheets while watching the game films on a Monday. As many as 200 separate plays could be entered on the 1500, then shipped over telephone line to an IBM 360/65 and Itel AS-5 system operated by Quanex Management Sciences in Detroit where the data is processed and returned within hours for on-site report preparation on the 1500's printer. In this way, coaches will have the necessary computerized information printouts to develop strategy for their next game as early as Tuesday morning. The programs were developed by Sports Data, Inc. of Los Angeles and are implemented on Quanex computers. (Photo is of Los Angeles Rams coach Ray Malavasi, right, and Joe Guardino, president of Sports Data.)

EUROPE MOVES TOWARD CONTROLLED DATA FLOW

How legislation to protect privacy rights could affect U.S. computer users.

by Angeline Pantages, International Editor

The multinational executive—corporate president, data processing head, legal counsel—who is just now trying to figure out what the transborder data flow issue is all about, must be reminded that a multination treaty is already in the works. *And it is moving into final draft status.*

The Council of Europe's draft convention on data protection will soon go up the ladder for approval, and by 1980 it will inexorably move out to its 20 member nations for ratification. The United States will have an opportunity to be a signatory, as will other nonmember countries, like Japan, Canada, and Australia. Whether the U.S. signs this treaty or not, it will be affected. And the multinational organization that operates in the signatory nations will be affected.

The convention will achieve a noble goal—establishing common rules among nations on the rights of the individual when an automated record on the individual is gathered, processed, and transmitted across borders. Signatories will have to cast these rights in legal concrete, and many countries already have laws passed or pending that do so. As an international accord, the treaty is also aimed at solving jurisdictional problems when data is gathered in one country and processed or stored in another.

In this sense, the convention will spell out some standards for the multinational. But the caveat is that it represents minimum rules. Each nation can expand the scope of protection and tailor compliance to its own legal system. In other words, the computer user will still have to spend enormous amounts of time figuring out the laws of each country, because the variations so far are great.

What is the convention? Two documents explain it: one is the latest available draft, developed last May but just now being analyzed by U.S. government experts and industry; the other is a written explanation of several points which was provided us by one of the chief architects of that convention, Frits Hondius, head of the Division of Public Law in the Legal Directorate of the Council of Europe in Strasbourg, France.

The first major point is that the convention is trying to walk a tightrope among the important issues involved: protection of the rights of the individual, preservation of the free flow of information, and recognition of the supremacy of national law and of variations in legal systems. The preamble states that the convention is concerned "not to place unjustified barriers in the way of the development of economic, commercial,

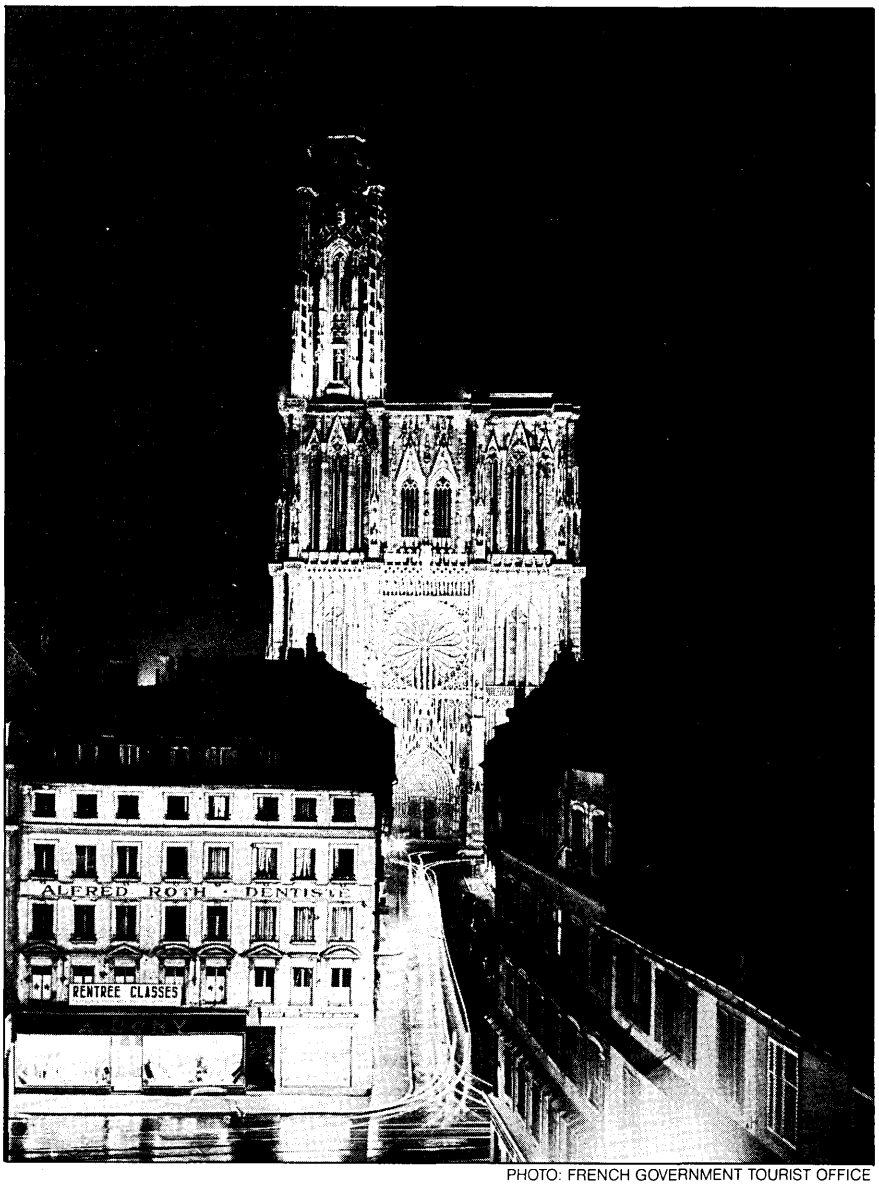


PHOTO: FRENCH GOVERNMENT TOURIST OFFICE

Located in the French region of Alsace on the left bank of the Rhine, at the confluence of the River Ill, Strasbourg has been an important political and cultural center since its formation as a Roman township in the first century. The ancient city is the home of the Council of Europe, whose efforts to develop common policy among its 20 member nations extend far beyond data protection. The Council is concerned with all spheres of public affairs, with the exception of national defense. Its mandate: "To uphold democracy, human rights, and the rule of law."

cultural and scientific links between nations . . ."

But balancing this stand is the following statement later in the draft: "Nothing in this convention shall prevent a Contracting State from requiring the licensing or registration of automated personal data records in its territory; from giving a wider measure of protection to the data subjects than is provided for in this convention."

The draft convention recognizes three specific points of departure among countries. First, as Hondius notes, "Not all countries will impose regulation on all types of computerized records." Signatories will be able to sign the convention in modules. That is, a country can agree to meet the treaty's requirements for specified regulated sectors only, such as banking or medical data.

Another major point is that countries, when signing the convention, can declare that they are extending their data protection to manual records and/or to groups of individuals, such as corporations and associations. Signatories can note, in ex-

U.S. POSITION: GUIDELINES VS. TREATY

Some sources in the U.S. think there's not a "hope in hell that the U.S. will sign the Council of Europe's treaty" on data protection.

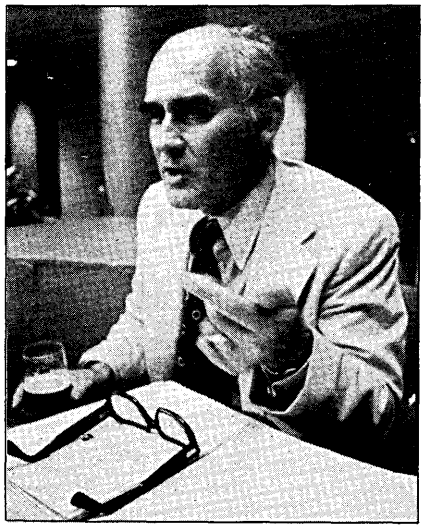
Said one, "You envision this treaty going up before Congress. The U.S. has not even had a hand in devising it. It has not yet established its own privacy policy domestically. It is not at all of the European mind that any omnibus law covering all personal data is necessary. And so far, although everyone believes that international cooperation is necessary, few are convinced that a treaty of legal obligations is the way to go."

The U.S. has committed itself to participating in the Organization for Economic Cooperation and Development (OECD) effort to devise guidelines for cooperation on the transborder data flow issue. While the Council of Europe concentrates on the main issue of protecting individual rights, the OECD is looking at the total economic, cultural, and social impact of regulating all kinds of data flow, not just personal data. And its charter is not to devise legal protection, but to establish voluntary cooperation.

Those guidelines, now in the drafting stage themselves, are not unlike some of the basic tenets of the treaty of the Council of Europe. Why would they not suffice? Frits Hondius, head of the Division of Public Law in the Council's Legal Directorate, points out succinctly, "A legally binding treaty is a necessity between countries where data protection laws are in force . . . in order to solve conflicts of jurisdiction." Six of those laws have been passed already in Europe, so in Hondius' view the time for guidelines has passed.

"Common guidelines are a useful first step for legal cooperation between states," he concedes. "This was the case with the Council of Europe's resolutions in 1973 and 1974 (setting forth principles on individual rights regarding automated records), and may well be the case with the OECD guidelines.

"A critical difference between a treaty and a guideline is that the former offers a much higher level of protection to data subjects . . . the whole *raison d'être* of data protection laws."



DR. FRITS HONDIUS: A treaty offers a much higher level of protection.

Hondius, chief spokesman for the Council of Europe on the issue, has been involved with the convention's development since work on basic principles began seven years ago. He and his colleagues from the 20 member nations have molded, changed, and refined it repeatedly in an effort to come up with a palatable, effective solution.

While Hondius' dedication and integrity are admired, his words on the high aim of the treaty have not always been met with applause around the world. Many fear that the intent and the words of the treaty could be perverted by nationalistically motivated nations that see privacy as a convenient mask for more nefarious motives—protectionism and data barriers. The Council often has been blamed for starting the whole data protection movement, and a great many people wish it would all go away.

Despite those wishes, the passage of national laws is gathering momentum, so the Council is undeterred by its opponents. But it is proving not to be insensitive to the objections and differing legal systems of such countries as the U.S. Its recent draft treaty indicates that. Hondius' comment summarizes the effort to accommodate: "We are aware that a convention having a wide geographical scope—which is desirable in view of the rapid growth of computer networks—should have a wide flexibility of implementation, as long as the basic objectives of a convention are achieved. Whether a country will have a single law, or a number of laws, whether it wants to institute a central authority or rely on several authorities, or on the courts, is up to that country."

In other words, the U.S. rifle-shot approach to privacy laws, taking one sector at a time and only where necessary, and its method of providing reciprocity through the courts, may suffice. This was not so in earlier conceptions of the convention.

Whether the Council's concessions will satisfy the U.S. Congress when the day of reckoning on the treaty comes is another matter. At that point the U.S. still may be embroiled in arguments over its own domestic policy and still be viewing international legal requirements as just one portion of the issue. It may be one of the noncontracting states.

Yet Hondius has the last word here too: "It is not in the spirit of our organization, let alone in its statutory powers, to erect barriers between the signers or cosigners of any of its conventions. Not all the member states of our organization are signatories to all conventions included or concluded in our framework.

"We also make sure that specific forms of cooperation existing in our family of states do not stand in the way of global cooperation."

It appears that the Council of Europe, at least the likes of Hondius, has not drawn a hard line of challenge between itself and the OECD and other international organizations. However one may judge it, the Council is doing what it feels it must. But it is leaving the door open for some voluntary cooperation between signatories and nonsignatories.

—A.P.

tending the scope, that it is "conditional on reciprocity."

The convention does not cover manual records or data on groups (often called "legal persons" although in this context, the group does not have to be a legal entity). But the drafters are trying to provide a mechanism for cooperation, since several nations include such information in their laws. Hondius indicates that the results are not yet in on the "legal persons" issue. "Whether a legal person should be able to claim the same protection as a natural data subject is a controversial question that needs careful study," he emphasizes.

All this is very significant for computer managers and planners. For instance, if a computer user in Country A, which protects all designated computerized records, wants to transmit data to Country B, which is a partial signatory and does not have a law protecting that data, the computer user has a reciprocity problem. He will either need special authorization or he will not be allowed to transmit that file.

When it comes to groups of individuals, some countries, such as Norway and Denmark, already have expanded protection to them. A company wishing to transmit, for example, customer or competitor information to a country not providing such protection, will again have to seek authorization.

Many nations probably will ease these problems of conflicting scope of law by agreeing to reciprocity, or some form of extradition, when one country's broader law is violated in another country. The corporation, for its internal data that is covered by law, may be permitted to transmit some or all that information *if it assumes some legal liability for it.* Some countries, like Germany, are already advising companies to draw up legal contracts that assure the individual that the data will be protected wherever it is kept. *(It appears that such contracts may become a standard prerequisite for the multinational.)*

What is the convention trying to protect? It addresses the kind of treatment of data, and moves to solve transnational jurisdictional problems.

Data types. A computer user is essentially prohibited from gathering sensitive data on an individual (philosophy, religion, politics, sexual habits, etc.) unless he is authorized by law or has the person's consent. In the case of all other personal data, purpose and relevance of the data must be specified. Many who read the original drafts feared that prohibitions could even be extended to such normal applications as reservations handling. Hondius puts that in perspective: "Airlines, ferryboat companies, or hotels may freely process the data at their disposal as long as this is necessary for their purposes. But an airline or hotel which reveals information about a private journey to their client's jealous spouse oversteps the boundary of what is harmless. I repeat: the criterion is the use of the data rather than the data itself."

The computer user will have to go to each national law and the body of interpretation (yet to be formed in most countries) to find out what relevance and purpose means. This is also the case on the rest of the draft's minimum rules: personal data must be obtained and disseminated by fair and lawful means, accurate and up to date, and "not preserved in name-linked form for a longer period than is required for the attainment of the purpose of the records."

Rights of the individual. In addition to requiring a person's consent for keeping sensitive data in an automated record, the convention says that an individual has the right to know a record exists on him and why. He also has the right to know who the "controller of the record" is and where he resides.

What is a "controller of the record," the computer user should ask. The convention precludes keeping an automated record of personal data unless a controller is designated—"the natural or legal person, public authority, body or agency who is empowered to decide what categories of personal information are to be stored and what processing operations are to be performed on them."

In Sweden, there is a government authority. In Germany, each company has to assign a responsible individual, or data administrator. (Were the U.S. a signatory, no doubt Germany's example would be followed, since current thinking here is toward multiple laws and voluntary compliance.)

The individual will be able to go to that controller to find out if such a record exists and to request any corrections. What remedy does he have if his rights are violated? Hondius points out that it is up to the individual nations, but "it has been proposed that as a minimum each country's law should make violations of data protection rules punishable as a criminal offense." Many laws in force already have imprisonment and fines as penalties.

What kind of security will the computer user have to provide? Hondius notes this is up to the laws of each nation. (Germany, for example, has already flexibly legislated that security and its costs should be commensurate with the importance and sensitivity of the data stored and transmitted.) The drafts of the treaty do state that the record should be protected against "accidental or willful loss or destruction as well as against unauthorized access, modification or release."

Rules on transborder data flow. Which law is supreme when data is gathered in one country and stored in another? Hondius states it simply: "The present tendency is to apply the law of the state of residence of the keeper of the record or his legal representative."

The convention tries to make it easy for entities to transmit among signatory states, saying signatories cannot make such transmission "conditional on special authorization." But, special authorization is needed when personal data is going from a signatory nation requiring such authorization to a signatory nation that does not have such a requirement. In other words, if the U.S. were not a signatory, a U.S.-based company couldn't avoid getting authorization to transmit data to the U.S. by routing its transmissions through a signatory country that doesn't require such authorization. Clear? Well, think of an American company trying to sell computer equipment to Russia, without getting government approval, by going through a third nation.

Liability. Some of the rules on transborder data flow indicate who is responsible for the records when data is moved around among nations. But what if a service bureau or a third party, in any country, does a company's processing? The Council of Europe "leaves it to its members to regulate liability," says Hondius. "In the national laws on data protection so far enacted, the main responsible party is the person or body who has created a record and who can decide what data are recorded and what operations are to be performed on those data."

The service company appears to be off the hook in that regard, but it too will have to abide by rules of security, which the convention generally covers but leaves to signatories to specify. (Some countries have further special requirements for service companies, such as permission to operate at all, as in Denmark.)

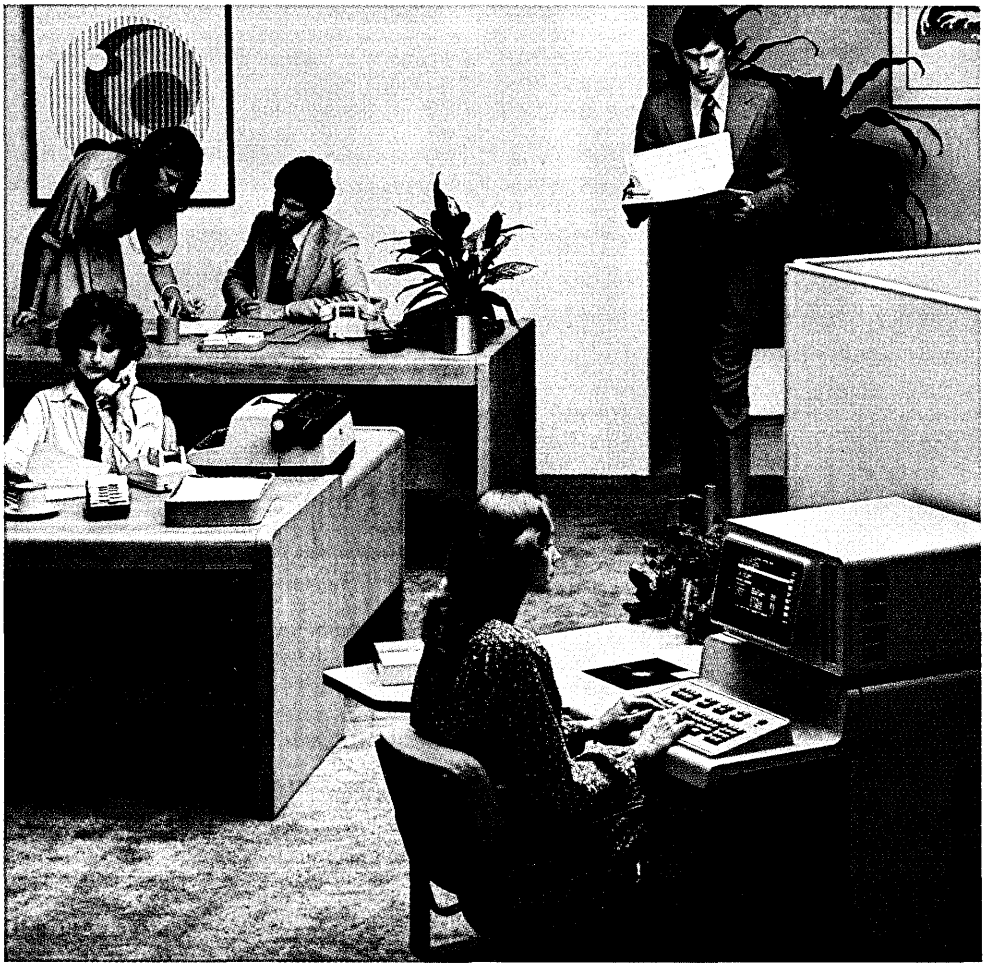
Where will the multinational data processor go to resolve conflicts? A nation, says Hondius, will have to "designate a public authority through which contacts to or from other countries can be channeled for purposes of the convention." The Council itself, according to the convention, will maintain a standing consultative committee "to improve the practical implementation of the convention and, if necessary, to amend or supplement its provisions."

But, notes Hondius, "I know of no intention to institute some sort of high international data tribunal" that might hear any complaints. The Council of Europe wants to discourage the erection of data barriers among nations. But its charter is not to stand as judge of those nations which choose to protect *more* than the treaty requires. ✲

What would you call a powerful business computer that takes no more space than a free-standing terminal, yet has data base management, a virtual memory operating system, up to one megabyte of main memory, and can support 16 terminals?

Extraordinary.

You've never seen so much power and versatility in a computer this size. The secret? An integrated display system (IDS), a built-in high density fixed disc, an easy-to-use multi-programming and multi-tasking operating system (AMIGO/300), and a powerful processing unit based on six proprietary HP silicon-on-sapphire (SOS) circuits.

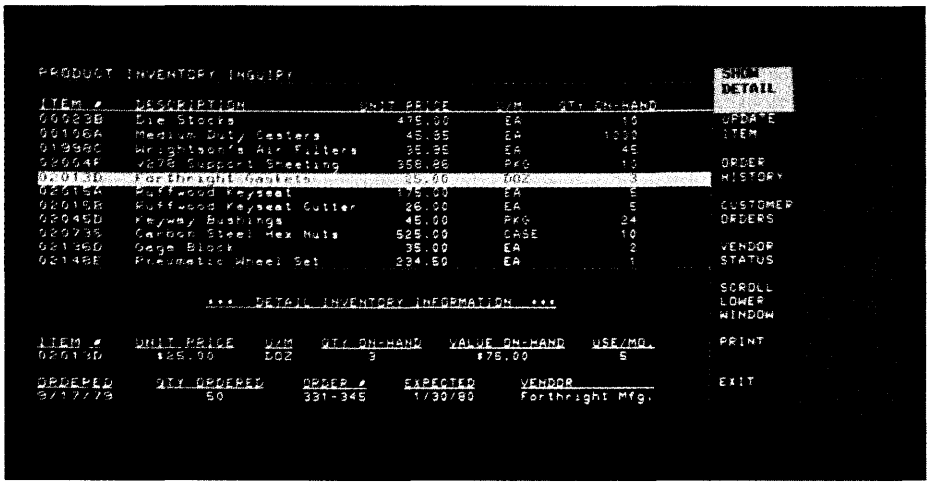


Looking at data through multiple 'windows.'

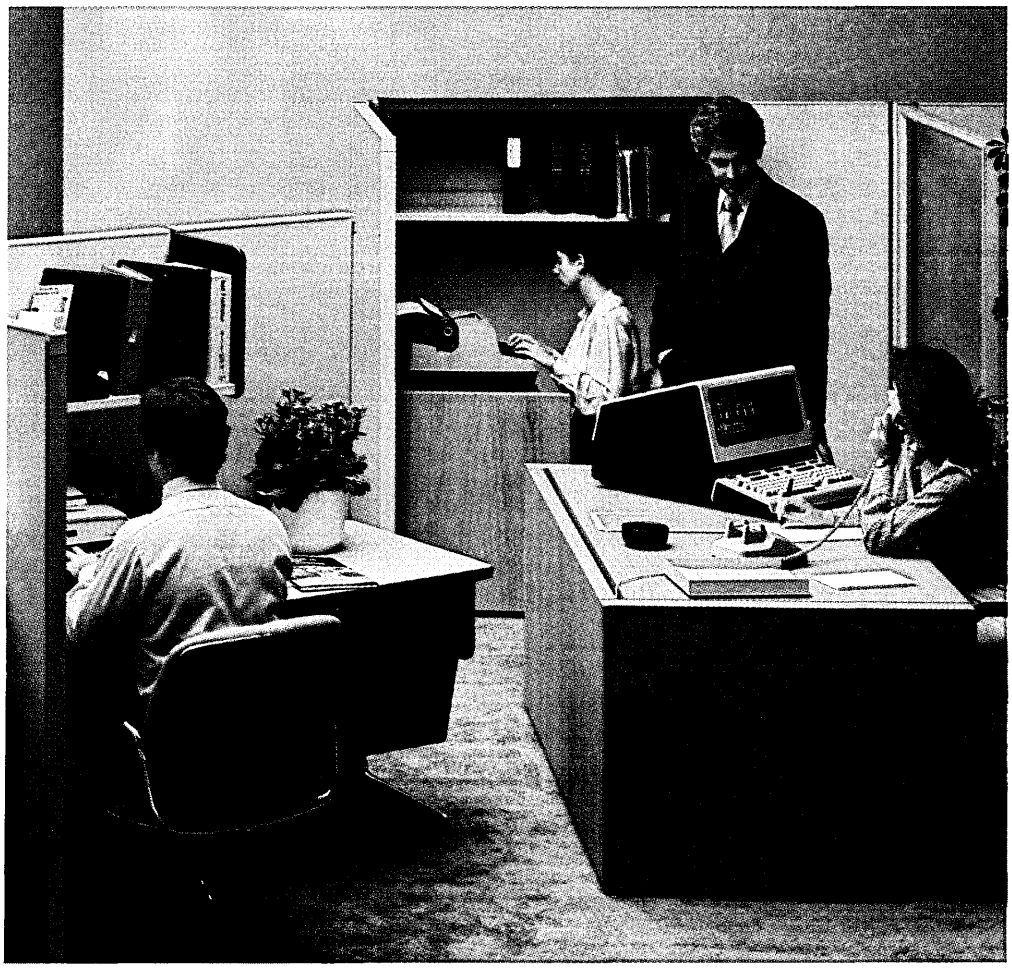
The screen can be split into several windows to display and control various aspects of one or more applications. You can also scroll each area horizontally or vertically—up to 160 columns wide and several thousand lines long.

One window can even be used to label eight 'soft keys' at the right of the screen. These lead the user step-by-step through each job.

The IDS is your window on thousands of transactions. In a large company, they might all be concerned with a single task, like order entry. In a smaller business they could cover the entire range of data processing, from displaying the latest sales figures to managing the inventory.



The HP 300.



Making it easier to distribute your processing.

The AMIGO/300 operating system was designed from the ground up to simplify writing and using dedicated on-line application programs. It supports two business languages—RPG II or Business BASIC. And six different file structures (including keyed sequential), IMAGE data base management, plus an English-like inquiry facility, all help to shorten program development time.

All this in a system that starts at $36,500, fits handsomely into any office environment, plugs right into a 10 amp 115 volt outlet, and is quieter than most office copiers. Impressed? Then a hands-on demonstration will really convince you that the HP 300 is a major step forward in business computers. Call your nearest HP sales office listed in the White Pages for a closer look. Or write to Hewlett-Packard, Attn. Bob Kadarauch, Dept. 434, 11000 Wolfe Road, Cupertino CA 95014.

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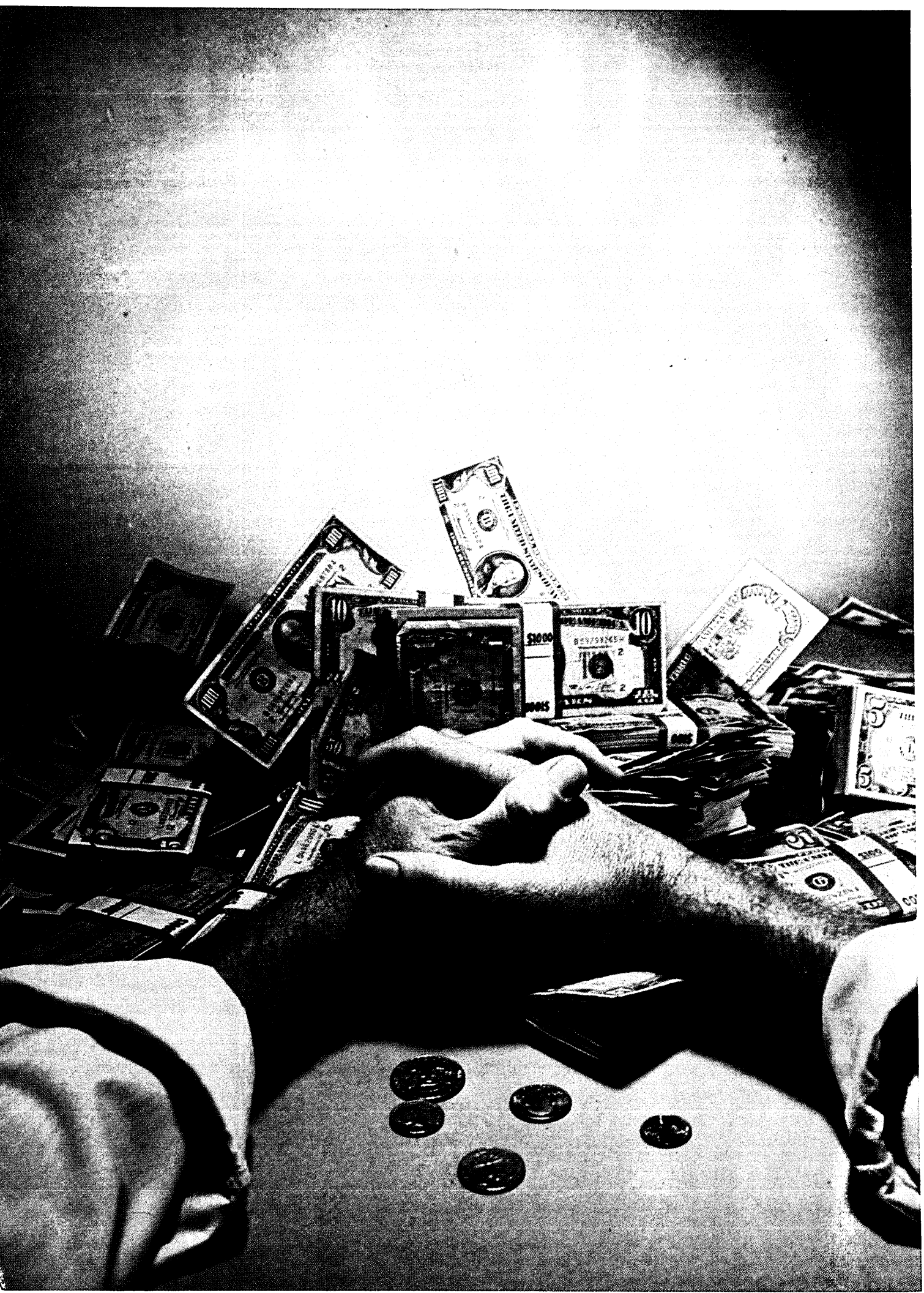
Prices are U.S. list.

CIRCLE 11 ON READER CARD



The degree of turnover is not surprising, nor are the wage increases earmarked for 1979. The big news is big growth for the whole industry.

DP SALARY SURVEY

by R.A. McLaughlin, Senior Editor, and Nancy Knottek, Assistant Editor

ANS, COBOL, IBM 360 EDOS, Teleprocessing. Due to expansion, established manufacturer has requirement for experienced programming personnel. Min. 1 yr. exper...

A GROWING consumer electronics company has challenging position for RPG II programmer...

COMPUTER OPERATOR For data input into our terminal. Computer experience desirable but not essential. We will train you if you have good typing skill and are interested in learning a high-pay job. Paid vacations, hospital, medical & life insurance, free parking. Salary open ...

FAST GROWING co. using a S370/148 with VM, CMS, DOS/VS OS/VS1, CICS is expanding & has opportunities for programmer/analysts...

PROGRAMMING Travel. Salary to $23K...

PROGRAMMER Analysts "We need you!"...

COMPUTER operator - Will train. Excellent company benefits. Salary open ...

The classifieds read the same in Los Angeles, New York City, or Oskaloosa, Alabama. Data processing personnel clearly are in demand. Salaries are "open," the ads say. And "experience" may mean one year—not much, but enough to land a job or to command higher pay. "In fact," says Sanford L. Fox, president of Fox-Morris Personnel Consultants, "it's not uncommon today for a top-notch entry-level B.S. graduate to be offered as much as $19,200 to start, although," he concedes, "The national average starting salary level is not that high, of course."

Dp managers are understandably perplexed. In some cases, employees are paid a bonus—actually a headhunter's fee—for bringing in a qualified programmer. "What's bad," says one aerospace manager, "is that you have to pay people with three or four year's experience just as much as people who have been working for you for nine or ten years." Where does that lead? To more head-hunting, higher turnover, and, so the logic goes, to higher salaries.

Inflation, increased competition for a limited resource, and growth combine to force salaries higher and higher. Is the situation exaggerated? Probably. But probably not much.

DATAMATION has just completed a survey of data processing salaries in the U.S. and Canada. Confidential information on salaries, expansion, and turnover was provided by 363 dp managers. Their part was not an easy one. Each had to compare his or her installation's job titles with ours, function by function, and then provide either the range of salaries covered by each title or the current annual pay, if only one person filled such a position at that site. That information was assembled into the tables which appear in this feature by workers here at the magazine factory.

A few stray values were discarded, but the data was not otherwise massaged. No regression analysis has been performed, no "smoothing" of the output to fit into predetermined job steps—as might be done if the intended audience were composed of salary administrators rather than dp professionals and managers. This has led to some anomalies, which have been left undisguised in the tables.

The data has been sliced by installation size, by industry, and by country. Those groupings were expected to have the greatest impact on salary figures. (Geography might also have been expected to play an important role—since people usually want more for working in a congested, high crime rate area, for example, than in a vacation spot—but the limited data could be stretched only so far. Job experience data for a given position, on the other hand, seems to mean less every year, and thus was not even collected.)

Installation size seems to have a significant impact. As installations grow, applications tend to become more sophisticated and jobs more specialized. This shows up, to some extent, in the averages.

Industry affiliation also makes a difference for some positions. Clearly, not all industries apply their computer resources in the same manner. Where online transactions are the order of the day, a programmer might demand more compensation than if maintaining the payroll system is his only task. Where we could find any consistency in the responses, those industries are listed separately.

We made an exception for one industry segment, the group consisting of computer manufacturers, service bureaus, and software vendors. Such busi-

The average raise exactly matched that for all white-collar workers.

nesses, we reflected, would not be typical in their assessment of dp skills. We hope they aren't, anyway. Their salary data is listed separately, and has *not* been included in the other averages.

The Canadians, whom we regularly regard as residing in states somewhere north of Montana and Michigan, were also studied separately, at least for a time. We wondered especially whether the difference between the Canadian and U.S. dollars would be reflected in pay rates. It doesn't seem to be, and thus the data for Ontario, British Columbia, and Quebec has been lumped in with that for Idaho, California, and Vermont, *and* listed separately as if it represented a different "industry."

Then there's the federal government. Jimmy Carter has decreed that raises for federal employees will be held to a noninflationary 5.5%. And many federal computer installations seem to go along with that. Still we found that pay rates vary from government installation to government installation, partly because the same job may be done by a GS 5 or 6 in one place and by a GS 7 or 8 in another. Even the monies set aside for next year's increases differ from one federal site to another, and Mr. Carter will either see some resistance in holding the 5.5% line or an awful lot of switching from one GS level to another.

NEXT YEAR'S RAISES Some employment agencies are claiming overall salary increases of 12%, even 20% for some categories of dp professionals in 1978. That seems to be an exaggeration. Our 360-some managers claim they actually gave raises averaging 7.90% for 1978, and that they expect to bump the numbers another 7.96% for 1979. And surprise! The Bureau of Labor Statistics recently announced that the average white-collar raise for the 12-month period ending March 1978 was 7.9%. Gosh darn. Once in awhile things work.

Installation size seems to make little difference in how raises were awarded to dp employees, but industry affiliation does. Here's the data:

Industry	1978 Raises	1979 Raises
Banking	9.5%	8.4%
Education	6.9%	6.7%
Fed. govt.	6.2%	6.8%
State/local govt.	6.2%	6.0%
Heavy mfg.	8.5%	8.4%
Light mfg.	8.4%	8.1%
Retail sales	8.5%	8.7%
Utilities	8.4%	8.4%
Dp vendors, etc.	11.5%	10.3%
Overall average	7.9%	8.0%

According to the average salary figures and the raise amounts, the places to be are with computer manufacturers, service bureaus, and software vendors—if you're good enough to land a job with them. Other conclusions don't come so readily. How are the security and fringe benefits of a government job traded off against the higher pay found in some parts of private industry, for instance? We'll leave that to the folks involved.

One other thing is clear about the wage increases, however: no one is doing much better than staying even with inflation. The consumer price index—which admittedly isn't the best measure of inflation but has the singular advantage of being available—marks the advance of inflation (or the decline of the dollar, whichever you prefer) as 7.4% for the 12-month period ending last June. Overall, those of us who aren't being promoted to new jobs are just breaking even.

What about that old bugaboo "turnover"? Did we finally get a fix on it? Not exactly. The problem is that dp managers in the bigger shops didn't always take the time to tell us how many of each category of programmer they employed, how many senior data entry operators and how many nonsenior. Thus we have no way of knowing how many dp employees our 363 sites account for, and cannot express turnover as a percentage of number employed. But that percentage isn't everything, and we do have some meaningful data.

We can account for a minimum of 1,388 persons *hired* at our 363 companies this year. Of that number, 855 or 62% could be counted as "turnover." That is, the firms fired or lost 855 persons and had to replace them. This means no fewer than 533 persons or 38% were hired because their employers needed more headcount than they had, because they were growing. That's an enormous increase in staff.

In corporate dp staff, systems analysis, applications programming, data base administration, and data communications/telecommunications, the number of persons added due to growth actually was greater than the number hired due to turnover. These are boom times, especially for the newer specialties like data base administration, or even corporate director of dp. These positions do not yet account for a great number of persons, but they are growing rapidly.

Some old myths can be put to rest too. One is the premature prediction of the death of keypunching and data entry, at least as part of the dp department's staff. Those managers reporting such data accounted for 187 data entry employees lost to them in 1978—and 224 hired.

Then there's word processing and its convergence with data processing. Only a half a dozen sites reported that wp personnel reported to dp managers. Those six firms are building up their word processing staffs a bit, adding 10 persons while losing 6 altogether, but numbers that small fall into the noise level for a sample of this size.

BY THE NUMBERS The rest of the story is told in the tables. Only a few items require any explanation. One is the series of entries labeled "Usual range." The managers providing data usually reported salaries as a range, say from "$12,000 to $14,000" per year. Sometimes, especially where only one employee is involved, the response was a single number, like "$15,237." The "Usual range" figures were compiled as averages of the lows and highs reported. The "Averages" reported were compiled from the midpoints of the individual ranges *plus* the single-value salaries reported.

This says two things about the numbers in the tables. First, more data was used to compile the "Averages" than went into the "Usual range" numbers. Second, and more important, *all of the numbers shown are the averages across installations, not the averages per employee.* Since we do not know how many employees in the "$12,000 to $14,000" range are paid $12,000 per year, how many $12,005, and so on, we can report only the average dollars paid per installation. (Most salary surveys are conducted this way, but the point is seldom discussed. Now that it's been brought up, it probably can be forgotten without great loss.)

Another point to note about the tables is that the installation sizes have been determined either by monthly hardware expenditures as reported to us, or by equivalent dollar amounts as determined by the computers installed.

Finally, remember that the overall averages are based on a larger sample size than any of the other information reported, and thus are more to be trusted, and that the industry breakouts are based on much smaller, though cohesive, samples. For purposes of candor more than anything else, the total number of sites reporting on any job position is the first data listed.

All salary surveys are of some value. We think those that don't massage the data before presenting it are more valuable than others. But all of them require careful analysis. Please read the directions before opening the bottle.

The Job Descriptions

CORPORATE STAFF

Corporate Director of Data Processing or MIS (Job #1)
Titles abound for this person. *The top executive over all computer processing.* May also have responsibility for functions such as office automation, information resources, and telecomunications. Is responsible for long range planning, budgeting, and operations.

Administrative Assistant (Job #2)
A member of the Corporate Director's staff. Directs the preparation and review of budgets and business plans. May negotiate contracts with vendors. Primarily concerned with money matters and sometimes with personnel administration. *Basically a business manager.*

Technical Assistant (Job #3)
A member of the Corporate Director's staff. Usually the head of advanced planning for the dp function. Assists in analyzing proposed and ongoing projects, and in conducting feasibility studies. *The top technical staff member in the dp function,* charged with keeping abreast of technical developments and determining how those developments apply to the company. Also is involved in major hardware and software acquisitions or conversions, in network design, and in considerations such as choosing between centralized and distributed configurations.

Services Coordinator/User Liaison (Job #4)
Less common at the corporate than department level (see below). *Coordinates dp activities with those of other functions or departments,* acts as the user's contact with dp, and assists in establishing standards and priorities.

DIVISION OR DEPARTMENT STAFF

Division or Department Director of DP or MIS (Job #5)

Administrative Assistant (Job #6)

Technical Assistant (Job #7)

Services Coordinator/User Liaison (Job #8)
These positions are *directly parallel to those above* for Corporate Staff, but their influence may be less and their responsibilities may be at least partially determined by decisions made by their corporate namesakes—especially in terms of standards, budgets, networking, etc.

"...Any other reason why you'd like to work in data processing other than the fact that you like air conditioning?"

SYSTEMS ANALYSIS

Manager of Systems Analysis (Job #9)
Responsible for the *analysis* of how dp can be applied to specific user problems, *and* for the *design* of effective and efficient dp solutions. Manages feasibility studies. Assigns personnel to projects and directs their activities.

This section is expected to produce designs or specifications for programs for use by other sections of the department, including especially Applications Programming, but may be involved in workflow and other analyses which do not lead to the production of programs.

Lead Systems Analyst (Job #10)
Assists in planning, organizing, and controlling the activities of the section. May also assist in scheduling and assigning personnel, or act as a project leader. *Usually is in semipermanent charge of a group* of analysts, and spends a significant amount of time directing their activities. May instruct lower classifications or design especially difficult or critical portions of systems.

Senior Systems Analyst (Job #11)
Broadly qualified to work on a variety of projects and fully competent to work alone. Confers with users to define data processing projects. Formulates statements of problems or objectives, and designs solutions. May produce block diagrams or pseudocode descriptions or applications systems, and may give some direction to lower classifications.

Systems Analyst (Job #12)
Fully qualified to work alone, requires only some general direction and instruction. Works with users to define projects or project segments, or to iron out details in specifications. *Usually works on only several types of projects; is not as broadly qualified as the Senior Systems Analyst.*

Systems Analyst Trainee (Job #13)
Usually works on one item at a time under direct supervision. May attend formal classes, and is expected to spend a good deal of time learning rather than producing. Usually has some dp experience.

APPLICATIONS PROGRAMMING

Manager of Applications Programming (Job #14)
Responsible for the development of effective, efficient, well documented *programs.* Assigns personnel to projects and directs their activities. This section may work from program specifications and designs prepared by Systems Analysis, for new projects, and is responsible for the

	Annual Averages			Average Salaries by Installation Size Determinec			
JOB TITLE	Number of sites reporting	Cumulative Averages Salaries	Usual range	to $5,000 Salaries	Usual range	to $12,000 Salaries	Usual range
Corporate Staff							
1. Corp. Director of DP/MIS	40	35,390	30,070-40,550	30,190	28,620-33,870	34,130	26,600-31,900 *
2. Administrative Assistant	10	23,040	18,240-24,040	—	—	16,830	18,200-22,100
3. Technical Assistant	8	26,400	21,390-29,020	—	—	—	—
4. Services Coordinator	5	24,080	18,640-27,560	—	—	20,000	16,000-24,000
Division or Department Staff							
5. Div. Director of DP/MIS	240	26,000	22,030-29,780	21,500	17,490-23,180	24,520	20,540-27,670
6. Administrative Assistant	21	18,850	16,730-23,160	15,940	13,850-19,970	17,200	16,210-23,490
7. Technical Assistant	20	23,650	20,380-27,730	19,820	15,760-23,870	21,190	14,630-27,750
8. Services Coordinator	14	19,190	16,640-23,160	14,740	13,890-18,750	16,950	13,400-20,500
Systems Analysis							
9. Manager	44	23,600	18,370-27,540	18,210	14,950-21,480	18,540	15,460-19,430
10. Lead	27	20,650	18,030-22,900	—	—	19,220	15,650-20,630
11. Senior	41	20,330	17,070-23,180	15,270	13,110-17,420	18,730	15,070-20,610
12. Analyst	50	18,340	15,880-20,890	17,910	16,280-20,680	16,530	15,100-18,830
13. Trainee	14	14,830	12,930-16,920	10,400	—	14,010	12,000-16,020
Applications Programming							
14. Manager	31	21,810	18,340-25,070	17,750	12,000-19,000	20,030	17,280-22,820
15. Lead	40	18,870	15,930-21,510	14,750	11,500-18,000	17,310	16,160-20,320
16. Senior	61	16,510	14,020-18,560	15,200	12,860-17,300	15,330	12,830-16,210
17. Programmer	109	13,850	12,050-16,210	13,380	11,360-15,700	13,270	11,700-15,260
18. Trainee	49	11,600	9,780-13,290	10,870	8,580-11,800	10,560	9,570-11,740
19. Team Librarian	10	11,960	10,260-13,920	—	—	—	—
Systems Analysis/ Programming							
20. Manager	87	24,580	20,500-28,550	21,650	15,310-22,100	23,180	19,010-25,350
21. Lead	71	20,100	18,630-25,030	17,250	14,260-21,120	19,590	17,740-22,620
22. Senior	85	20,020	17,170-22,940	19,040	16,220-21,850	19,190	16,390-21,520
23. Analyst/Programmer	119	16,410	14,110-19,000	15,060	13,310-17,170	15,630	13,850-18,120
24. Trainee	65	13,290	11,820-15,790	11,470	10,630-13,310	12,420	11,780-14,320
Operating Systems Programming							
25. Manager	51	24,410	20,440-28,620	—	—	19,250	18,000-22,000
26. Lead	26	22,290	18,790-26,740	10,000	—	—	—
27. Senior	35	20,480	17,010-23,590	—	—	17,800	14,100-21,500
28. Programmer	44	18,890	15,960-22,240	—	—	19,210	16,590-20,230
29. Trainee	14	14,530	12,100-17,570	16,000	15,000-17,000	—	—
30. Program Librarian	11	12,790	10,470-14,670	—	—	7,360	6,400-8,320
Data Base Administration							
31. Manager	14	24,020	21,140-28,200	—	—	—	—
32. DB Administrator	23	22,610	20,550-26,910	—	—	19,480	—
Data Communications/ Telecommo							
33. Manager	10	23,290	21,580-29,800	—	—	—	—
34. Analyst	8	23,450	20,490-26,820	—	—	—	—
35. Tech. Control Specialist	8	19,550	14,630-19,890	—	—	—	—
Computer Operations							
36. Manager of Computer Opns.	126	19,840	16,410-22,820	16,660	13,160-17,580	17,120	14,660-19,330
37. Manager of DP Operations	72	19,420	16,730-22,520	16,030	16,150-20,420	17,590	14,550-19,480
38. Lead	115	13,700	11,990-16,520	11,750	9,860-12,830	12,800	11,130-15,040
39. Senior	118	12,760	12,090-14,410	12,170	10,500-13,990	11,870	10,420-13,090
40. Operator	214	10,660	9,230-12,170	9,750	8,700-11,160	10,360	8,880-11,720
41. Trainee	51	9,650	8,410-10,990	8,210	7,850-10,020	9,770	8,590-10,960
42. Magnetic Media Librarian	30	10,640	8,730-12,230	—	—	9,100	8,580- 9,620
43. Postprocessing Clerk	18	9,380	7,700-10,280	12,250	5,500-7,000 *	9,960	8,640-11,280
Production Control							
44. Supervisor	59	15,950	13,450-18,420	16,780	13,950-19,130	11,440	9,600-13,280
45. Lead	54	12,390	10,750-14,050	10,830	9,950-12,590	11,250	9,330-12,110
46. Clerk	94	9,970	8,440-11,180	9,950	8,270-10,930	9,850	8,650-10,540
47. Trainee	9	9,060	7,980-10,670	12,350	10,140-14,560	—	—
Data Entry							
48. Supervisor	111	12,840	11,030-14,760	10,350	9,240-12,040	12,060	10,170-13,730
49. Lead	147	10,120	8,900-11,470	9,280	8,310-10,340	9,920	8,661-11,210
50. Operator	243	8,950	7,720-10,070	8,500	7,410- 9,640	8,920	7,680- 9,890
51. Trainee	35	7,680	6,830- 8,550	6,770	6,120- 7,410	6,430	5,920- 7,160
Other Positions							
52. Staff Consultant	13	15,620	12,260-18,730	—	—	10,560	8,790-12,320
53. Librarian	12	10,080	8,530-10,980	—	—	9,100	7,800-10,400
54. WP Supervisor	5	12,590	10,700-14,490	—	—	8,750	8,000- 9,500
55. WP Operator	6	8,760	7,090-10,440	8,500	7,000-10,000	7,550	6,660- 8,450

* In a few cases the number representing the "high" end of a range is smaller than that listed as the average. This is explained in the text.

JOB TITLE	to $25,000 Salaries	Usual range	to $50,000 Salaries	Usual range	to $150,000 Salaries	Usual range	over $150,000 Salaries	Usual range	Job
Corporate Staff									
1. Corp. Director of DP/MIS	27,500	23,990-32,270	36,360	28,970-41,310	36,960	29,900-45,230	45,110	44,940-53,500	1.
2. Administrative Assistant	—	—	26,850	19,410-26,150 *	25,420	19,680-26,920	14,510	13,040-15,980	2.
3. Technical Assistant	—	—	22,940	18,330-24,170	26,820	21,070-27,400	39,000	31,200-46,800	3.
4. Services Coordinator	—	—	22,250	18,880-25,620	—	—	27,950	20,800-35,000	4.
Division or Department Staff									
5. Div. Director of DP/MIS	27,410	23,720-31,770	28,950	24,200-33,080	32,220	25,010-36,280	39,390	31,990-41,840	5.
6. Administrative Assistant	17,030	15,250-22,850	20,360	17,620-23,100	22,280	18,460-25,280	15,400	13,630-17,870	6.
7. Technical Assistant	24,130	16,890-24,280	23,550	20,410-26,680	28,690	25,280-29,610	31,090	26,130-36,090	7.
8. Services Coordinator	21,350	16,700-26,000	21,520	17,960-25,070	21,250	19,000-23,500	—	—	8.
Systems Analysis									
9. Manager	22,230	20,020-26,360	22,700	19,380-26,010	26,480	22,430-30,900	29,010	24,320-33,700	9.
10. Lead	20,550	18,500-22,600	20,570	18,170-22,960	22,710	20,140-25,290	20,010	17,160-22,860	10.
11. Senior	19,870	16,910-21,460	21,390	18,420-24,830	21,100	17,630-24,450	21,480	17,050-25,910	11.
12. Analyst	18,430	16,130-20,720	18,390	16,280-20,900	19,580	15,900-22,340	20,180	16,620-23,740	12.
13. Trainee	18,220	16,580-20,000	12,250	11,000-13,500	15,700	13,340-18,050	12,770	10,670-14,880	13.
Applications Programming									
14. Manager	21,860	17,970-23,170	20,330	17,960-23,250	22,890	18,440-27,280	35,380	30,750-40,880	14.
15. Lead	18,950	14,660-19,450	18,230	16,270-20,200	21,090	17,390-24,790	26,780	19,760-33,800	15.
16. Senior	16,220	13,200-18,120	17,690	15,690-19,630	18,300	15,360-21,240	—	—	16.
17. Programmer	13,530	11,690-15,790	14,950	13,070-16,540	15,240	12,660-17,810	14,940	12,790-17,090	17.
18. Trainee	11,820	9,190-13,850	11,910	10,310-13,510	12,570	10,560-14,580	13,130	10,920-15,340	18.
19. Team Librarian	10,470	8,730-11,120	12,990	12,020-15,070	12,740	7,800-17,680	—	—	19.
Systems Analysis/ Programming									
20. Manager	21,980	17,910-24,840	24,950	20,350-29,350	28,180	23,870-32,450	31,590	28,170-38,580	20.
21. Lead	22,380	19,200-26,280	22,080	18,430-25,240	23,090	20,220-26,080	24,310	20,730-27,900	21.
22. Senior	19,450	16,530-21,710	20,060	17,030-23,080	20,950	17,660-24,070	22,660	21,180-28,180	22.
23. Analyst/Programmer	16,010	13,200-17,550	17,370	14,560-20,180	17,310	14,820-20,230	19,140	17,110-24,990	23.
24. Trainee	13,370	11,550-15,320	14,200	12,040-17,580	13,920	12,390-16,420	14,140	12,660-15,630	24.
Operating Systems Programming									
25. Manager	20,420	17,530-24,170	24,460	20,370-28,400	24,670	20,020-28,810	29,490	26,020-35,630	25.
26. Lead	21,500	17,140-22,200	21,300	16,820-26,700	21,880	18,130-25,640	28,780	24,320-33,250	26.
27. Senior	19,160	16,140-22,180	20,330	16,800-23,380	19,870	16,180-22,700	23,330	19,820-26,840	27.
28. Programmer	18,900	15,000-17,000 *	18,580	16,050-22,250	18,610	15,590-22,600	20,520	17,220-23,820	28.
29. Trainee	12,110	8,000-14,000	17,010	13,860-20,160	13,620	10,650-16,580	15,190	12,670-17,710	29.
30. Program Librarian	9,980	8,550-11,400	12,920	9,780-13,970	13,440	10,670-16,220	17,160	14,820-19,500	30.
Data Base Administration									
31. Manager	17,390	16,210-19,750	24,150	21,350-26,950	27,650	22,220-33,070	30,250	25,020-35,490	31.
32. DB Administrator	24,600	—	23,160	21,790-27,900	19,730	17,880-25,550	26,170	21,750-30,590	32.
Data Communications/ Telecommo									
33. Manager	18,670	17,840-19,500	23,080	19,490-26,420	24,470	19,100-29,840	24,790	30,980-43,390	33.
34. Analyst	—	—	24,290	20,490-26,280	22,200	19,800-26,810	24,080	21,880-28,440	34.
35. Tech. Control Specialist	12,200	10,400-14,000	21,870	17,960-24,340	19,650	11,600-17,390 *	—	—	35.
Computer Operations									
36. Manager of Computer Opns.	17,810	15,090-20,880	20,640	17,070-24,090	23,280	18,680-27,030	28,440	23,010-32,160	36.
37. Manager of DP Operations	18,670	16,460-20,150	18,630	15,300-21,040	22,050	18,300-26,300	26,640	26,250-36,550	37.
38. Lead	14,430	12,470-16,520	14,060	12,300-18,030	14,750	12,910-17,910	14,410	12,040-15,930	38.
39. Senior	13,010	11,010-14,090	12,880	15,710-14,810	13,650	11,530-15,560	13,020	11,240-14,800	39.
40. Operator	10,800	9,420-12,140	11,020	9,520-12,730	12,080	9,820-13,620	11,550	10,010-13,110	40.
41. Trainee	9,290	7,760- 9,610	9,250	8,280-11,260	10,590	8,690-11,740	10,220	9,090-11,350	41.
42. Magnetic Media Librarian	10,720	8,950-11,940	10,230	8,380-12,150	11,600	9,150-13,140	9,610	8,460-11,570	42.
43. Postprocessing Clerk	7,050	5,870- 8,230	9,630	9,010-11,850	10,250	8,420-11,880	6,750	6,500- 7,000	43.
Production Control									
44. Supervisor	14,390	11,800-15,730	15,330	12,932-18,094	16,990	14,210-19,810	20,390	18,170-24,060	44.
45. Lead	11,550	8,850-12,110	12,770	11,198-14,590	13,520	11,710-15,340	14,190	12,730-16,520	45.
46. Clerk	8,700	7,530- 9,870	10,160	8,355-11,726	10,670	9,050-12,510	12,230	10,480-13,170	46.
47. Trainee	—	—	8,130	6,450- 8,990	9,250	9,000-11,000	9,070	7,920-10,230	47.
Data Entry									
48. Supervisor	12,070	10,090-12,820	13,000	10,830-14,970	15,210	12,920-17,570	15,860	14,710-19,900	48.
49. Lead	10,200	8,940-11,270	10,450	8,950-11,850	11,540	9,870-13,220	10,530	9,690-12,220	49.
50. Operator	8,780	7,660- 9,920	8,820	7,590-10,220	10,010	8,050-11,060	10,150	8,950-11,350	50.
51. Trainee	7,800	7,100- 8,950	8,450	7,280- 9,180	8,770	7,680- 9,860	7,760	6,730- 8,780	51.
Other Positions									
52. Staff Consultant	15,270	13,980-19,600	11,650	9,540-13,770	22,060	16,460-27,660	22,000	—	52.
53. Librarian	9,450	8,750-11,370	10,100	8,290-10,170	10,240	8,900-11,580	14,000	—	53.
54. WP Supervisor	8,650	8,100- 9,200	15,460	13,160-17,760	15,360	12,420-18,300	14,750	11,800-17,700	54.
55. WP Operator	—	—	8,720	6,800-10,640	9,570	8,060-11,080	10,690	7,330-14,040	55.

Average Salaries by Industry

JOB TITLE	Average for Canada (11 sites)	Banking (17 sites)	Education (41 sites)	Federal govt. (17 sites)	State/ local govt. (27 sites)	Heavy mfg. (16 sites)	Light mfg. (26 sites)	Retail sales (10 sites)	Utilities (9 sites)	DP Vendors (22 sites)
Corporate Staff										
1. Corp. Director of DP/MIS	39,000	61,300	34,550	33,380	28,630	32,500	50,320	40,000	34,000	32,500
2. Administrative Assistant	25,250	24,000	18,100	25,000	22,720	—	—	35,000	14,510	—
3. Technical Assistant	21,880	—	19,250	25,000	—	—	29,220	28,000	—	—
4. Services Coordinator	—	—	28,000	25,000	19,490	—	—	—	—	—
Division or Department Staff										
5. Div. Director of DP/MIS	22,920	23,740	25,720	30,770	23,830	26,630	25,030	25,040	28,420	31,430
6. Administrative Assistant	—	27,000	12,900	16,250	23,380	—	25,850	—	20,190	—
7. Technical Assistant	—	18,500	21,730	23,750	21,900	—	24,490	—	25,000	23,400
8. Services Coordinator	16,500	—	16,610	15,000	24,140	—	27,300	—	—	27,300
Systems Analysis										
9. Manager	30,000	21,770	21,790	27,840	21,440	23,320	—	32,370	18,500	27,470
10. Lead	29,000	17,500	20,210	23,270	21,150	—	20,650	—	—	22,000
11. Senior	23,350	18,500	19,000	22,200	18,520	23,300	19,270	19,390	—	23,330
12. Analyst	19,650	—	15,500	22,210	18,060	21,000	17,500	18,950	—	16,080
13. Trainee	—	10,500	11,700	11,650	15,550	17,500	—	—	—	14,400
Applications Programming										
14. Manager	—	—	18,470	23,090	18,710	21,650	20,790	28,140	22,800	26,700
15. Lead	—	21,700	16,630	21,000	17,270	18,250	21,020	21,280	19,180	20,830
16. Senior	—	16,930	15,600	19,180	15,100	17,470	17,760	18,650	—	19,430
17. Programmer	16,200	13,670	13,040	16,380	13,140	14,480	14,700	15,660	12,600	12,970
18. Trainee	—	11,890	11,860	9,960	11,170	14,380	12,480	10,550	—	13,640
19. Team Librarian	—	—	12,580	14,000	—	—	—	—	—	—
Systems Analysis/Programming										
20. Manager	26,020	21,850	24,150	27,820	22,110	24,420	—	28,000	28,650	28,460
21. Lead	22,640	20,940	18,600	23,770	20,250	22,550	20,650	20,710	25,300	22,870
22. Senior	20,210	17,500	17,850	25,350	18,140	21,230	19,270	18,500	23,650	21,730
23. Analyst/Programmer	16,360	13,770	16,180	20,290	16,420	17,120	17,500	14,870	18,220	17,640
24. Trainee	12,780	12,040	12,000	12,290	15,210	15,290	—	13,250	14,370	10,200
Operating Systems Programming										
25. Manager	23,900	25,310	23,450	26,240	20,620	24,710	21,130	23,140	23,740	26,790
26. Lead	22,520	17,110	20,940	27,550	21,450	20,500	22,900	—	23,060	—
27. Senior	22,310	19,860	18,460	14,970	17,780	20,480	22,600	18,600	20,900	—
28. Programmer	16,420	15,630	14,480	17,780	18,400	13,380	18,780	18,750	17,940	17,200
29. Trainee	—	—	14,380	9,020	9,360	—	17,080	—	—	—
30. Program Librarian	9,150	—	12,010	16,510	10,670	—	—	7,360	9,150	—
Data Base Administration										
31. Manager	—	15,600	20,670	32,930	19,490	—	—	—	27,540	—
32. DB Administrator	17,520	—	22,000	24,350	21,750	26,640	19,880	—	22,640	—
Data Communications/Telecommo										
33. Manager	—	—	18,880	28,040	19,490	27,640	—	24,470	—	—
34. Analyst	18,840	—	18,430	24,810	21,880	—	—	—	17,680	—
35. Tech. Control Specialist	17,550	—	13,930	17,940	13,130	22,020	—	—	—	—
Computer Operations										
36. Manager of Computer Opns.	22,620	17,150	19,580	19,250	18,790	21,230	18,770	23,660	21,310	12,000
37. Manager of DP Operations	18,420	14,880	16,890	21,750	17,130	20,000	21,590	19,980	21,780	14,900
38. Lead	15,550	11,520	13,100	14,530	13,520	15,300	13,430	15,600	15,060	11,810
39. Senior	13,060	10,470	11,550	15,630	12,710	13,790	13,530	12,740	14,590	10,680
40. Operator	11,000	8,740	9,960	13,000	10,330	11,680	10,730	10,780	12,810	9,030
41. Trainee	10,000	7,190	7,500	10,550	10,450	—	10,280	8,850	16,000	6,760
42. Magnetic Media Librarian	12,390	9,000	9,890	10,200	10,370	10,360	—	8,120	—	—
43. Postprocessing Clerk	10,050	8,420	8,530	8,900	7,800	10,360	8,380	8,260	—	—
Production Control										
44. Supervisor	16,080	12,010	14,650	29,920	16,350	—	16,100	18,920	20,850	14,780
45. Lead	14,710	8,960	11,270	14,640	12,090	17,110	11,660	13,560	14,540	—
46. Clerk	11,190	7,380	9,830	11,630	9,470	11,820	9,080	9,590	11,650	10,200
47. Trainee	8,750	—	8,500	—	7,310	—	—	9,250	—	—
Data Entry										
48. Supervisor	13,670	11,300	11,320	12,050	12,140	12,600	13,390	13,650	16,080	12,540
49. Lead	10,830	8,410	8,740	10,620	9,330	9,630	9,460	10,530	13,560	8,740
50. Operator	9,940	7,520	8,720	10,540	8,140	9,500	9,060	8,360	9,220	8,770
51. Trainee	8,550	—	7,300	8,000	7,590	6,400	7,000	7,070	8,550	6,510
Other Positions										
52. Staff Consultant	—	11,050	17,480	—	12,580	—	9,200	—	—	30,840
53. Librarian	14,400	7,540	10,500	—	8,650	14,400	9,300	—	—	11,400
54. WP Supervisor	—	—	8,650	10,240	15,460	—	—	—	—	—
55. WP Operator	—	—	—	—	8,420	—	—	—	—	7,200

ongoing maintenance of existing programs.

Lead Applications Programmer
(Job #15)
Assists in planning, organizing, and controlling the activities of the section. May also assist in scheduling and assigning personnel. May act as a Chief Programmer on a programming team. *Usually is in semipermanent charge of a group* of programmers and spends a significant amount of time directing their activities. May instruct lower classifications, or program especially difficult or critical code.

Senior Applications Programmer
(Job #16)
Broadly qualified to work on a variety of applications and fully competent to work alone. Works with program designs or specifications which may be in block diagram or pseudocode form to produce working, debugged, and documented code; or works with specifications or descriptions of program changes to maintain existing programs. May give some direction to lower classifications.

Applications Programmer (Job #17)
Fully qualified to work alone, *requires only some general direction and instruction.* Usually works on only one or a few types of applications; is not as broadly qualified as the Senior Applications Programmer.

Applications Programmer Trainee
(Job #18)
Usually works on one item at a time under direct supervision. *Is learning to program.* Any work produced is carefully checked.

Programming Team Librarian
(Job #19)
Supports the activities of *a programming team* by keeping track of program revisions, enforcing documentation standards, and maintaining program listings. May track the testing of individual software modules, and may edit or produce program documentation and user manuals.

SYSTEMS ANALYSIS/PROGRAMMING

Manager of Systems Analysis/ Programming
(Job #20)

Lead Systems Analyst/Programmer
(Job #21)

Senior Systems Analyst/Programmer
(Job #22)

Systems Analyst/Programmer (Job #23)

Systems Analyst/Programmer Trainee
(Job #24)
These positions usually occur in installations which do not have separate Systems Analysis and Applications Programming groups. The empolyees *do both the analysis and programming jobs,* as described above.

OPERATING SYSTEMS PROGRAMMING

Manager of Systems Programming
(Job #25)
Plans and directs the activities of the section, assigns personnel to projects. Is *responsible* for supporting the operations staff as well as the programming and analysis staffs by *maintaining the operating system software environment* in which the others work. Within boundaries established by management, is responsible for selection, evaluation, installation, and maintenance of operating systems and utilities (often including teleprocessing monitors, access methods, etc.) Participates in projecting hardware and software requirements.

The staff also usually provides consulting services, recommends standards, monitors computer performance, performs hardware troubleshooting, and may coordinate the installation of new equipment.

Lead Systems Programmer (Job #26)
May function as an assistant manager. Assists in planning, organizing, and controlling the activities of the section. *May be in semipermanent charge of a small group* of systems programmers, and spend some time directing their activities. May act as a project leader in implementing or converting major systems, as in converting to a new operation system.

Senior Systems Programmer (Job #27)
Competent to work at the highest levels of programming. Depending on the size of the staff, may specialize in the support, maintenance, and use of one or more major operating systems components or subsystems, such as a time-sharing monitor or several access methods. May also design and program specialized utilities or be in charge of a function such as maintaining on-line system logs and defining cost allocation algorithms. May specialize in computer performance monitoring.

Systems Programmer (Job #28)
Fully competent to work alone, may specialize in the support of one or a few operating system components or subsystems, such as a compiler. Is capable of developing or modifying utilities, or installing changes to the operating system.

"I'm Thelma Brunkhauser of Dataexchange, Inc., Milwaukee, Wisconsin. I'm here to share my knowledge of Government mass storage usage, to learn more about information exchange between federal agencies and to tie one on at the annual conference cocktail party."

Systems Programmer "Trainee" (Job #29)
Not a trainee in the usual sense, has a good background in dp and knows or is learning assembler language. May have had operations or programming experience.

Program Librarian (Job #30)
Responsible for maintaining the on-line and off-line libraries of production programs in source and object form. The libraries may include math, scientific, statistical or other programs, depending on the nature of the work performed by the organization. Also responsible for the production of documentation for those library programs, although the writing, editing, printing, and filing of that documentation may be done by others with this person's concurrence.

DATA BASE ADMINISTRATION

Manager of Data Base Administration (Job #31)
Since the DBA function is still relatively new, and often performed by one person, *the Manager position is uncommon.* When it does appear, the manager has all the usual functions of planning, organizing, and scheduling the activities of the section, including assigning personnel to projects or functions.

Data Base Administrator (Job #32)
Analyzes the company's computerized information requirements, *coordinates* the *data collection and storage* needs of all users, organizes the data, chooses file organizations for shared data, creates data dictionaries, establishes standards for the use of data, and ensures data integrity and security. May provide guidance in the use of data base management systems.

DATA COMMUNICATIONS/ TELECOMMUNICATIONS

Data Communications/ Telecommunications Manager (Job #33)
Responsible for the design of data communications networks and for the installation and *operation of data links.* The section usually works in conjunction with others to evaluate and select communications processors, data transmission protocols, and standards for network operation—including encryption. The section may also be responsible for non-data links, including those for facsimile, message store and forward, voice lines, and office automation.

Job Families

The job descriptions have been grouped into a number of families, ranging from Manager to Trainee. The classifications have the general qualifying characteristics listed below. Please note that *for a one-person department, neither the Manager category nor Lead applies.*

Manager Usually in full charge of all activities of a section or department. May personally supervise the operations of his staff or direct the operation through subordinates.

Lead May be a shift leader, section head, or group head. Often a line supervisor with full technical knowledge with added duties of assigning, instructing, and checking other members.

Senior A person fully qualified to work at the highest technical level of all phases of the activity. Works without supervision most of the time. May give some direction to lower classifications.

Member Usually the most populous of the categories, whether programmer, analyst, or operator. Works under general supervision, but is competent to work alone on some or many phases of the operation. Requires only general direction or instruction for the other phases.

Trainee An employee who has no previous experience in doing these tasks.

Data Communications Analyst (Job #34)
Specializes in network design, traffic analysis, and data communications software. Performs simulation and modeling tasks, defines standard block sizes and message formats, and works with persons in other departments on the evaluation and selection of communications processors, telecommunications access methods and protocols, and in specifying data communications links and network operating standards.

Technical Control Specialist (Job #35)
Primarily concerned with hardware selection, operation, and maintenance. Arranges for the installation of modems, multiplexors, and switches and often works directly with the communications carrier in diagnosing problems with the communications facility. Performs diagnostics on in-house equipment and lines and arranges for service as required.

COMPUTER OPERATIONS

Manager of Computer Operations (Job #36)
Responsible for the operation of the computers, including the scheduling of their operation, assignment of operators, and the monitoring of operations efficiency. Also responsible for scheduling preventive maintenance, calling for emergency maintenance, balancing the workload between available machines or facilities, training the operators, and responding to changes in priority. May also be responsible for the operation of remote sites.

Manager of Data Processing Operations (Job #37)
This is a *less common position.* This manager is in charge of Computer Operations, Data Entry, Production Control, and Post Processing, but is *not* in charge of Systems Analysis or Applications Programming. May be in charge of (Operating) Systems Programming.

Lead Computer Operator (Job #38)
May be responsible for the operation of large scale computers for the duration of *an eight-hour shift,* for the operation of a remote computer site, or for the operation of one computer system at a multisystem site. Assists in scheduling the operations, assigning personnel, and coordinating the activities of the operations group.

Senior Computer Operator (Job #39)
May be responsible for all operations on a medium scale computer, or for console operation of a large machine. In the latter case, will direct the activities of other operators working on the system. May maintain performance and production logs, call for reruns, log problems, and inform management of system failures.

Computer Operator (Job #40)
Assists in running the computers and may operate the central console of a large scale machine in the absence of the Senior Operator. Functions usually include mounting and dismounting magnetic media, adding or removing paper from the printers, working with production controls and scheduling staff, and assisting in monitoring and logging functions. Is also capable of running a remote job entry terminal or a small scale computer.

Computer Operator Trainee (Job #41)
Not qualified to work alone in operating a computer. Usually assigned to mounting magnetic media, loading printers, or working on a peripheral subsystem, always under direct supervision.

Magnetic Media Librarian (Job #42)
Maintains the library of magnetic tapes,

disks, and/or cartridges. Catalogs them, racks them, pulls them on request for operations use, maintains charge-out records, schedules and performs media cleaning and inspection.

Post-Processing Clerk (Job #43)
Operates forms bursting, decollating, and binding equipment. May deal with microfilm and microfiche output as well as with printed output.

PRODUCTION CONTROL

Production Control Supervisor (Job #44)
Responsible for setting up and scheduling jobs for processing, including making certain that the correct generation of a file is used, that the correct job control commands are used, that jobs are processed in the correct sequence, and that the processing was performed without error. Usually this function is performed for all jobs in batch environments, and for regularly scheduled production jobs in on-line environments. The supervisor is responsible for assigning personnel to tasks, scheduling and instructing them.

Lead Production Control Clerk (Job #45)
This person may be responsible for the data control function for the duration of one eight-hour shift, or for the data control function of a single site in a multisite organization. *Usually is in semipermanent charge of a group* of clerks and spends some time in directing their activities.

Production Control Clerk (Job #46)
Prepares jobs for processing, attaches or enters the appropriate job commands, and *gathers the output for routing* to the appropriate department. May also log the receipt, processing, and delivery of output from the job.

Production Control Trainee (Job #47)
Learning the production control function, and works under direct supervision. The work is carefully checked by a higher level data control staff member.

DATA ENTRY

Data Entry Supervisor (Job #48)
Responsible for a staff which performs data entry and verification functions. The data entry may be centralized or performed at multiple sites, and may employ keypunch, terminal, ocr, or other hardware. The Supervisor is responsible for scheduling work, assigning work to operators, maintaining logs, training operators, and ensuring efficient, accurate operation.

Lead Data Entry Operator (Job #49)
May be responsible for data entry during an *eight-hour shift,* or may be responsible for data entry at one site in a multisite environment. Assists in assigning work to operators, in maintaining logs, and in training.

Data Entry Operator (Job #50)
Qualified to operate one or more data entry devices, *requires only general supervision,* and may assist in training new operators.

Data Entry Operator Trainee (Job #51)
Has not yet become fully qualified to operate one type of data entry device.

OTHER POSITIONS

Staff Consultant/Trainer (Job #52)
Sometimes found in the (Operating) Systems Programming group, may report to the Director instead. Thoroughly knowledgeable in broad aspects of dp. *Provides guidance to users.* Helps in debugging and in understanding system messages. Acts as technical liaison for individual users outside the dp department. Also teaches the use of languages and systems, and provides aid in conversions. May specialize in scientific processing, commercial processing, or narrower fields depending on organization site.

Librarian (Job #53)
Responsible for the library of technical documentation, including manuals used by programmers, operators, and equipment specifiers. Maintains manuals, usually releases updates to holders of manuals, and acquires documentation from equipment and software suppliers on request.

Word Processing Supervisor (Job #54)
Responsible for a staff which operates word processing equipment. That equipment may consist of intelligent typewriters, multistation word processing systems, or terminals connected to a general purpose computer. The Supervisor is responsible for the efficient and accurate operation of that equipment, for scheduling jobs, for assigning work to operators, for operator training, and for maintaining logs. Usually will understand the programming of that equipment, and may be involved in the evaluation and selection of the hardware and software.

Word Processing Operator (Job #55)
Qualified to operate either intelligent typewriters, word processing system work stations, or terminals for text-editing/word processing. Is familiar with the command language of the equipment and *works under only general supervision.* ✲

"Let's try it again: two plain, three cream, four sugar, two cream and sugar. Eleven ham on rye: two no mustard, three no mayonnaise, two no mustard or mayonnaise, one no butter, three extra mustard."

Salary is important, but don't overlook fringe benefits and social reference groups. A supervisor can have considerable impact on an employee's perception and evaluation of equity by identifying appropriate reference groups for employees.

COMPENSATION PREFERENCES OF DP PROFESSIONALS

by J. Daniel Couger and Robert A. Zawacki

One of the most closely scrutinized articles in DATAMATION each year is the salary survey. Both managers and the folks in the trenches are very interested in what others are being paid, and for good reason. If you carefully checked the average salary figures in the preceding feature, consider yourself quite normal.

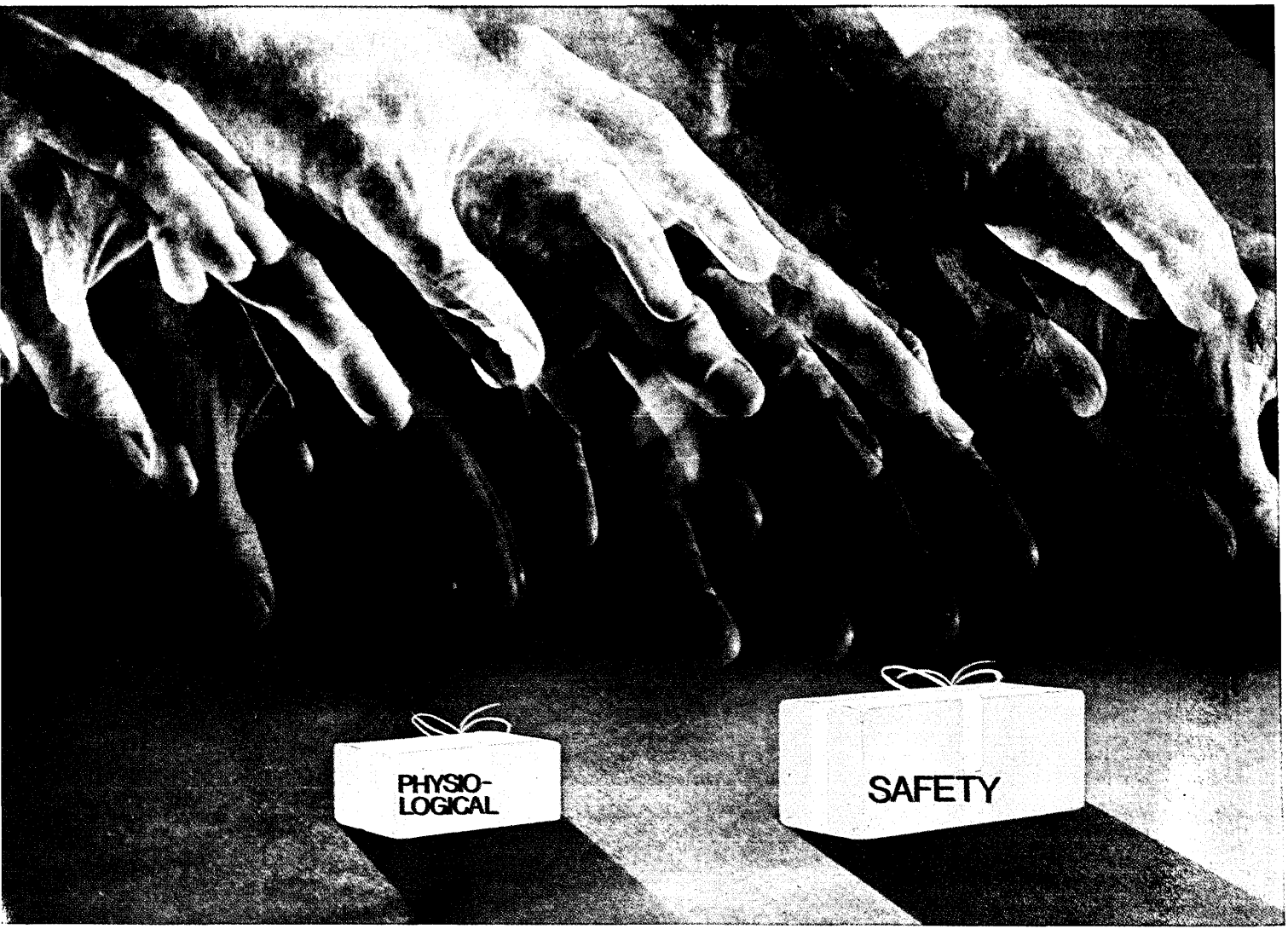
Still, how important is one's salary in the total scheme of things? Even to you? It's easy to be glib, and say "the paycheck is where it's all at," but that isn't true. Probably not even to you, as we can demonstrate.

In his article in the September issue (p. 125), Jac Fitz-enz reported that salary ranked tenth in importance in his survey of what really motivates dp employees. Fitz-enz compared his results with those for employees in other fields as reported by Frederick Herzberg, one of the big names in behavioral science; Herzberg found salary ranking ninth. Both men found other rewards, including achievement and personal growth to be more important.

Even in terms of compensation, base salary isn't all-important. How does it compare with, say, a retirement plan or hospital/medical plan?

And is it true that younger dp professionals place more emphasis on salary than on fringe benefits while older ones value the perks more highly? Well, no, as a matter of fact, that isn't true either.

The survey we reported on in the September issue ("What Motivates DP Professionals?" p. 116) also provides good data on how dp professionals want



to be compensated—data which managers can use to make jobs more attractive, and which employees can use to better evaluate how well their employers are doing by them. We'll share that data here, but it may be more meaningful to you if you'll first answer the survey question in the box on page 98. (Managers might fill in how they think their employees would respond, as well as answering for themselves.)

Supervisors, managers, employees, union leaders, and academicians have long debated the importance of money as a motivator, and the relationship between pay and productivity. Recently comedian Jackie Mason showed them all how the argument could be simplified:

"Some people think the most important thing in life is money. It's not true. Love is the most important thing in life. Personally, I'm very fortunate because I love money."

Most people didn't answer the survey question that way. We found that the average respondent wanted only 76.8% of his compensation as salary; but as shown in Fig. 1, there is quite a range of preferences. Fig. 2 shows the preferred allocations for each compensation category.

Are these responses typical? They should be, given the sample size and randomness. More than 700 dp professionals from 25 government and industry organizations participated. Industries covered include food processing, airlines, electronics, retailing, banking, insurance, and mail order sales. Government sites include city, state, and federal operations. Participants came from systems and programming groups ranging in size from five to 80 persons.

Table 1 profiles the participants. The average respondent was found to be married, 29 years of age, degreed, and to have worked 3½ years with his or her present employer.

THE SURVEY RESULTS

Here's how the individual compensation categories came out:

Base pay. The surprising outcome of the survey was the lack of correlation between compensation categories and employee characteristics. We expected, for example, that base pay amount would be negatively correlated with age—that is, the younger you are, the more you desire in salary and less in fringe benefits. The survey response was just the opposite:

Age	Base pay preference
20-29	72.9%
30-39	74.3%
40-49	74.9%
50-59	76.8%
Over 59	83.4%

Amount desired in base pay had insignificant correlation with level of education, nor was it correlated with sex or with job title (analyst, programmer/analyst, or programmer), or by industry.

Marital status was the only other category that correlated with base pay amount. The mean for married persons was about 3% higher (75.2% compared to 72.3%). But we feel our use of marital status was an error in survey design; in-

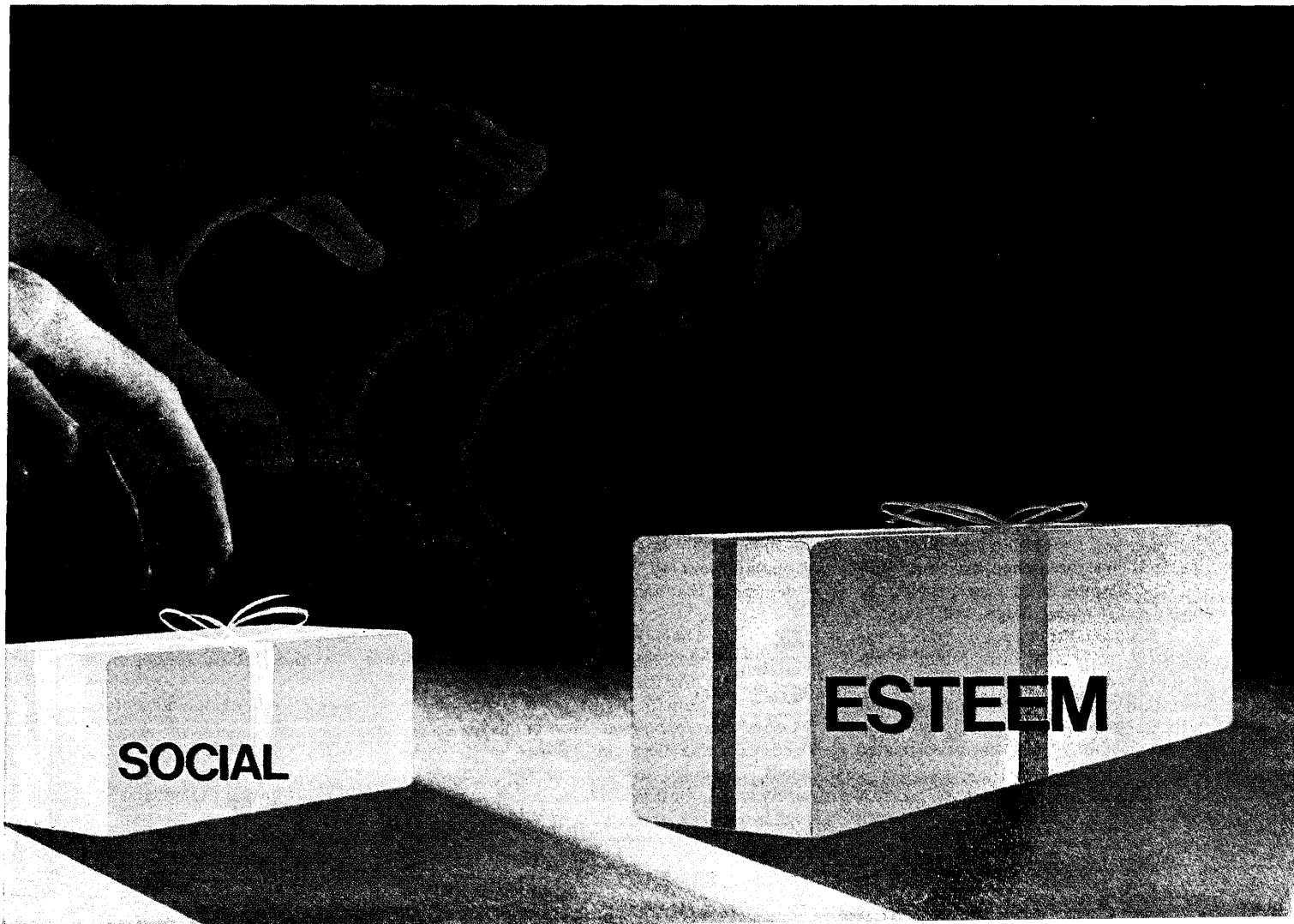


PHOTO: ©HOLLY AHLBERG 1978
ILLUSTRATION: TIM ALT

stead, we should have asked about the number of dependents.

Retirement. As might be expected, age is positively correlated with preference for retirement compensation. Preference for retirement compensation is even more highly correlated with "number of years with present employer," but is negatively correlated with education. Apparently, the more education you have the less you feel dependent on retirement benefits.

Hospitalization. Age is *negatively* correlated with preference for hospitalization compensation—another surprise for us. Perhaps younger people with lower salaries and more dependents feel more susceptible to large medical expenses.

Dental care. As with hospitalization, dental care was negatively correlated with age. Responses were also inversely related to education. In fact, the negative correlation with education was twice as high as that for hospitalization. It would appear that with higher education (and hence probably higher income) one feels less threatened by dental bills than by hospital bills. Few people ever have a catastrophic dental bill!

Tuition. Preference for tuition was negatively correlated with amount of education. It might be that persons with advanced degrees expect to spend less time in formal academic programs. As we expected, tuition is negatively correlated with age.

Travel and professional society dues. Little correlation existed between the preference for travel reimbursement and other compensation categories—except one. There was a significant tie to professional dues. People who prefer membership in a professional society probably want to attend the national meetings of that society.

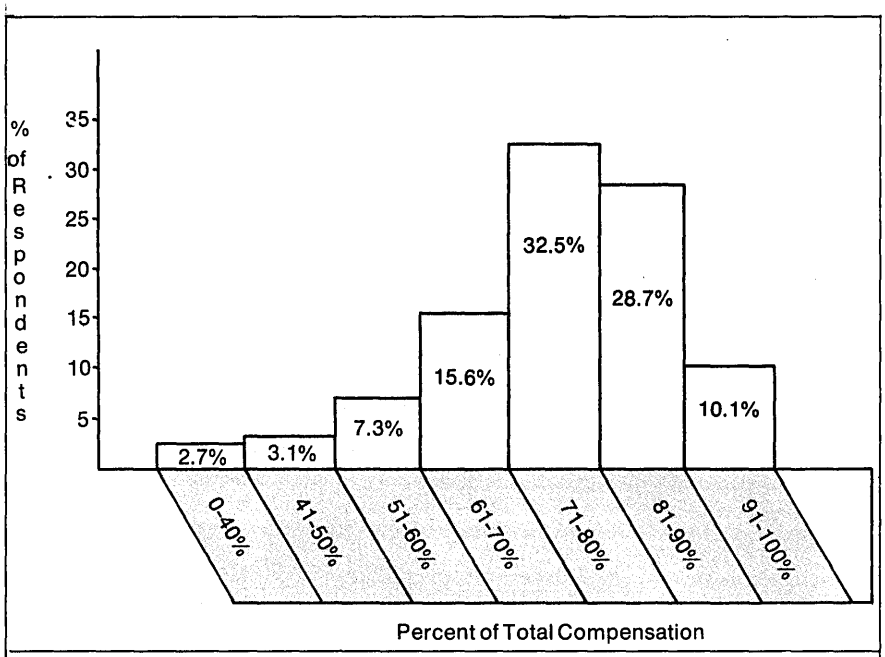


Fig. 1. There was a wide variance in views of how much of each person's compensation ought to be in the form of salary, how much in fringes. And that variance was not related to age in the manner expected.

Category	95% Confidence Interval
Base pay	75.60%-78.07%
Retirement	7.58%-8.62%
Hospitalization	6.05%-6.93%
Dental	2.50%-3.07%
Tuition	1.99%-2.59%
Travel	1.73%-2.25%
Dues	0.60%-0.94%
Other	0.48%-1.01%

Analysis of variance and correlation techniques were used to analyze survey data and to ensure sample validity. There is a 95% probability that the true population means for each compensation category is as listed above. For example, there is a 95% probability that dp professionals wish to receive between 75.60% and 78.07% of their compensation in the form of base pay.

TAKE THE TEST FIRST

Assume your company pays you one set amount, but allows you to allocate portions of your pay among the following items. What percent of your salary would you allocate to each? (Ignore the income tax implications of which items are deductible, etc.)

Item	Percentage to be allocated
Take-home pay	____%
Hospitalization insurance	____%
Travel reimbursement for national meeting or educational seminar	____%
Tuition reimbursement	____%
Dues for professional society	____%
Retirement	____%
Dental care	____%
Other: (explain)	____%
Total	**100%**

OUR "OTHER" NEEDS

These findings make sense in the light of what behaviorists have been telling us about human nature. Abraham Maslow best explained how employee needs exist in a hierarchy. "Lower level" needs, explained as physiological and safety needs, must be satisfied before the higher ones, social and esteem needs, begin to work as motivators. People simply aren't going to be much concerned about whether their offices have windows or carpets if they aren't bringing home enough to keep the kids in shoes or braces or whatever.

From the top down, Maslow saw the "needs"structure as:

Esteem: self-respect, self-confidence, achievement, recognition, freedom.

Social: belonging, acceptance, friendship.

Safety: security, protection against threat, fair break.

Physiological: survival, food, clothing, shelter.

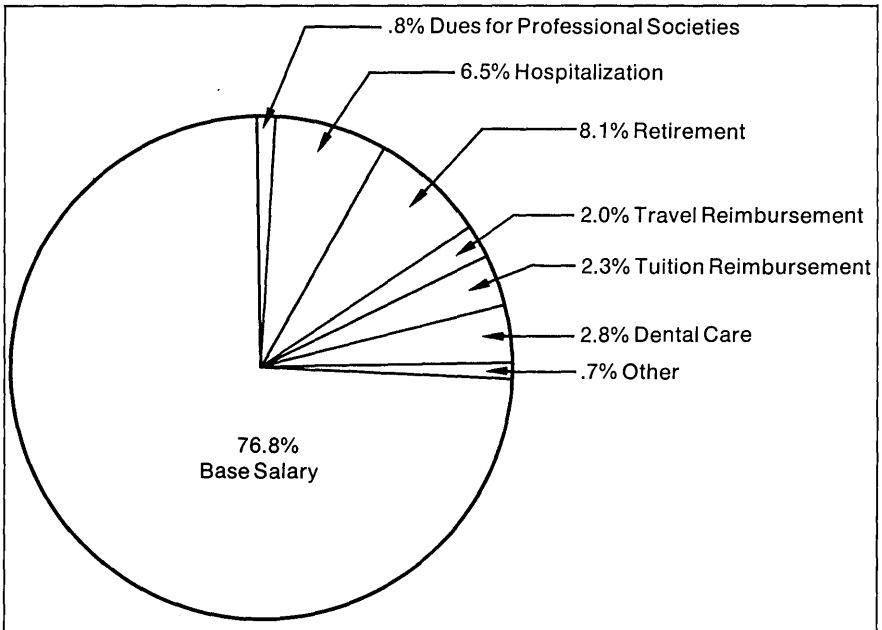


Fig. 2. The average response for compensation breakdown is as shown above. Unexpectedly, some of the smallest figures relate to items with big impact.

Who Provided The Data

Attribute	Percentage by Category			
	20-29 years	**30-39 years**	**40-49 years**	**Over 50 years**
Age	37.5%	41.7%	13.1%	7.7%
	High school	**Some college**	**BS/BA degree**	**Masters degree**
Education	5.5%	41.9%	46.9%	5.7%
	1 or less	**1-4**	**4-8**	**Over 8**
Years with organization	16.4%	35.6%	23.7%	24.3%
	Male	**Female**		
Sex	73.2%	26.8%		
	Married	**Single**		
Marital status	61%	39%		

Table 1. More than 700 dp employees from 25 government and industry organizations participated in the survey of what motivates dp professionals (in this case, systems analysts, programmers, and programmer/analysts).

The pay preferences expressed in the pie chart fit approximately into that hierarchy. (See Fig. 3.)

Items relating to physiological needs were base pay, hospitalization insurance, and dental care. Retirement benefits might be considered in the safety need category.

Examples of higher order needs were tuition and travel reimbursement to national meetings or educational seminars. Travel to a national professional meeting is as much an esteem need as a safety need. Prestige among peers through being selected to attend such a meeting provides recognition and indicates achievement. Attendance fulfills a need for belonging (to a professional group); therefore, it also satisfies the social need. Likewise, participation in these meetings provides for safety needs—keeping current in a fast moving field.

Dues for professional societies enable an individual to satisfy both esteem and safety needs in the same sense as described above. But their primary advantage is meeting the social need.

The "other" category had a wide range of responses, from parking fees to union dues. A savings plan was the most frequent response. This would fall under Level 2 (safety) if an individual were saving for security. It would fulfill a Level 4 (esteem) need if the individual were saving for an ocean cruise. Life insurance was number two in the "other" category—fulfilling a Level 2 (safety) need.

How does this stack up in terms of dollars? According to the DATAMATION survey beginning on page 86, the average annual salary for a systems programmer/analyst is $16,410. You can see in Fig. 3 that selection of a pyramidal shape for the needs hierarchy model is appropriate: The average respondent allocated 86% to physiological needs, 11% to safety needs, etc. The analogy breaks down when we try to ascribe a dollar value to social and esteem areas. Nevertheless, some monetary value can be ascribed to these areas.

When you filled out the survey questionnaire, you probably did not calculate the cost to get you to a national meeting each year. However, the average allocation of 2% for travel amounts to $328 for the programmer/analyst. That amount adequately covers the cost of such a trip (at least if the meeting site is nearby), as does the $377 for tuition reimbursement for continued education (2.3%).

The retirement allocation was bimodal, about 22% of the respondents designating 5% of total compensation and 25% designating 10%. The most frequent response for hospitalization insurance was 5%, and either 1% or 5% were the most frequent responses for dental care.

Preferences for tuition and travel were quite similar, heavily skewed toward the 1% to 2% category. A big majority of the responses concerning professional dues were in the 0% - 1% category.

WHY BOTHER?

Now we are ready to consider a basic question: "Why go through this exercise—I have little control over compensation allocation where I work?" It turns out that supervisors have more control than they may recognize—even in the area of salary, where adherence to company standards is required. If salary for dp personnel is less than the going market, dp management can use the data from the salary survey to substantiate the need for change.

If allocations for fringe benefits are inconsistent with those shown here, dp management can use our industry data to precipitate a company change.

It may even be possible to implement some unique compensation approaches. For example, one of the 1978 NCC panelists explained his department's approach for providing *incentive* pay for quality and quantity improvements. Although we are not advocating such an

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approach, its mention shows that changes are possible in areas previously thought sacrosanct.

But even in those situations where company policy on compensation is inviolate, the supervisor is not hamstrung. We've shown through our analysis of the Maslow hierarchy of needs that the cost of meeting employee high order needs is disproportionately low. The $30 to $50 fee for professional dues is trivial when compared to the benefit of filling the needs for belonging (Level 3) and for prestige (Level 4). Similarly, the proportion of the total dp budget devoted to travel and tuition reimbursement is insignificant compared to the degree to which these activities meet high order needs. And supervisors have a great deal of influence in this sphere, especially if he or she understands how employees perceive equity or the lack of it in their organizations.

The concept of equity can be traced back to the philosophy of Aristotle, who defined distributive justice (equity) as "proportional allocation of rewards according to merit." George C. Homans, a noted sociologist, elaborated on Aristotle's concept of distributive justice, theorizing that an employee's investments must be in line with the profits of the job. Investments, as defined by Homans, are such things as age, experience, skills, education, and seniority. Profits (outputs) are rewards minus costs. Rewards include recognition, advancement, salaries and wages, status, and fringe benefits. Costs are such things as physical danger, long or poor working hours, boredom, and health hazards.

The individual attempts to maintain equity by keeping investments and outputs at a ratio of 1:1. If the worker perceives this ratio as out of balance (inequity), he or she becomes dissatisfied.

An employee's evaluation of equity, however, is not based solely on the ratio of personal investments and outputs. A systems analyst, say, will compare herself/himself to some social reference group. Which social reference group applies is a highly subjective determination made by the systems analyst. The social reference may be another coworker (even in a different job), another professional, a neighbor, or another systems analyst in another organization. If the relationship is out of balance from the analyst's viewpoint—even if the choice of reference group is inappropriate—then she/he perceives the situation as one of inequity.

Recognition of this behavioral concept can improve a supervisor's effectiveness. A supervisor can have considerable impact on an employee's perception and evaluation of equity by identifying appropriate reference groups for employees.

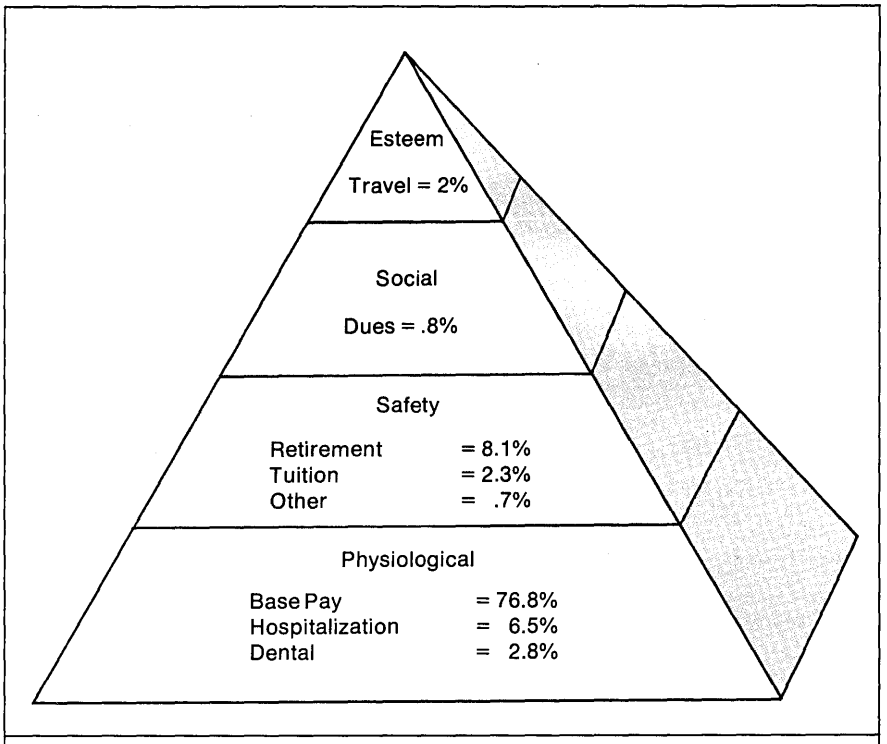


Fig. 3. The general rule in considering a person's hierarchy of needs is that lower level needs must be fairly well satisfied before higher level needs begin to function as motivators. In some ways, the survey responses on compensation preferences are much in keeping with the hierarchy.

Consider three real-life cases:

Case 1: The obstinate personnel man. Larry, the dp manager, fought a continuous battle with the personnel department to keep salaries current with market demand. Personnel balked, arguing that the dp department salaries would be inconsistent with salaries for people with similar experience/education in other departments. Larry used salary surveys to prove his point, supported with the argument that crucial company systems would be developed by inexperienced personnel if salaries were not competitive. Personnel countered with the argument that dp personnel should be transferred in from other company departments where salary expectations were not so great.

Larry intensified his research and showed that two other departments, engineering and accounting, were also paying premium salaries because of market demand. He assured management that he would be the first to recommend adjustment in salary structures when the scarcity of dp personnel was resolved. He gained credibility by citing statistics which showed that the premium in starting salaries for dp people had already declined (in real dollars) over the previous year.

Case 2: The oil company system analyst. Sarah was an outstanding system analyst in a family owned firm in a Midwestern city. She served on the executive board in the local chapter of a national professional society. Another board member was a system analyst in a division of an international oil company. Her salary was higher than Sarah's, despite comparable experience. Sarah demanded a salary increase even though she knew she was the highest paid analyst in her company. Sarah's supervisor was able to show her why his company could not compete with the oil company in salary. He also identified some high order benefits in working with a small company. After considerable deliberation, Sarah decided that her social reference group should be the company's dp department.

Case 3: The affluent neighbor. Roger, a programmer, was persistent in his demands for a salary increase. His supervisor believed Roger's pay was consistent with that of other programmers with comparable experience and performance. During one heated discussion Roger admitted that his wife continuously pressured him. Their neighbor (about Roger's age) earned a great deal more money in his job as an insurance salesman—despite his lack of college education. The supervisor convinced Roger that he had equity in his own job. Nevertheless, Roger was not able to see his company programmer staff as a proper social reference group. Roger quit his dp job and entered the insurance field as a sales trainee, seemingly oblivious to the fact that his neighbor had built up a clientele and corresponding income over a 10-year

period.

Supervisors in the cases above did not use the terms "high order need" or "social reference group." They had intuitive knowledge of employee behavior and needs, which they were able to apply. In two cases, the supervisors and employees came to agree. Case 3 only showed that problems involving behavioral issues cannot always be solved to satisfaction of the company.

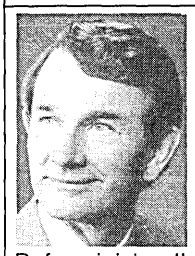
Compensation disagreements between employees and employers will continue. However, the degree of conflict can be lessened when both parties take the time to acquire new information. Understanding the behavioral concepts of equity theory and hierarchy of needs is helpful, in this respect. So are surveys on compensation preferences.

Employees can work on selecting appropriate social reference groups and supervisors can work on understanding the full range of employee needs. Both can work on improving communication over issues such as these.

The information presented in this article shows it isn't necessary to make a revolutionary change in compensation structure to improve employee satisfaction.

We hope the new information in this article—some of which comes as a surprise to the writers as well as readers—acts as a catalyst in compensation discussions between employees and supervisors. ✲

J. DANIEL COUGER



Dr. Couger is professor of computer and management science in the Univ. of Colorado's College of Business. Before joining the CU faculty in 1965, he spent 13 years in industry. He has more than 20 years experience in computing.

Dr. Cougar has served as a consultant to more than 30 organizations, including Dow Chemical, IBM, and Hewlett-Packard. Last year he was selected as DPMA's U.S. Computer Science Man-of-the-Year. He is listed in "Who's Who in America," "Who's Who in Computing" and "Outstanding Educators of America."

ROBERT A. ZAWACKI

Dr. Zawacki is an associate professor of management and organizational behavior at the Univ. of Colorado, where he teaches personnel management and organization behavior courses. Before joining the CU faculty, for nine years he was on the faculty of the Air Force Academy.

His consulting experience has included work for businesses, hospitals, government agencies, and academic institutions.

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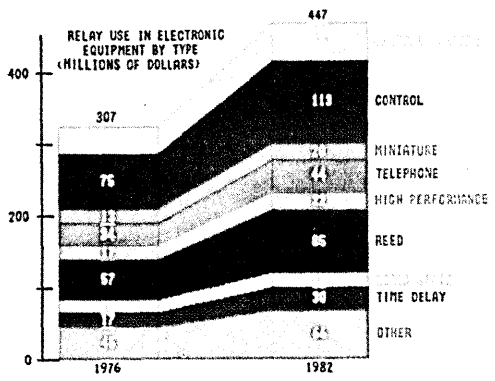

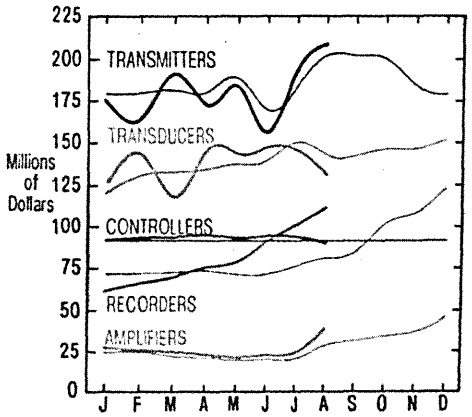

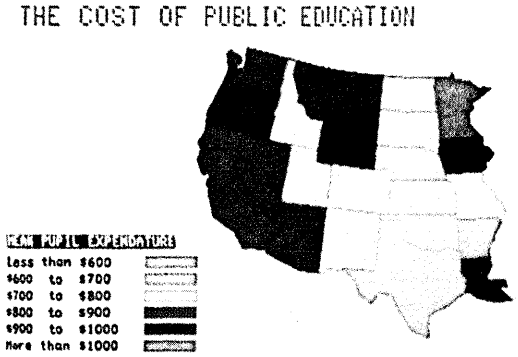

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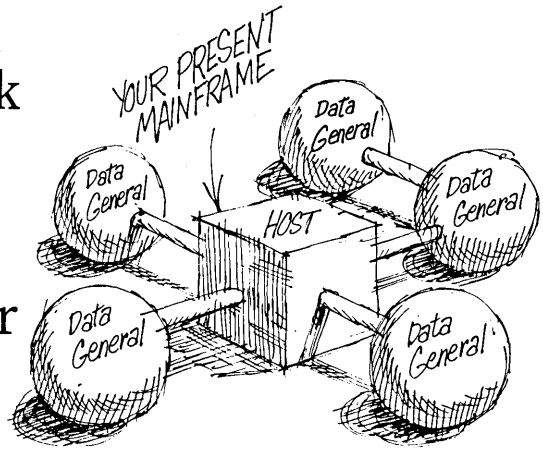

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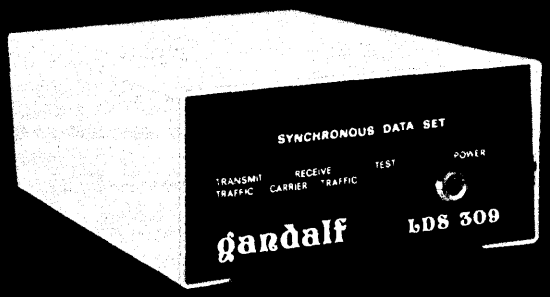

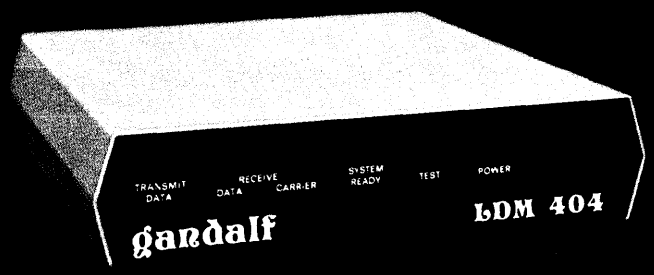

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CIRCLE 47 ON READER CARD

Amid discussions of computers and unemployment by trade unionists and computerites, few constructive proposals have emerged.

EUROPEANS BLAME COMPUTERS

by Fred Lamond

Until the beginning of this year, European concern about computers was mostly over the difficulty European manufacturers were experiencing in competing against the U.S. multinationals, and how much government help they would need in order to survive. This was, for instance, the theme of a weekend conference on "The Future of the British Computer Industry" that *Computer Weekly* and the London chapter of the ACM organized at Hedsor Park in the Thames Valley in July of 1977.

To the extent that any wider social issues were debated at all, it was usually the issue of privacy and the supposed dangers to it if data bases of personal data collected by employers, health authorities, the police, and the Census were allowed to be linked to each other.

Suddenly this year, however, the focus of interest has shifted to the impact of computers and microprocessors on employment. On March 31, BBC-TV screened the Horizon program "Now the Chips Are Down," describing the impact of microprocessors on the technology and employment in the watch industry, cash register manufacturing, and production of telephone switching exchanges, and the further changes that might occur in other industries. The program was widely watched and has been the subject of debate in and out of the computer industry ever since.

Its theme dominated a second *Computer Weekly*/London ACM conference held in London last April, one that had been intended originally to develop further the previous July's Hedsor Park theme. And it was taken up again in a pamphlet "The Chips Are Down" by Colin Hines, published by Earth Resources Research (the research arm of the ecologist pressure group Friends of the Earth) later in April.

Nor is Britain the only European country to be worried. In West Germany, *Der Spiegel*'s cover story at the end of April featured a computer hitting a worker over the head with the caption: "Computers Take Jobs Away." There have been strikes in printing as well as metalworking firms against the introduction of computer controlled equipment and the resultant downgrading of the skill needed to operate the equipment, the first sign that the hardworking Germans might be affected by the early stages of the "English disease."

In France, the democratic trade union federation CFDT has published a pamphlet called "Les dégâts du progrès" (The wreckage left by progress). The impact of computers on employment formed one of several themes of the report on "L'informatisation de la société" by a team of government officials led by Simon Nora and Alain Minc. It was published in Paris on May 17 after being presented to the French President (who commissioned it) at the beginning of the year. And the same theme was also widely discussed in a two-day symposium in Paris in June on the theme "L'informatique, l'homme et le travail" (Computers, Man and His Work) organized by the Fondation Fredrik R. Bull, a think tank sponsored by CII-Honeywell Bull.

THE PROBLEM

There is a remarkable degree of agreement in the diagnosis of the problem in all these various publications and conferences. The cheap, mass produced, programmable microprocessors are accelerating the trend toward industrial automation, and bringing it within economic range even of processes that have to be altered frequently. As Colin Hines puts it in his Earth Resources Research pamphlet, "The process is still expensive, but ... automation has finally come home to roost because the technology has developed to the point where it is often as flexible as the retraining of people."

The application of microprocessors has in recent years sharply reduced the manpower required to build digital watches, electronic cash registers, and telephone switching exchanges, and is also expected in time to cut sharply the number of maintenance personnel who will be required.

"How many people are required to maintain a new System X electronic exchange?" runs a rather bitter joke in the British Post Office Engineering Union. Answer: "A man and a dog." "What does the man do?" "Feed the dog." "What does the dog do?" "Make damn sure

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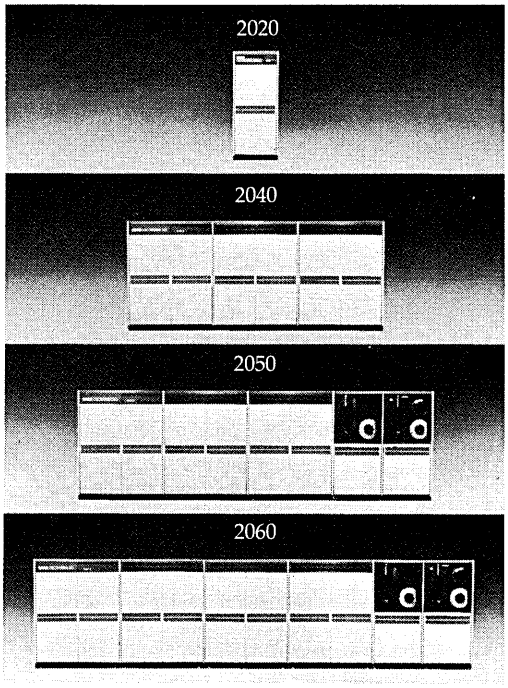

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CIRCLE 127 ON READER CARD

What haunts Europeans is the nightmare of ever-lengthening dole queues . . . and insecurity spreading among those who remain at work.

neither the man nor anybody else gets his fingers on the equipment."

Until recently, a continuing fall in industrial employment resulting from more automated processes had been offset by rising employment in the services sector. But European industry observers see office automation, electronic mail, computer aided design, and similar techniques having a similar devastating effect on service employment in the 1980s, notably on copy typists, post office sorting workers, even relatively skilled professions such as draftsmen. Colin Hines mentions a *Times* article entitled "The Four Thousand Pound Typist-Substitute That Will Soon Pay for Itself." He adds: "For the roughly 800,000 people, mostly women, employed as secretaries, this somewhat chilling title is likely to foreshadow major social changes. This is because the growth of typing and secretarial work has contributed to the increase in employment for women and has been responsible to some degree for their growing independence." Interestingly, the Nora report in France also puts at 800,000 the number of French secretarial jobs jeopardized by the spread of word processing, and it adds to these some 30% of jobs in banking, insurance and similar services.

ALL NEGATIVE

The depressing thing about the tone of the current debate in Europe is that it is almost wholly negative. There is little rejoicing that automated machines are about to take over jobs that are dull, repetitive and routine (they couldn't take over any others), and therefore unworthy of human beings. What haunts Europeans is the nightmare of ever-lengthening dole queues, mainly of young school-leavers, and insecurity spreading among those who remain at work.

Nor do the new jobs likely to be created by the Information Society cause much excited anticipation. Many of the computer professionals who spoke from the floor at the Fredrik R. Bull symposium in Paris regarded their own jobs as dull grinds, and saw little job enrichment in being equipped with a display screen at which to stare all day. The current rebellion among West German printing and metal industries workers against computerization is precisely against the downgrading of their skills and the resulting loss of job satisfaction that is seen as the main effect of the introduction of process control computers.

In this chorus of European Cassandras, constructive proposals are few. The idea that renewed economic expansion might expand employment sufficiently to absorb the growing pool of European unemployed is rightly dismissed as an illusion. So the European trade unions are taking an increasing interest in "work sharing" schemes to spread employment among more people by reducing the working week and lengthening annual holidays. In Britain, the Post Office Engineering Union has been "working to rule" for the last 12 months, refusing overtime and banning the installation of new electronic exchanges and data transmission modems to back its demand for a standard 35-hour week instead of its present 40-hour week. And similar demands are coming from West German and French trade unions.

These demands, however, are being strongly resisted by employers. If

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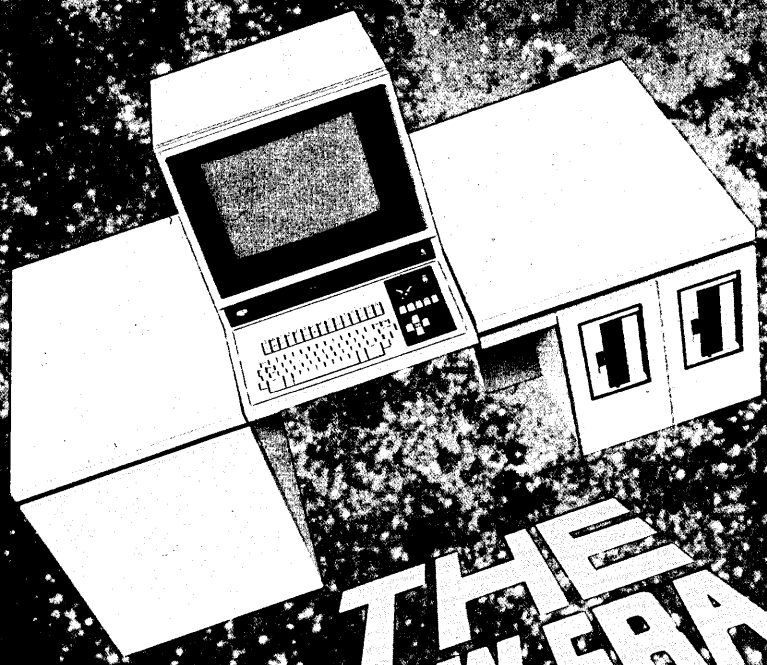

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CIRCLE 125 ON READER CARD

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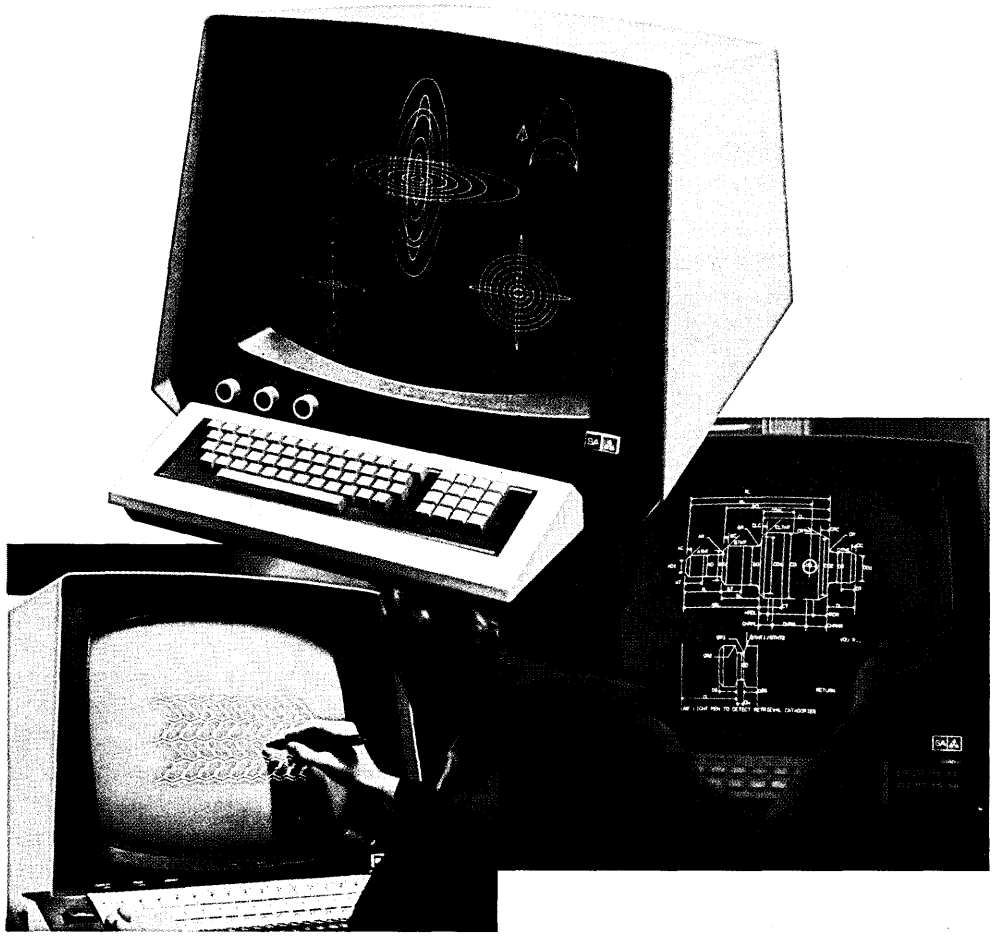

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CIRCLE 129 ON READER CARD

Many computer professionals regard their own jobs as dull, see little job enrichment in having crt's to stare at all day.

workers are to be paid the same as now for their shorter working weeks, it would be equivalent to steep increases in pay, which would make many industries noncompetitive in export markets. But if each worker's take-home pay is cut proportionally to the cut in working hours, they fear a discontented work force that would resort to go-slow tactics and produce overtime work artificially. Employers much prefer to reduce their work forces by attrition and to split the fruits of increased productivity among higher wages for their remaining workers, lower consumer prices, and higher profits.

A PROPOSAL

The most sophisticated approach to the problem published to date in Europe is to be found in Simon Nora and Alain Minc's book. The authors propose dividing the economy into two distinct sectors: the "efficient" and the "social."

The "efficient" sections of the economy would comprise all those manufacturing industries producing export or import-replacement goods. They should be encouraged to be as efficient as the latest technology permits, make the fullest use of computers and all types of automation, and run with as few employees as they need. Their task in the economy would not be so much to provide employment, as to earn the foreign exchange that will pay for the "social" side of the economy to function.

The "social" side of the economy will include greatly expanded educational, medical, and social services, a flowering of all the arts—a new Athenian society that uses computerized tools instead of human slaves to do all the drudgery.

Yet even the authors of the Nora report doubt whether it would be healthy for the state to attempt to create all these new "social" jobs. It would lead to an increasing bureaucratization of society harmful to individual freedom. For this reason, they are perhaps unnecessarily scathing about the proposals put forward in 1973 by the Japan Computer Usage Development Institute under the title "Towards the Information Society." At any rate, they regard the latter's top-down planning approach as inappropriate to the European character.

Yet in the absence of increased social spending by the state, who is to provide the new "social" and artistic jobs? A return to an economy of small crafts exercised for their own sake demands banking and taxation structures more favorable to the small entrepreneur than now found in Europe. Or a California-style philosophy about maximizing the human potential that can keep a growing army of freelance gurus gainfully employed. Neither of these is yet strongly in evidence in Europe. Hence the prevailing gloom. ✲

FRED LAMOND

Mr. Lamond, a regular contributor to DATAMATION and DATAMATION International, is an independent computer consultant in Europe. He is also European editor for Auerbach Publishers Inc., responsible for European dp equipment coverage in Computer Technology Reports. In his varied career, he has been a systems analyst at Univac, export salesman for English Electric Computers, and consultant for Leasco Systems and Research.

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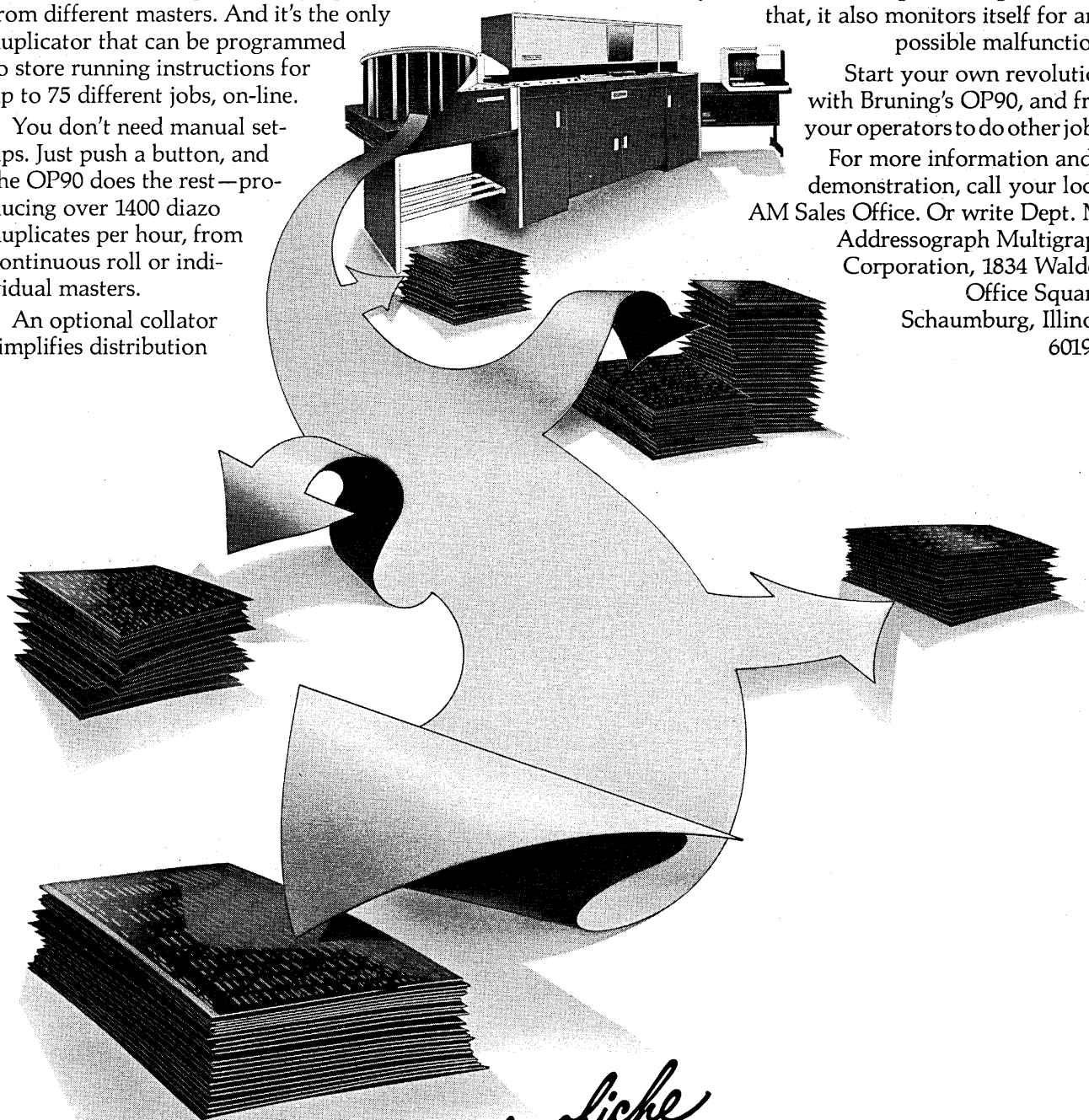

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CIRCLE 30 ON READER CARD

Tests show the IBM 3033 to have between 1.10 and 1.53 times the internal performance of an Amdahl 470V/6-II

BENCHMARKING THE IBM 3033

By A.L. Duey and J.K. Fang

During the 1970s there has been a phenomenal growth in the purchase of goods and services on credit. For TRW Credit Data, this has meant a need to upgrade its host computers every 18 months. And because of the rapid change of hardware, benchmarking has become an important and well established process in the selection not only of mainframes but also peripherals.

TRW Credit Data is the nation's largest supplier of automated credit reports to consumer and business credit grantors. With a data base of more than 70 million consumer and business files, it provides information to some 10,000 subscribers in the continental U.S.

At the Information Services data center in Anaheim, Calif., the hardware complement has advanced from four IBM 360/50s in 1970 through a range of IBM 370/155s and 158s. It currently has two 158 model 3s and an Amdahl 470V/6-II, supporting 136 IBM 3350s, 24 3330s, a 3850 mass storage system, and an assortment of tape drives and other peripherals. The system is designed to handle a peak load of about 50,000 reports an hour, with response times at the terminal from 3 to 7 seconds.

The communication system, which includes eight Comten 3670s and more than 50 minicomputers serving as remote terminal concentrators, supports some 6,500 low-speed terminals (TTY's and crt's) and a number of TSO and RJE terminals.

The current Amdahl 470V/6-II was installed in September 1977. Scheduled for December 1978 delivery is an IBM 3033 to replace the dual 158s currently in use. Due to the heavy concentration of IBM disks, tape drives, MSS, and other IBM peripherals, in addition to standard IBM operating systems, it is the company's stated objective that there will always be a minimum of at least one IBM mainframe host in-house. In this respect the benchmark results had no bearing on the December delivery. The tests were necessary to ensure software compatibility, to prove (or disprove) the vendor's performance claims, and to gain experience in running TRW's own software on the new system.

THE BENCHMARK

Five groups of jobs were run on the IBM 3033 processor at the IBM Washington Systems Center in Gaithersburg, Md., in July 1978, under the auspices of a TRW system programmer, aided by IBM systems engineers. Inasmuch as 80% of the TRW data center computer resources are dedicated to batch file updating (over 100 million transactions per month), the benchmark was limited to batch jobs, including sort and merge, I/O functions, table look-ups and comparisons, etc. The job groups are defined below.

Type A. A highly cpu-bound job that uses a tape input file and, based on the contents of numerous decision tables, performs in-core table searches and creates up to five sequential output files. The benchmark input file contained 188,000 records.

Type B. A highly cpu-bound job that uses a presorted tape input file, merges and deletes records containing similar data, and outputs an updated tape file. The benchmark input file contained 1.8 million records.

Type C. A job that reads a tape file at a very fast rate and makes a large number of statistical calculations based on the contents of the data. The benchmark input file contained 2.4 million records.

Sort. A sort of 1.2 million records.

100 Jobs. A job stream consisting of 52 assemblies/compiles (PL/1, FORTRAN, COBOL, BAL) and linkage edits, 24 Sorts ranging from 1,900 to 50,000 records of various sizes, and 24 runs of a simulator that uses control cards to simulate cpu-bound or I/O-bound jobs. Many of the jobs made heavy use of virtual I/O.

The same job streams were repeated on the 470V/6-II at TRW using the identical operating systems. The two operating environments were duplicated as much as possible, differences in I/O configurations, support software, etc., being minimal. The benchmark was also repeated on the 3033 with the MVS/ Systems Extension program product (MVS/SE), and a portion of it on a 370/158-3, for comparison.

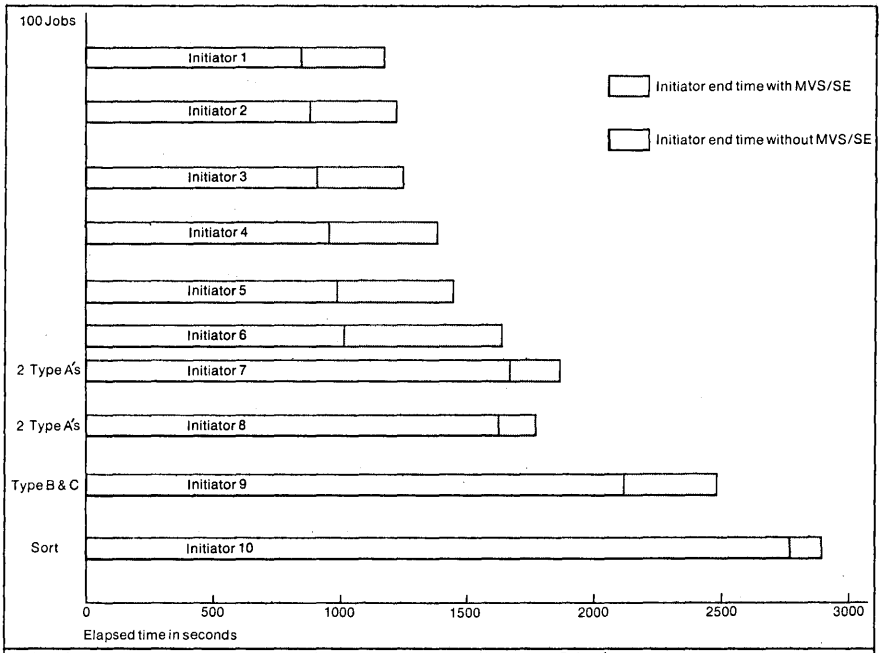
The Type A, Type B, Type C, and Sort jobs were run individually in a stand alone environment and the 100 test jobs

were run, several at a time, on a dedicated system. Two additional runs were also made, one comprised of four Type A jobs executing concurrently and one combined run consisting of the Type B, the Type C, the Sort, four Type A's, and the 100 test jobs.

Job Type	Cpu Time Ratio (V/6 : 3033)
A	1.41
B	1.11
C	1.10
Sort	1.53

All standalone jobs required less cpu time to execute on the 3033 than on the V/6, as shown above.

In the Washington Systems Center, Model-8 3420 tape drives were used; they have a faster data transfer rate than the Model 6 drives used for the 470V/6 runs. Because of the different model tape drives, elapsed time ratios for jobs using tape may not be totally accurate, especially for jobs that process at tape speed (Type C).



All job groups were completed sooner on the IBM 3033 than on the Amdahl 470V/6-II, and tended to run faster with MVS/SE than without. All elapsed and cpu times shown here are expressed in seconds. Note that the two columns on the right under Cpu Ratio are derived by dividing column (Z) by column (X), and (Z) by (Y).

Benchmark Jobs	IBM 3033 with MVS/SE (X) Elapsed	Cpu	IBM 3033 without MVS/SE (Y) Elapsed	Cpu	Amdahl 470 V/6-II (Z) Elapsed	Cpu	Cpu Ratio Z/X	Z/Y
Type A	178	170.49	178	171.98	285	243.24	1.43	1.41
4 Type A's	713	681.73	715	691.79	1012	988.83	1.45	1.43
Sort	2446	185.92	2520	204.47	2540	313.38	1.69	1.53
Type B	748	670.72	729	679.19	763	753.60	1.12	1.11
Type C	199	152.99	208	155.41	291	171.25	1.12	1.10
100 Jobs (4 megabytes)	793	236.20	756	266.3	1008	360.80	1.53	1.35
100 Jobs (6 megabytes)	744	234.60						
Combined job stream		1963.55		2012.52		2714.51	1.38	1.35

Fig. 1. Initiator elapsed times, 4 megabyte 3033

All the jobs in the three multiple job streams individually executed faster on the 3033 than on the V/6. Following are the computed ratios of V/6 times to 3033 times.

Jobstreams	Cpu Time Ratio (V/6 : 3033)
4 Type A jobs	1.43
100 job stream	1.35
Combined job stream	1.35

The jobs in the 100 job stream were run with 10 initiators in both 4 megabyte and 6 megabyte memory configuration. The ratio of elapsed to cpu time for the job stream was about 3 to 1.

In 6 megabytes a 2% reduction in elapsed and a smaller reduction in cpu time was achieved for the 100 job stream. The 2% reduction should in no way be taken as a serious evaluation of the benefit of 2 additional megabytes of storage. The purpose of the benchmark was not to evaluate the benefit of extra storage, so the job streams were not created large enough to stress even 4 megabytes of storage, let alone 6 megabytes. Also, the number of initiators available in the test systems were not sufficient to stress storage. The 2% figure is mentioned for information only.

The combining of all standalone jobs into a single job stream was done to approximate the typical batch workload at TRW/ISD. The combined run was set up to use 10 initiators. Six were designated for the 100 job stream, two for the four Type A jobs, one for both Type B and Type C jobs, and one for the Sort.

MVS/SE THROUGHPUT

Some throughput comparisons can be made, but will be limited to comparing the 3033 throughput for the combined job stream with and without MVS/SE. A comparison with the 470V/6-II with MVS/SE could not be made because the Amdahl MVS/SE Assist package was not available at the time of the benchmark.

In measuring throughput, the test was terminated when the tape-bound Type C job finished, because after that point, the only job left running was the Sort, which used only 7% to 10% of the cpu. The elapsed times to the end of the Type C job were:

2100 seconds with MVS/SE
2430 seconds without MVS/SE

This gives a ratio of $\frac{2430}{2100} = 1.157$, or in the same time period of 2,430

In observing the running of the combined jobstream, it was very apparent that MVS/SE had something to offer.

Benchmark Jobs	158-3:3033 with MVS/SE	158-3:3033 without MVS/SE	158-3:V/6-II
Type A	4.50	4.46	3.15
Type B	4.74	4.68	4.21
Sort	8.02	7.29	4.75

Fig. 2. 370/158 model 3 cpu comparisons

seconds, 15.7% more work could be put through the MVS/SE system. This number is within the IBM announced performance range for MVS/SE. Additionally, since the jobs were batch only, the percentage improvement in the TRW/ISD installation is expected to be greater when the real world of batch and TSO are running together.

In observing the running of the combined job stream, it was very apparent that MVS/SE had something to offer. In the run without MVS/SE, the page swapping was excessive, cpu was poorly utilized, and processing preference was given to the 100 job stream. During the run with MVS/SE, the system gave preference to utilizing the cpu which ran at 100% most of the time. Page swapping was minimal, and although the 100 job stream finished later, the total job stream to the end of the Type C job finished significantly faster. Fig. 1 shows the time that each of the 10 initiators were active with a job.

3033/158 COMPARISON

To compare the performance of the 3033, as well as the 470V/6-II, to that of a 370/158-3, performance ratios from a benchmark of the 470V/6 and the 370/158 conducted in August 1977 have been used. The results are shown in Fig 2. The results of the benchmark showed the IBM 3033 to have an internal performance of between 1.10 and 1.53 times that of an Amdahl 470V/6-II.

There are three differences between the 3033 and the V/6-II that are major contributors to the superior performance of the 3033: the processor cycle times, size of the high-speed buffers, and the instruction preprocessing designs.

The cycle time of the 3033 is 58 nanoseconds versus 32.5 nanoseconds for the V/6-II. Although the 3033 has the slower cycle time, more than half of all instructions can execute in one cycle whereas the V/6-II cannot execute any instruction in less than two cycles.

The 3033 has a 64K high-speed buffer and the V/6-II has 32K. The larger buffer permits a higher buffer hit ratio, which is especially significant with a workload that causes varying address reference patterns.

Both the 3033 and the 470V/6-II have instruction fetching and preparation logic that operate concurrently with instruction execution. When a conditional branch instruction is encountered, both systems also prefetch instructions from the branch address as well as from the address following the branch instruction. The instruction preprocessing function of the 3033 has several enhancements (over the 370/168 series) that contribute to its improved performance. One of the more significant enhancements is the ability to buffer three instructions streams concurrently, which permits instructions in the original stream and instructions at up to two branch addresses to always be available.

The smallest performance improvements (1.10 and 1.11) were achieved by the two benchmark jobs (B and C) that consisted primarily of straightforward logic with relatively few decision points that would require branching. The relatively small improvements obtained by these two jobs confirm the reasons we identified as the major contributors to the performance difference between the two machines. Because the nature of these jobs was such that the address reference patterns were varied little due to minimal branching requirements, advantage could not be taken of the improved instruction processing functions of the 3033 or the larger high-speed buffer. The improvement that they did obtain can be attributed primarily to the improved 3033 instruction execution function.

In a typical large commercial type data processing center operating with OS/VS Release 3 and supporting both batch and interactive workloads, the performance of the 3033 should be somewhere between 1.30 to 1.45 times that of a 470V/6-II.

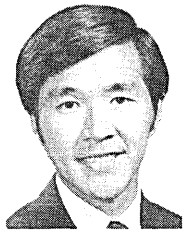
The cost of a water-cooled, 6-meg, 12-channel IBM 3033 is about $3.6 million vs. $2.7 million for a comparable but air-cooled Amdahl V/6-II, representing a cost ratio of 1.33. The performance ratio of 1.30 to 1.45 would seem to indicate that the 3033 is a more cost effective system, but many additional factors must still be considered in the final decision to go one way or the other. These factors include delivery, hardware reliability, vendor support, and environmental needs.

It would also be interesting to benchmark the newly released 470V/7, which has a price tag comparable to that of the 3033, is air-cooled, smaller, and, due primarily to improvements in the cycle time and instruction set, is some 50% faster than the 470V/6-II, according to Amdahl. ✲

A.L. DUEY

Mr. Duey is manager of the Technical Services Dept. at the Information Services Div. of TRW Inc., Anaheim, Calif. His management responsibilities include both systems programming and capacity planning. Prior to joining TRW in 1976, Mr. Duey was in systems software with ITT-Federal Electric Corp. at Vandenberg AFB, Calif. He has also been affiliated with System Development Corp., the Canadian Air Force, Bendix Corp., and Bell Labs.

J.K. FANG



Dr. Fang is director of information systems and operations for the Information Systems Div. of TRW in Anaheim, Calif. He has done post-doctoral research at the Technical Univ. of Munich, West Germany, where he worked on one of the first 360/91s ever installed. He has held technical and management positions with Dow Chemical Co., Pacific Telephone Co., and Computer Sciences Corp. Prior to joining TRW, Dr. Fang for four years was in Hong Kong, serving as marketing and development manager for Asiadata Ltd., one of the largest service bureaus in Southeast Asia.

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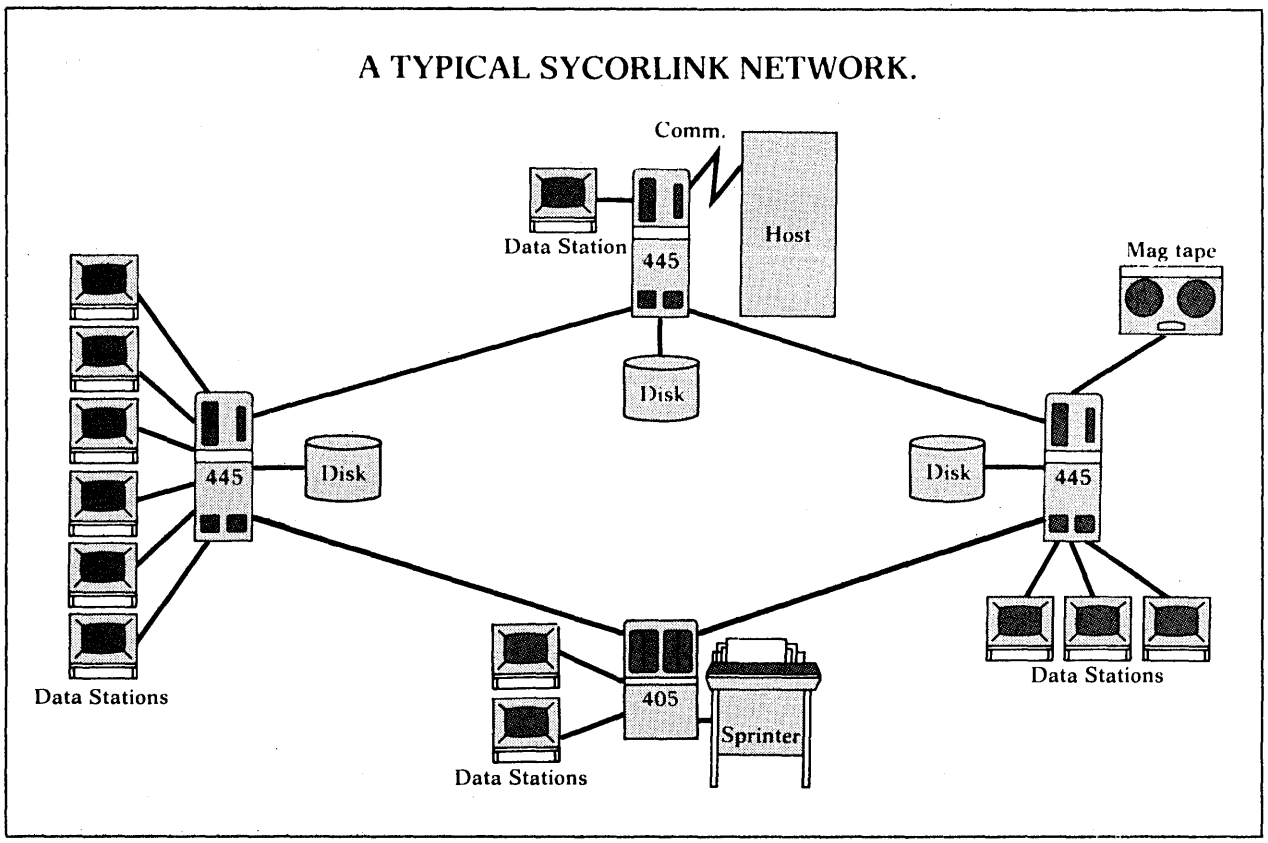

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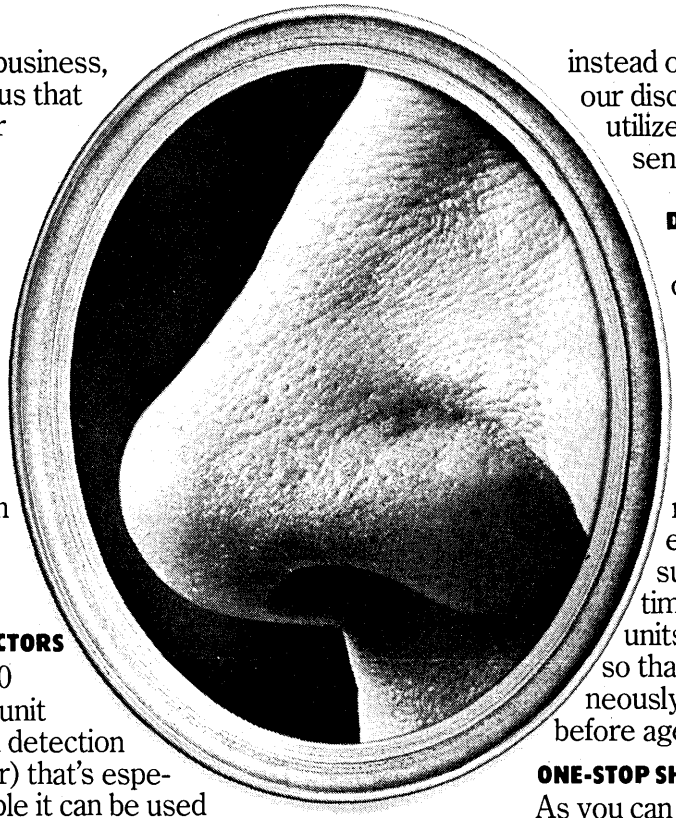

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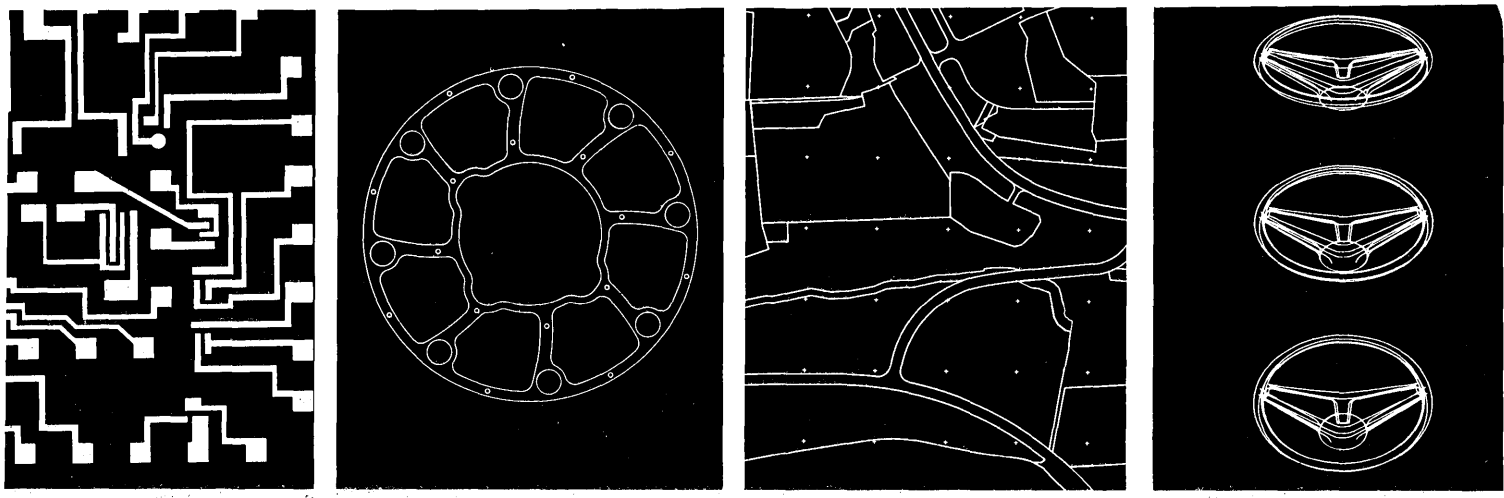

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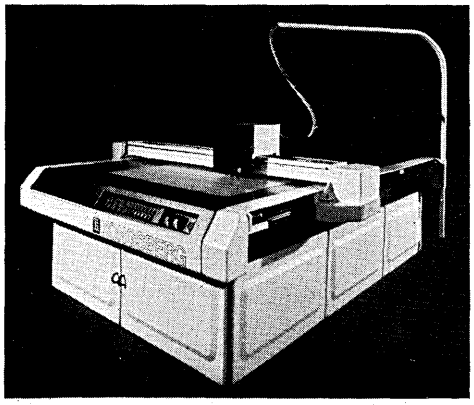

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CIRCLE 49 ON READER CARD

There has been a great change in user attitudes, and there's soon to be a great change in products too.

THE CHANGING WORLD OF NONIMPACT PRINTING

by Stephen A. Caswell

In the last three years there has been one major turnabout in the field of nonimpact printing, and there soon will be another. The first was a complete reversal in user attitudes concerning nonimpact versus impact devices. The second will be a reversal in the price differences of the two.

We detected the change in user attitudes just this June, when we repeated a comparative market study initially performed in 1975. As late as 1975, impact printers were considered superior to nonimpacts in six of nine categories tested; now we find the same audience considers nonimpacts superior in six of those categories and equal in two more. Nonimpact units have even gained strength in such impact strongholds as the ability to make multiple copies, which we can show in detail later.

Sales of nonimpact units are already measuring this increased acceptance, both at the high and low ends of the product range—although not yet in that middle ground where so many dollars change hands. Ultrahigh speed nonimpact units from IBM, Honeywell, Xerox, and Siemens have found ready buyers. Showing off one of the advantages of nonimpact technologies—their high speeds—these printing subsystems put down from 13,000 lpm to 21,000 lpm compared to a high of about 3,000 lpm for the best common impact units.

At the low end, as for terminals, thermal and ink jet printers are gaining ground rapidly. Texas Instruments' Silent 700 portable thermal-printing terminal is one of the country's hottest selling computer products; and the IBM 6640 Document Printer, which uses ink jet printing, has found a waiting audience in word processing installations.

Still, both of these categories of devices have disadvantages that are restricting the market penetration of nonimpacts in general. The ultrahigh speed line printers like the IBM 3800 are priced from $250,000 to over $300,000. While one can replace as many as five 1,500 lpm impact line printers, this still means that only shops operating at least five such line printers—and probably closer to 10—are likely to be serious sales candidates. In effect, the market is restricted to only a small number of large scale shops, which eliminates the bulk of potential users.

In the terminal market, the other end of the line, the inability of nonimpacts to produce multiple copies eliminates them for consideration on small business systems that must produce checks, W-2s, and other such special forms.

Thus, nonimpacts currently have an applications oriented restriction at the low end of the market and a price restriction at the high end. What is needed is a nonimpact printer with a modest price that can compete head-on with impact line printers ranging in speed from 500 lpm to 1,000 lpm. While such a unit would not solve all of the problems with nonimpacts, it would place them squarely in the mainstream of the dp world. The unit still could not handle most forms

Where the Data Comes From

In 1975, International Resource Development Inc. conducted a mail survey of Fortune 1000 companies, polling those firms on their attitudes regarding and use of computer output printing. Responses were received from 112 firms. In May of this year, 40 of those responding to the 1975 survey were again contacted, this time by phone. The accompanying feature was one of the results of the two studies.

The size of the firms represented is shown below. The annual sales figures suggest that the sample has shifted somewhat, but analysis of the effects of inflation, plus a study of which firms in 1975 were almost ready to enter the next highest dollar group, both confirm that the demographic breakdowns are almost identical. Thus the results of the study are almost certain to reflect attitudinal changes rather than a change in the survey sample.

And although the favorable results for nonimpact units could conceivably have been explained by having a large number of nonimpact users in the current sample, this is not the case either. Of the 40 respondees in 1978, only 15 currently have nonimpact units installed. (Many, however, expect to install them soon.) ✻

Annual Sales	1975	1978
Under $100 million	16.0%	7.5%
$100 to $499 million	43.0%	40.0%
$500 million to $1 billion	18.0%	25.0%
Over $1 billion	11.5%	20.0%
Sales not given	11.5%	7.5%
	100.0%	100.0%

processing, but it could handle all single copy printing needs, which are considerable in medium-size shops, and could also handle word processing tasks if its print resolution were high enough. And such a unit may have just appeared.

Our current research suggests how well such a device will be welcomed. Table 1 shows the categories on which users were polled in 1975 and again this year. The numbers seem to represent a complete reversal. Consider the requirement for multiple copies, for example. In 1975, 72% of the respondees considered impact printers superior in the ability to output multiple copies. In 1978, 45% said that *nonimpacts* are superior in this respect; apparently they prefer several original copies, produced one at a time, to an original and carbons.

There's another factor to consider regarding multiple copy output: how much of it is necessary? In 1975, 54% of the respondees indicated that half their printing could be done in single-copy form; in 1978, 59% of all users claimed half their work was in single copy output. The modest 5% increase is not so significant, but the fact that so much of the market is open to nonimpact, single copy printing certainly is.

The overall market is currently very large. We believe the market for nonimpact printers climbed to $481 million this year, from $120 million in 1975—an increase of almost 60% per year!

Of particular importance to the printer business is whether or not the use of paper output is likely to change within major user firms. Since output from computers amounts to hundreds of thousands of tons of paper annually, drops of only a few percentage points represent $ multimillion losses to the paper and printer manufacturers. Thus, when users were asked if they expect paper usage to change in the future, it is quite significant that more than 58% expected their use of paper to *decline*. Table 2 shows the results of this question.

While one should not jump to any hasty conclusions based on the results of this small sample, there is a clear indication that users are becoming polarized over the issue of a decline or increase in paper use. While more users now expect the use of paper to decline than did in 1975, more also expect its use to increase, however slightly.

In effect, the user community cannot make up its mind on what is going to happen. On the one hand, they perceive the use of computers increasing, which increases the total output of paper; on the other, they see a diversion of output from paper to crt's and microfilm. (We can certainly substantiate the latter. In 1975, only 43% of the users had diverted paper output to crt's, and only 59% had diverted any to COM. In 1978, 60% of the sites are using crt's as an alternative to hardcopy, and, more surprisingly, fully 75% are using COM).

Another factor influencing the acceptance of impact printers and nonimpacts is noise. In what is a highly significant finding, if it truly represents a long term trend, users have apparently become substantially more concerned with the noise level of printers. Table 3 shows the change.

The results suggest a desire for a quieter environment, even in the computer room. This could snowball into being a more important criterion than the ability to produce multiple copies, at least in some applications. Given that the market potential for nonimpacts already seems as high as 40% of current output needs, changes in the perceived importance of quiet operation could have enormous impact.

Their usually quieter operation may influence the uses nonimpact devices are put to as well. Respondents were asked to specify what functions nonimpacts performed and to estimate the proportion of these uses compared to other uses. Table 4 shows the results.

It seems there has been a shift of use of nonimpacts toward on-line computer printers and away from console terminals. (The latter are being replaced by crt's.) There has also been a small, but potentially significant, increase in the use of crt demand printers.

Users were asked how many non-

USER RATINGS OF IMPACT VERSUS NONIMPACT PRINTERS

Item Rated	Impact is superior 1978	Impact is superior 1975	Nonimpact is superior 1978	Nonimpact is superior 1975	No opinion 1978	No opinion 1975
Print quality	22%	48%	75%	30%	3%	22%
Paper costs	34%	46%	58%	30%	8%	24%
Multiple copy capability	50%	72%	45%	12%	5%	16%
Ocr readable printing	17%	32%	75%	22%	8%	46%
Equipment costs	48%	34%	48%	33%	4%	33%
Noise level	0%	7%	98%	80%	2%	13%
Reliability and maintainability	25%	27%	63%	38%	12%	35%
Paper "feel"	48%	38%	48%	19%	4%	43%
Ecological considerations (disposal of carbons, presence of chemicals, etc.)	17%	14%	75%	58%	8%	28%

Table 1. One of the study's most significant findings was the major change in acceptance of nonimpact printing, especially for the production of multiple copy output.

FUTURE REQUIREMENT FOR HARDCOPY PRINTOUT

Forecast	1978 Number of companies	1978 Percentage of companies	1975 Number of companies	1975 Percentage of companies
Significant increase	—	—	10	9%
Slight increase	14	35%	9	8%
No change	3	7%	48	43%
Decrease	23	58%	45	40%
Total	40	100%	112	100%

Table 2. Users are undecided on what's going to happen to printing volumes. Compared to 1975, more now believe that print volumes will decline slightly *and* more believe volumes will go up slightly.

ENVIRONMENTAL DISTURBANCE OF PRINTER NOISE

Location	Tolerable 1978	Tolerable 1975	Intolerable 1978	Intolerable 1975	Negligible/ No response 1978	Negligible/ No response 1975
Computer center	53	70	10	4	37	26
Offices	48	50	11	8	41	42

Table 3. Noise is becoming a more important factor for printer installations, even in the computer room, and the change will favor nonimpacts.

WHAT THEY ARE, WHERE THEY COME FROM, WHERE THEY'RE GOING

Nonimpact printing is far from new. In the mid-1960s, for example, facsimile transmitting machines used a technique to produce an image electronically on a page by sending a spark into paper coated with carbon and then with a pigment that evaporates when struck by the charge. The image is formed by the burned off white pigment leaving the black, carbon undercoating visible.

The basic theory behind almost all widely used nonimpact printing technologies is that a complex paper can be used to form an image. In the technique used in facsimile, called electrosensitive printing, the paper burns off its top layer. This is now employed by a number of low cost printers.

Another popular nonimpact technique, thermal printing, works in a similar manner. The paper is coated with a chemical that changes color when exposed to heat. Thus, the image is formed by heating tiny rods in a matrix printhead so that dots are placed on the paper when the rods heat up. This technique is used in the line of Silent 700 portable time-sharing terminals offered by Texas Instruments. It was pioneered in the U.S. by NCR, which built the first thermal printhead and terminal, and by Computer Transceiver Systems, which built the first portable, time-sharing terminal.

Still another well known nonimpact printing technology to put the complexity in the paper, not the printer, is electrostatic printing. Using a paper coated with a chemical that can hold an electric charge, the printer is constructed to place the requisite charge on the paper and then pass the paper through a bath of toner with the opposite charge. The toner adheres to the charged area of the paper, and, since toner is made of plastic, melts when exposed to high heat, forming the image. This is the reason for the fuser section in office copiers and electrostatic printers.

The principal advantage of these nonimpact technologies is that the cost for the printer is normally much lower than for impact devices that operate at similar speeds. This is because most of the complexity is placed in the paper in nonimpacts, while it must be placed in the printer in impact units. This is particularly true in computer line printers. Electrostatic line printers are one-third the cost of equivalent impact units, for example. Electrostatic paper, on the other hand, is three times the cost of plain paper.

While most nonimpact techniques place the complexity in the paper, there is one technique—electrophotographic (also known as xerographic)—in which the complexity is returned to the printing device. In this technique, a charge sensitive drum is used for the imaging. Light causes the drum to be charged. Toner is then applied to the drum, which rolls against the paper. The toner is thereby transferred to the paper, and then fused.

So far, the electrophotographic printers have been ultrahigh speed in operation, with IBM's 3800 line printer, for example, operating at 13,000 lpm and costing $310,000.

Other nonimpact printing techniques are also gaining in favor, particularly ink jet printing. In this technique, a tiny jet shoots droplets of charged ink through an electrical field. By adjusting the charge in the field, the charged ink can be deflected so that it lands on a specific point on the paper. In this manner, it is possible to paint a matrix image on the paper. IBM's well known 6640 Document Printer that operates on the Office System/6 has a 24x40 dot matrix and shoots ink droplets at the rate of 117,000/second. It literally paints its image, character by character. The ink first forms the leftmost portion of the character then moves across.

While IBM's ink jet is the best known, it is far from the fastest or most elegant. These distinctions belong to a printer from the giant paper company Mead. This firm offers its Dijit printer to forms manufacturers. The Mead Dijit is harnessed to printing presses and has multiple ink jets that allow it to print from 48,000 lpm to 60,000 lpm—almost 1,000 times faster than IBM's ink jet.

The leading suppliers of nonimpact printers are old friends to those in the computer industry. IBM is the leading vendor today by a substantial margin because of its 3800 computer line printer and 6640 Document Printer. Siemens and Xerox are also leading producers because of their computer line printers. The Siemens unit, the ND-2, has found rapid acceptance in worldwide markets, as have the Xerox 9700 (18,000 lpm) and 1200 (4,000 lpm).

While the above firms all produce ultrahigh speed line printers, Texas Instruments has become a leading nonimpact printer supplier via the low speed route. Its line of Silent 700 portable thermal printer terminals has become highly successful worldwide and is now in such demand that there is often a waiting period of two months to obtain units.

Besides these firms, other leading manufacturers of nonimpact printers include Versatec, Olivetti, Computer Devices, Honeywell, Hewlett-Packard, and Computer Peripherals.

In 1978, the market for nonimpact printers is estimated to be in the vicinity of $481 million, which indicates a growth rate of 60% during the last few years. While this rate is expected to slow—nothing grows that fast forever—the long-term prospects for nonimpacts is quite rosy. In overall size, the market is expected to boom during the next five years, reaching a level of $795 million despite substantially decreasing prices of nonimpact units.

While forecasting the market further is subject to much higher inaccuracy, it appears at this point that the five to ten year outlook is such that nonimpact printer growth should slow down, but still top the $ billion market by the late 1980s.

Clearly, nonimpact printers seem headed for some good years. ✻

impact line and character printers would be in use at their companies in two or three years. The results are shown in Table 5.

According to their answers, the growth of nonimpact printers is likely to be excellent, with 68% of the users saying they now *prefer* to purchase nonimpact printers instead of impacts. In particular, the next few years should be phenomenal for nonimpacts, with respondees saying their installed bases would increase by almost 300%!

None of the respondees, incidentally, expects to replace all of his impacts with nonimpacts. They have all said that impact printers are needed to handle specific functions such as forms, invoices, and checks. And that brings us back to the disadvantages of nonimpacts.

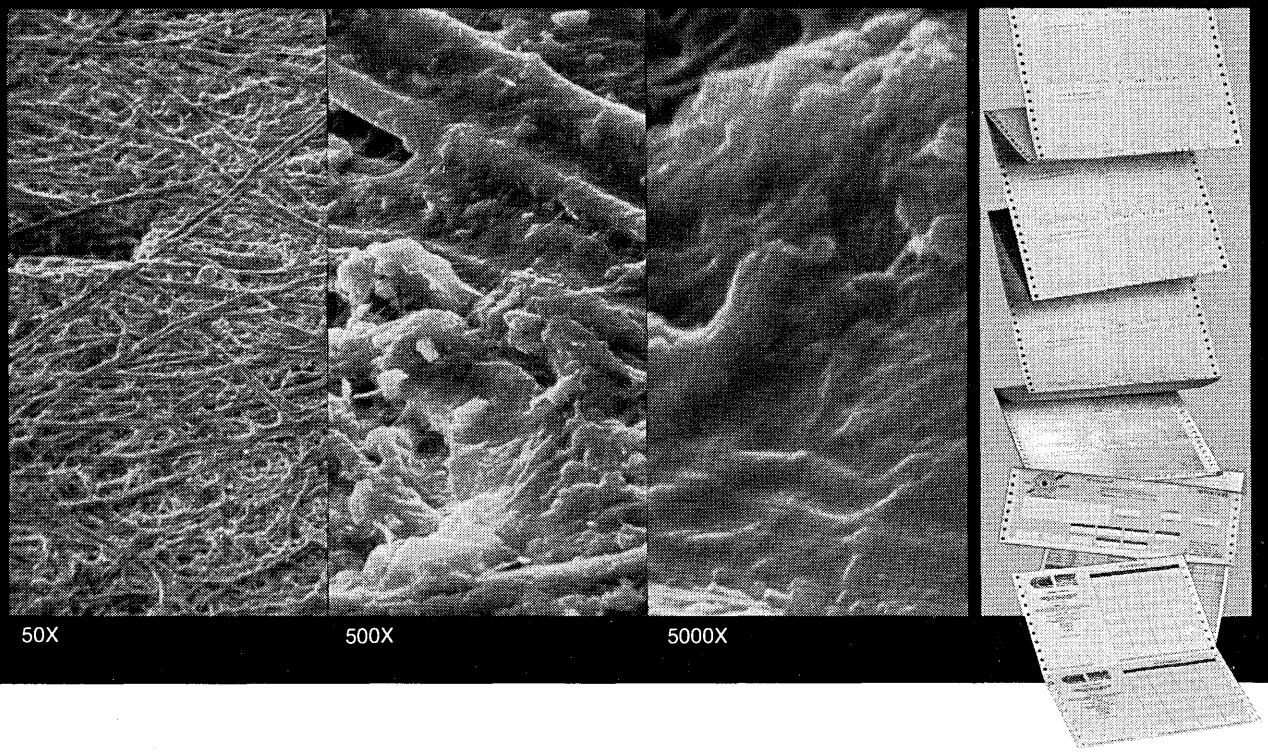
DISADVANTAGES OF NONIMPACTS

There is still a solid minority, 10 out of 40, of the users who do not wish to switch to nonimpacts. And the 15 companies surveyed which do not yet have nonimpacts on site but plan to switch also bring up some of the same problems with nonimpacts.

Cost is an often mentioned factor. Available nonimpact line printers cost more than impact printers, as mentioned earlier. In addition, some of the high-speed units require special paper, which adds to the cost of their operation. Paper cost is a significant complaint in discussing the slower character printers as well, even though the printers themselves may be less expensive than impact devices.

Incompatibility is also frequently mentioned. The Honeywell Page Printer, for instance, is currently incompatible with the NCR Criterion, according to one manager. Another complains that his Burroughs equipment cannot operate with nonimpacts, as does a third who runs CDC equipment. "When the vendors are ready to adjust to following the industry trends, rather than the trends of IBM," said one, "they will find some new users."

There's more to paper media than meets the eye



This close look at a business form shows details not apparent to the naked eye. And while forms design normally does not require the high technology of a scanning electron microscope, the process of designing and manufacturing business forms is a complex and demanding task.

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CHANGES IN USAGE OF NONIMPACT PRINTERS

Functions	Number using 1978	Number using 1975	Percentage of users 1978	Percentage of users 1975
Console terminals	4	16	27%	44%
Auxiliary to crt	4	8	27%	22%
Off-line computer printer	3	10	20%	28%
On-line computer printer	5	4	33%	11%
Time-shared terminals	7	16	47%	44%
Other	2	3	13%	8%

Table 4. Many of those responding used their nonimpact printers for more than one purpose; thus the count of users and percentages add to more than 100% of the 15 sites responding. All data is from the 1978 study.

FORECASTS OF NEW NONIMPACT PRINTER INSTALLATIONS

	Installed 1978	Installed 1980	Percent Increase
Line printers	15	58	290%
Character printers	455	925	103%
Total	470	983	109%

Table 5.

Other users aren't waiting for that to happen. Two respondees said they were actively developing interfaces for their computers with nonimpact line printer manufacturers.

Several managers expressed a concern about the reliability of nonimpacts. Having had little or no experience with these printers, they fear that not all of the bugs have been worked out.

Another issue is conversion. Users who have purchased impact printers point out that it is far easier to switch over for those who have only leased. Still, several of these managers expressed an intent to dispose of their impact units and switch over within the next few years, although they are somewhat disappointed that the process will take so long to accomplish.

WHAT THE FUTURE HOLDS

A hint about what is likely to happen for these users and others came at the Hannover Fair in Germany this year, where the Japanese electronics giant Toshiba quietly displayed a nonimpact, plain paper line printer that operates at 1,000 lpm. The unit is essentially an office copier harnessed to an optical-fiber imaging process. Its price, through unofficial sources, was quoted to be $7,000 in oem quantities. The suggestion is clear: by customizing their office copiers, Japanese manufacturers could soon flood the U.S. market with line printers capable of matching impact printer speeds but selling for $ thousands less.

There is already a precedent. In the early 1970s, Xerox ruled the world of office copiers and showed no particular concern over losing its lead. Users, however, were quickly reaching the stage where they were willing to consider alternatives. What happened was aptly described by Richard Shaffer in a *Wall Street Journal* feature published on May 17, 1978. "Following the pattern of their triumphs with cameras, small cars, and television sets," wrote Shaffer, "the Japanese, in just five years, have come from nowhere to an 80% share in 1977 of all new business in a fast growing part of the office-copier industry: the low-volume machines that make copies on ordinary paper."

The same pattern seems to be developing in the computer line printer business. It may just happen that the Japanese find a much higher level of success in supplying nonimpact line printers on an oem basis to computer manufacturers than is expected. Nor is this success likely to be limited to Japanese firms alone. Both IBM and Xerox are fully capable of producing competitive models, along with at least a dozen or two other U.S. firms. The prospects of gaining a foothold in a market that is above $100 million yearly and rising at 10% to 15% is likely to spark more than one of these firms to make an entry.

The point is that Japanese and, presumably, American manufacturers are shortly going to be introducing a raft of nonimpact line printers that operate at speeds from 1,000 lpm to 5,000 lpm. Their prices will be competitive with existing impacts. (For example, a 900 lpm printer from Dataproducts, the Model 2290, is priced at $9,400 in oem quantities of 100; this is 35% above the estimated price for the Toshiba unit.)

Such machines could open up the vast middle ground of printers lying between the terminal-oriented serial devices and the superspeed page printing systems, a territory which previously has been closed to nonimpacts. In medium size shops that operate three or four printers, for example, it will probably make sense to have one or two nonimpacts along with the impact devices. The only changes necessary would be in JCL.

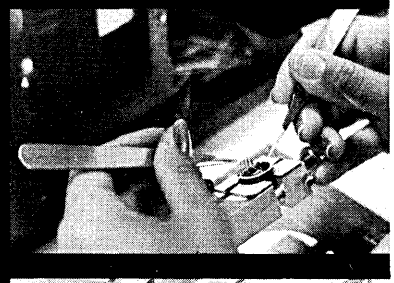
Consider the potential cost benefits for the user: 30% or so lower cost hardware, 20% to 25% lower forms cost, and potential savings in maintenance (although this part is less certain—office copiers are not exactly noted for their high reliability).

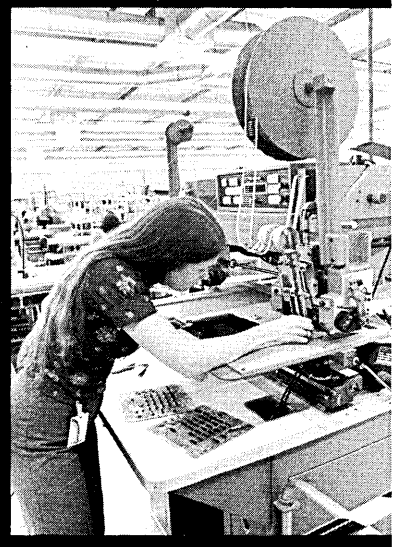
Most likely, all shops with varied printing needs will come to the same opinions expressed by current users of nonimpact printers, which are typified by one manager's comments: "Impact printers and nonimpact printers both have their place in our company. We have not thrown away our pencils because of the availability of pens. They complement each other, and through the use of both (impact and nonimpact), our effectiveness is much greater than ever before."

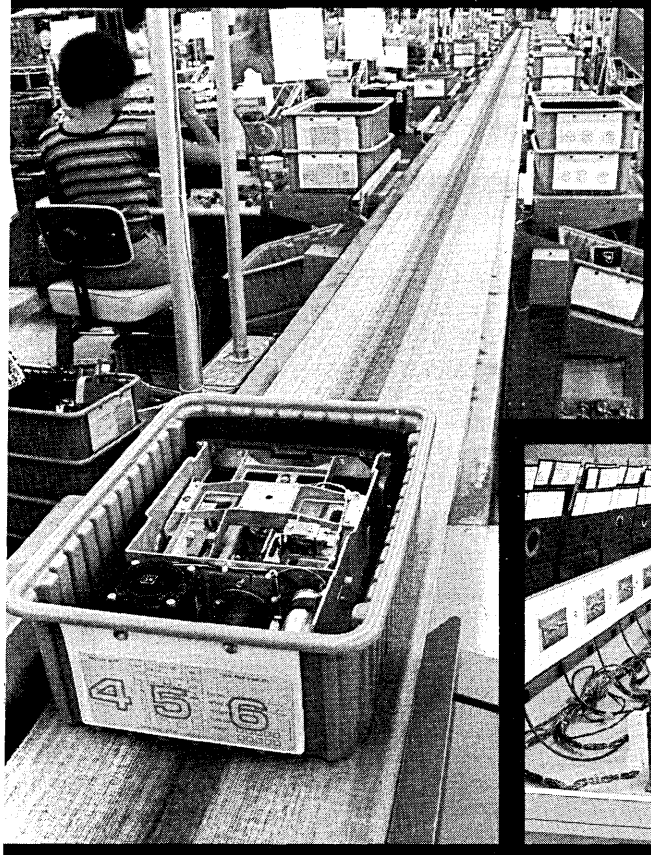
This feature has been adapted from a 220 page report published in May by International Research Development Inc., of New Canaan, Conn. Titled "Non-Impact Printers," that study is available from IRD for $795.

STEPHEN A. CASWELL

Mr. Caswell is the director of development for International Resource Development Inc., where he is responsible for the management of market development studies such as the one on Non-Impact Printers. He is also the editor of IRD's twice monthly newsletter *EMMS* (Electronic Mail & Message Systems), and the author of a number of multiclient studies including "Telecommunications Market Opportunities in the U.S., 1978," and "Printers and Paper in the Office of the Future."







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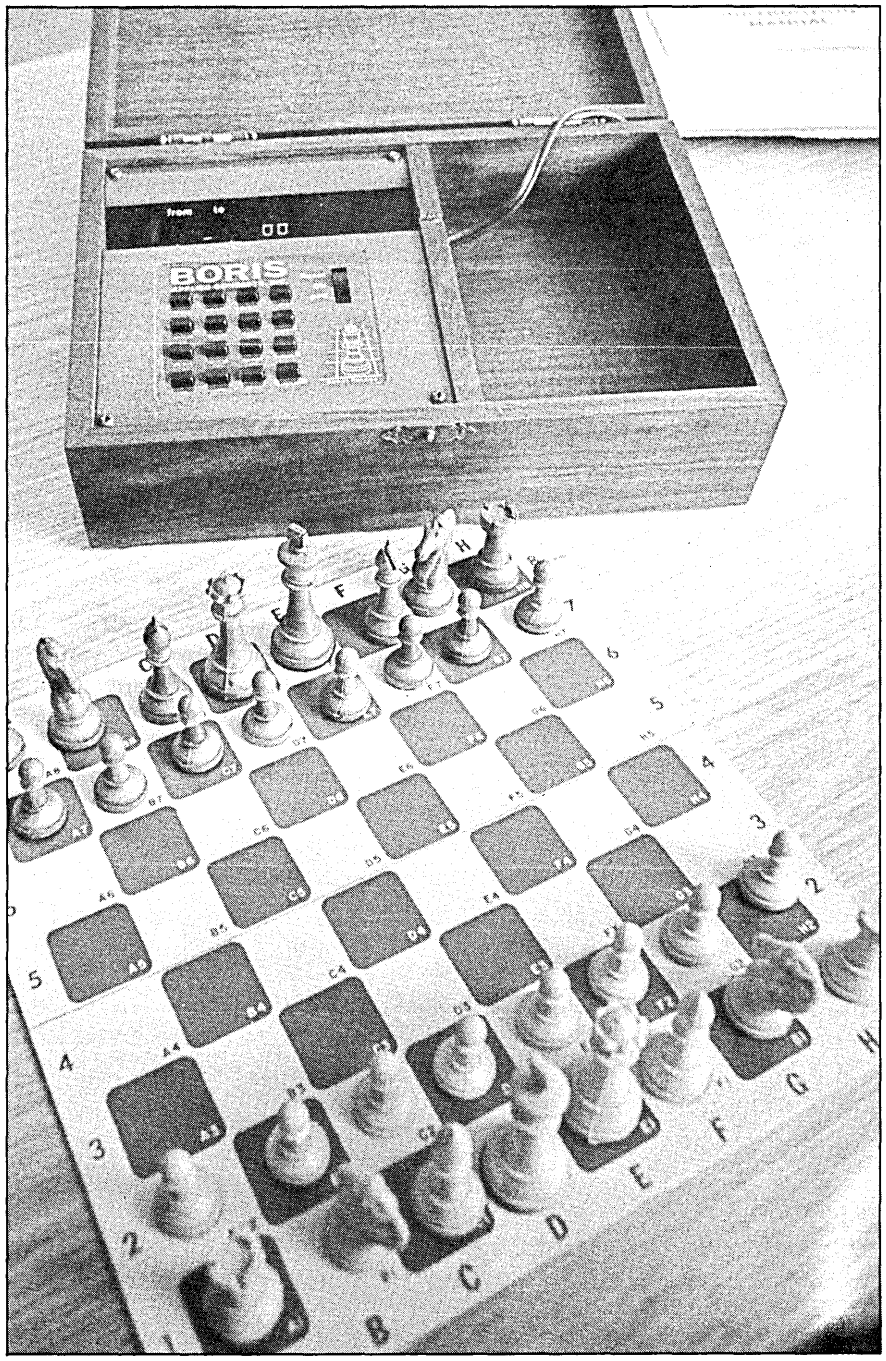
HERE'S WISHING YOU A DIGITAL CHRISTMAS

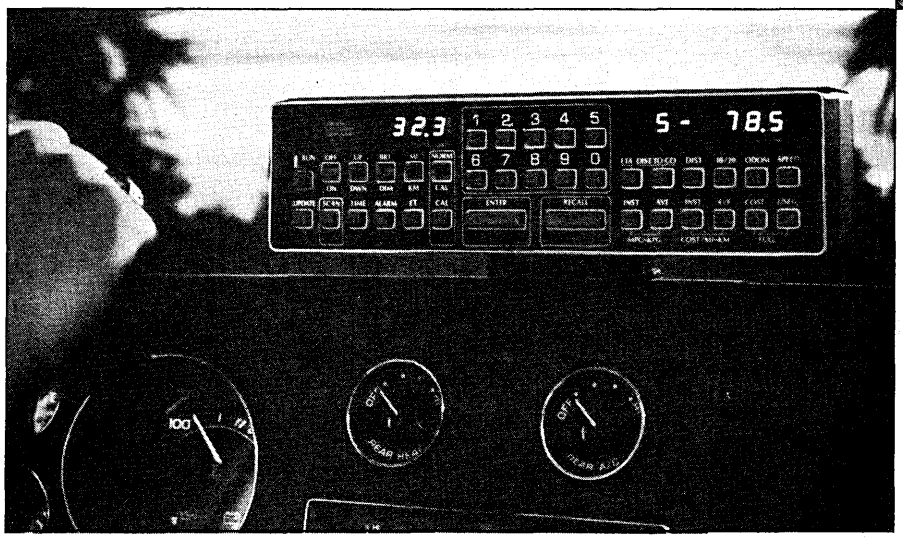
by Laton McCartney, Associate Editor

Can't think of what to give that special man or woman in your life for Christmas, or what you'd like to find in your own stocking? Well, when old St. Nick climbs down the chimney this year, he's likely to be carrying a host of microprocessor-based goodies in his gift bag—presents that are just the thing for the dp professional who has everything. Here's a sampling:



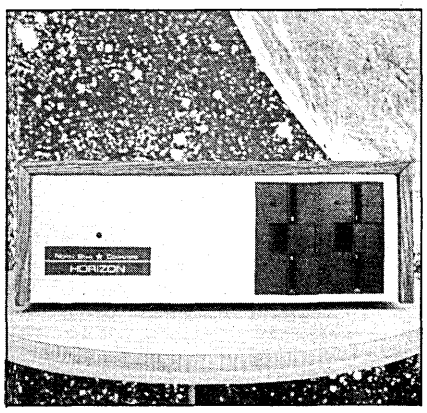
Beat Boris, the master chess computer, at his own game. The hand-crafted walnut case contains a microcomputer, chess pieces, and folding board. Available at most Brentano stores. $300.

Teach Junior and Jane how to spell Mississippi and improve their reading as well with Speak & Spell. The machine which has audio response capabilities, stores more than 200 of the most common reading and spelling stumbling blocks. Available from stores that carry Texas Instruments calculators. $50.



Install a processor in your car with the Prince On-Board Computer. This dashboard-mounted machine can be used to determine everything from your current location to the estimated time of arrival. You can even use the five separate memory banks to store the location of speed traps along your route. The Prince will automatically trigger an alarm as you approach the smokies in hiding. Retails for $449 at Automotive Air Conditioner outlets around the country.

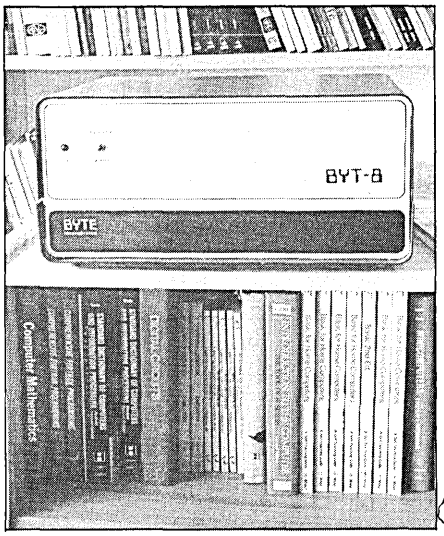
Keep track of your blue chips with Marketline, a quotation terminal that gives you the latest Big Board prices in your own home or office. Available from Hammacher Schlemmer, New York City. $500.

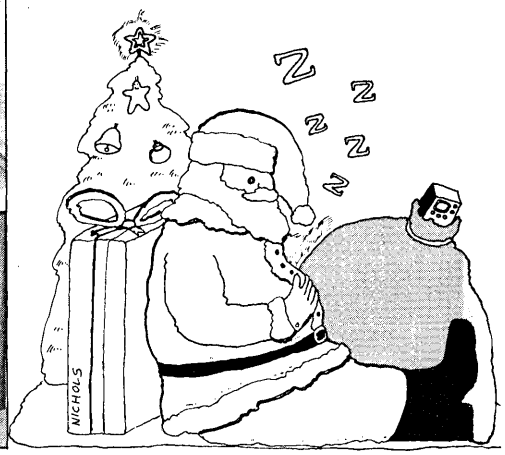


The North Star Horizon microprocessor system with its integrated floppy disk makes a nice addition to any Christmas gift list. Available assembled, through most computer stores, with 16K memory from $1,899.

ILLUSTRATIONS: © MIKE NICHOLS

On the first day of Christmas, your true love gave to you—one personal computer, two floppy disks, and your very own crt. And here, boys and girls, is a sampling of some of the more popular personal systems on the market today: The VideoBrain, which comes with 1K RAM and 4K ROM memory and sells for about $500 at many major department stores, including Macy's and Bloomingdales; the popular TRS-80, which starts at $599 with 4K memory and is offered by most of Radio Shack's national outlets; the BYT-8, priced at about $500 assembled and sold at the Byte Shop East in New York City and in other Byte outlets around the country; Sorcerer, priced at $895 with 8K memory and sold through most computer stores. ✲





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CIRCLE 38 ON READER CARD

A plethora of home computers to choose from? Wait till next year.

WHAT SANTA WON'T BRING YOU

by Marvin Grosswirth

In the closing months of last year, you may recall, the 1978 holiday season was expected to be "The Christmas of the Computer." Department stores were expected to sell millions of the little electronic devils to customers desperately seeking that special something for The Person Who Has Everything.

As things now stand, however, you may have to shop around a bit for the computer of your dreams. Much of the optimism that was to have permeated the mass retailing industry is manifested today, instead, by cautious market testing. Uncertainty is the keynote, and reticence is the rule: nobody wants to talk about it very much.

One retailing executive puts it this way: "I'm not as optimistic today as I was six months ago about a mass market in home computers." What has happened to dampen all the enthusiasm?

For one thing, the customer profile is changing rapidly. Stanley S. Veit, proprietor of Computer Mart of New York, said: "The kit-builder is gone. Most of my customers today are users who want everything built and running and guaranteed. Ninety percent of our original customers were involved in the electronics or computer fields. Now we're getting completely different people." Veit's current customers are physicians and dentists, operators of small businesses and corporate executives who want ready access to their own files—a far cry from the hobbyists who use their computers to play chess and tic-tac-toe.

At least one major company has recognized this shift and is acting accordingly. T. Eugene Smith, a Pertec vice president, said: "For the foreseeable future, we plan to increase our growing emphasis on . . . systems for business applications, de-emphasizing the computer kit or hobby-type business." Smith now talks about "our primary market, the business sector . . ."

With companies like Pertec moving out of the home-user market, other manufacturers should be moving in. Apparently, they are—more or less. Radio Shack, for example, claims that their TRS-80's are a commercial success. To what extent, however, is a secret. "We're not publishing any numbers of any kind," says John Burnam, a Tandy executive, "about sales, production, or anything like that." He insists that "business is good" and that production is keeping up with

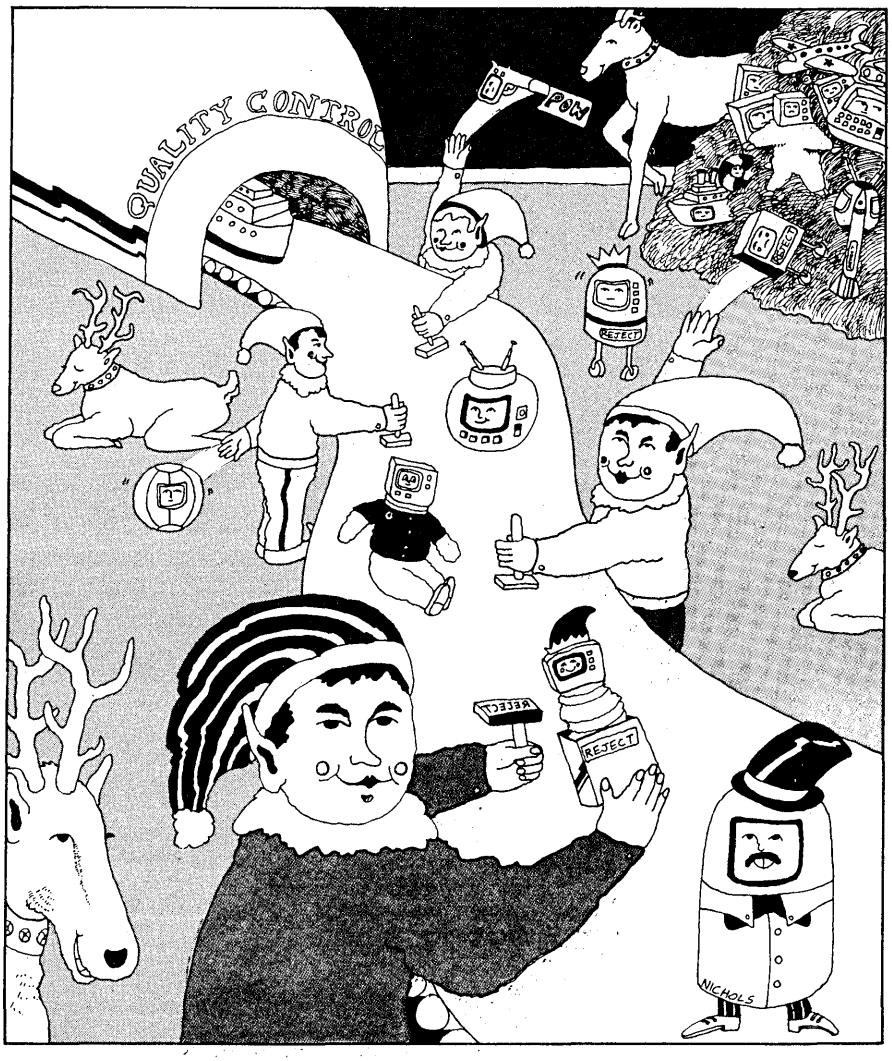


ILLUSTRATION: ©MIKE NICHOLS 1978

"Three months after Christmas, 90% of those things will be thrown into a closet and not used."

demand. Radio Shack will not be selling computers in other people's stores "We don't have to," Burnam said bluntly. "We have 110 franchised stores, 4,000 company-owned stores, and 2,000 dealers who have exclusive rights to the Radio Shack line." Where does that leave Sears, Montgomery Ward, J. C. Penney, K-Mart, Spiegel, and the other retailing giants? They aren't talking.

At least not for publication. One executive of a major department store chain agreed to talk if his anonymity, and his company's, were guaranteed. We'll call him Frank Ernest and his company Biggie Stores, Inc. You can substitute the name of virtually any large retailing chain without being far off the mark.

"In 1978," Ernest said, "we'll be testing ... not the product, but the marketing of the product. Who's going to buy computers? No one really knows. We get a lot of answers, but there's been no research so far. Therefore," he predicted, "you're simply not going to find home computers nationally in our stores or in any other large, mass-distribution retailer's." Key stores, located in major metropolitan areas, will carry some computers this year. How they sell will determine whether 1979 will herald "The Christmas of the Computer."

Another problem is software. Hobbyists are capable of writing their own programs; indeed, they enjoy doing so. But Warren Zorek, electronics department manager for the trendy Bloomingdale's stores, states: "My type of customer ... is not going to sit down and write his own programs." All 12 Bloomingdale's stores will be carrying computers this Christmas, but Zorek will not discuss brands, quantities or prices.

HARDWARE REPAIR Maintenance and service are also giving would-be computer retailers nightmares. Computer Mart's Veit predicts that department stores will sell every unit they carry but envisions, within weeks after the Christmas rush, "people walking in here with those damned things with the wires dragging out of them and getting mad at me because I won't fix 'em."

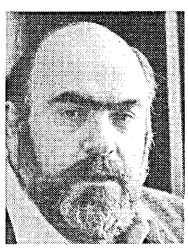
Biggie Stores plans to establish national service and maintenance centers. "We can get together some experts and train them at any one place," Frank Ernest said, "but the trick is to do that in a great many places. And we have to put that together this year." That is another reason Biggie won't be selling computers in all its outlets.

Bloomingdale's Zorek also recognized the problem. "The companies with whom we do business," he said, "will have service available; we've stressed that in our basic discussions. They will have to set up local service centers." Almost all the microcomputer manufacturers are west of the Mississippi, so without those local service centers, repairs and maintenance could prove an expensive nuisance to a computer owner. Veit is unimpressed by service claims. "I still think," he said, "that three months after Christmas, 90% of those things will be thrown into a closet and not used."

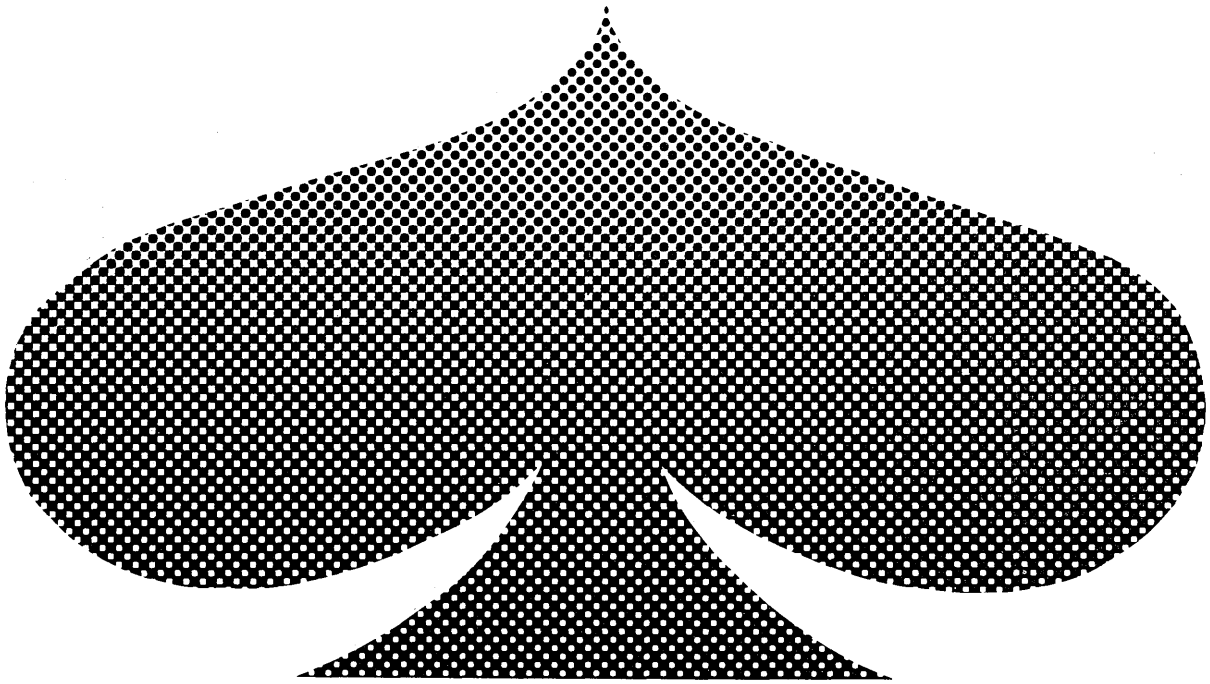
Perhaps the greatest damper on the retailing establishment's enthusiasm is, paradoxically, the rapid advance in technology. "Just look what happened with with calculators and digital watches," Frank Ernest said. "Within a couple of years, advanced technology made seemingly sophisticated products obsolete and caused prices to plummet. Since computers are built around the same chip technology, only a fool would predict that the same thing won't happen in this industry."

What does it all mean to the prospective buyer as Christmas approaches? First, virtually all major chains and catalog companies will have some computers, but not in all stores, and the selection will be small in any given store. Every machine will have some software, but promises of more to come will exceed what's available today. And for serious applications, the best bet is still the local computer stores that started all this madness. Merry Christmas. ❋

MARVIN GROSSWIRTH



A New York City writer whose material has appeared in DATAMATION in the past, Mr. Grosswirth is a free-lance writer on technical and scientific subjects for the layman. He is also the author of *Beginner's Guide to Home Computers* (Dolphin-Doubleday, 1978).



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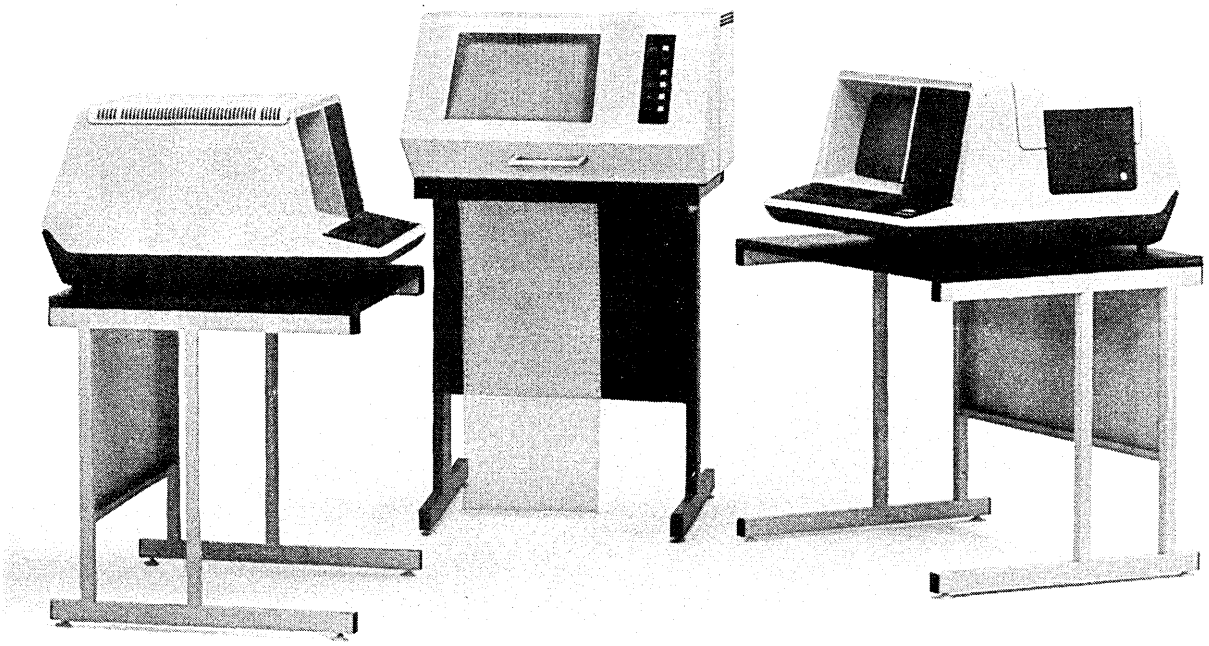

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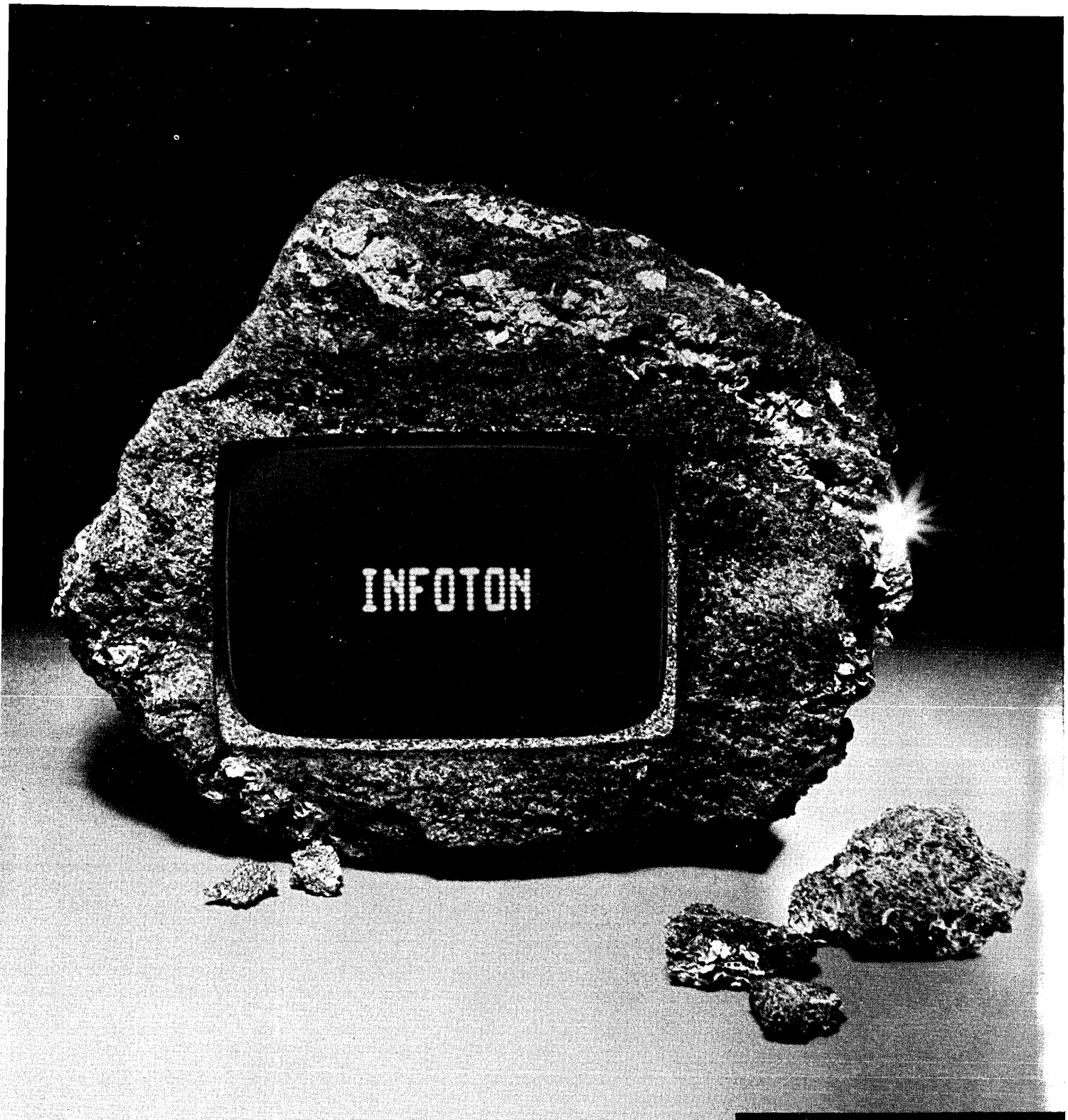

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CIRCLE 72 ON READER CARD

The system design should be creative; the coding should be downright dull and certainly predictable.

THE SKELETON PROGRAM METHODOLOGY

by David Schechter

The program skeleton is a source program constructed during the latter stages of detailed system design. It incorporates all file, record, and data element descriptions, together with a standardized Procedure Division implementing the top level of a structured program.

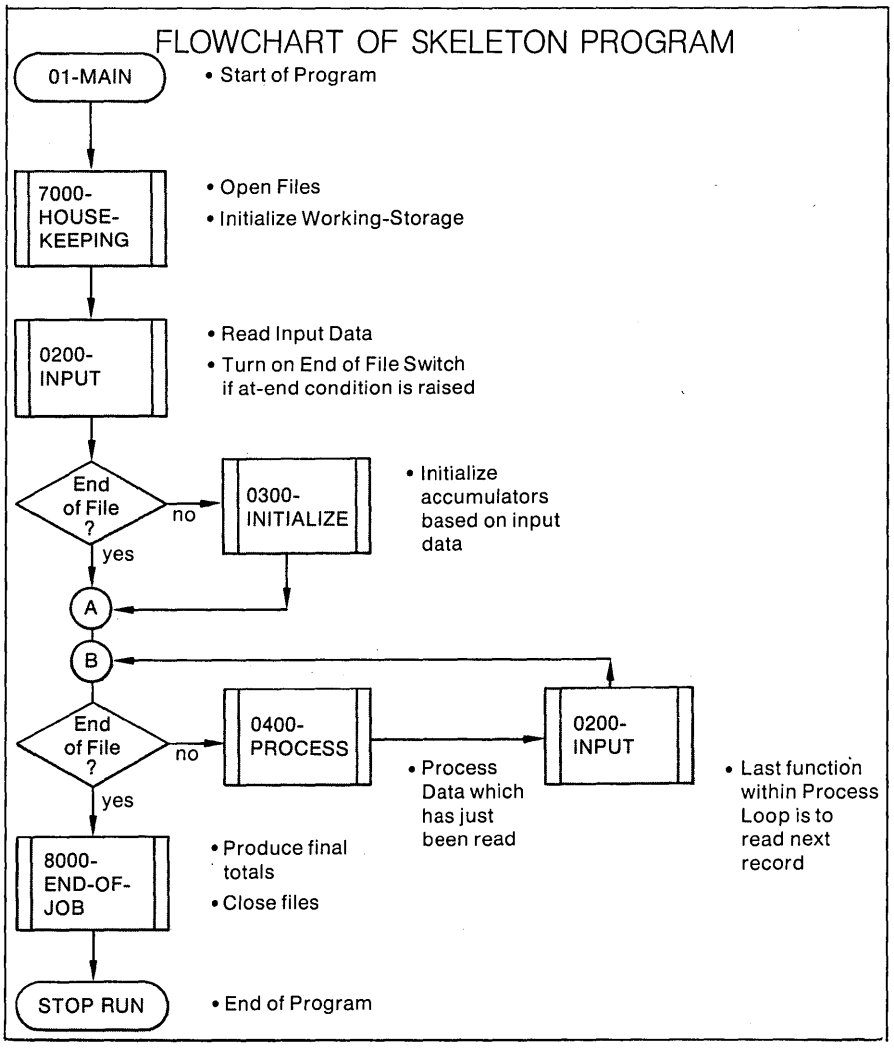
Where a source program library facility exists, the skeleton program is cataloged in that library. The skeleton is reproduced as many times as there are source modules to be coded. The essential task of the programmer, then, is to customize his particular version of the skeleton program until it satisfies the requirements of the program specification.

There are several major justifications for the skeleton approach. They are: custody, uniformity, illustration of standard technique, control over progress, and visibility.

Custody. A particular problem encountered during system implementation is that of locating all the programming components so that the status of work in progress can be determined. The approach of starting with all programs recorded in a library and requiring all coding to be updated in the library assures that there is custody of the entire system at virtually all times. Computerized library systems enable several people to obtain copies simultaneously. Consequently the programmer has a copy to work upon, the supervisor a copy to review. The work effort is thus conducted in parallel with the review effort.

If a specific programmer working on a module becomes unavailable because of some emergency, another programmer can immediately pick up the work, as the work is always on file in the library. A module cannot be "lost." And the matter of delivering the programs is simply one of transferring custody over the source statement library from the project librarian to the person designated by the systems/dp management as the recipient of all source programs.

Uniformity. To achieve a certain degree of interchangeability of programming tasks, it is essential that all modules have a common form. The skeleton program approach not only provides common forms, but identical names and structures as well. Consequently, a programmer need not be concerned with mastering the idiosyncracies of another programmer. Data-names and procedures-names are



spelled identically in all modules, making changes of assignment easier. Further, where there is uniformity there is the possibility of automating certain aspects of program documentation and maintenance. That is, it is possible to write programs to document and maintain other programs. Automating the process of writing documentation is very useful in that changes to the programs are automatically recorded as they occur. For example, the documentation identifying the programs to be recompiled when a change is made to a given layout is derived by cross-referencing, on a system-wide basis, all COPY statements.

Some documentation is used for reference purposes only. Such documentation is generally static. System overviews, for example, change very little, if at all, during the post-installation stage of system maintenance.

There is, however, a class of documentation needed to assist in taking effective action. This documentation must be accurate at all times. To be accurate, it must be derived dynamically from the implemented system. A system composed of uniformly developed source modules provides the necessary input to a process of dynamically derived documentation.

Illustration of Standard Technique. Nearly every dp organization is equipped with programming standards. They usually repose on the bookshelf of a recognized authority figure. The problem is that the standards exist in books and in theory and not in the program code where they ought to be embedded.

For one thing, standards are not self-explanatory. Because of this, even where there is a will on the part of the programmer to follow them, there can be errors of interpretation. To paraphrase the old adage, an illustration is worth a thousand words. The skeleton program exemplifies the standards to be carried forward. The concepts of "self-locating" code and structured programming are in effect made the property of the programmer who receives a copy of the skeleton. It is then the task of the programmer to maintain these standards by applying them in the continuation of program development as opposed to interpreting them.

Control over Progress. The technique, discussed below, of assigning short range tasks regarding the customizing of the skeleton to the needs of the specification, provides a basis for evaluating the programmer's understanding of the specifications as well as the quality of the specs themselves. Progress is controlled only when there are frequent checkpoints at which a binary determination is made: the task is completed or not. No task is considered in terms of percent completed; rather, there are only two reportable percentages as far as tasks are concerned—100% or 0%.

Visibility. The sight of a programmer hunched over a coding sheet is often mysterious. Is that page being coded the second of three or the second of three hundred? We don't know this until the whole program is dispatched to keypunch. Until that happens we do not even observe the quality of the code or its relevance to the program specifications. The source library approach requires that coding be deposited in the source library on a daily basis. This makes the progress of the coding visible and therefore reviewable on a daily basis.

ILLUSTRATION OF COBOL

```
000100 IDENTIFICATION DIVISION.
000200* ------------------------------------------------------------------------ *
000300*     A BRIEF NARRATIVE OVERVIEW OF THE FUNCTION PERFORMED BY              *
000400*          MODULE IS ENTERED HERE AS A REPLACEMENT FOR THIS                *
000500*          COMMENT.                                                        *
000600*     IF THE MODULE IS A SUBPROGRAM REQUIRING A CALLING SEQUENCE           *
000700*          AN ILLUSTRATION OF THE CALL STATEMENT TO INVOKE THE             *
000800*          MODULE IS SUPPLIED AS A COMMENT.                                *
000900* ------------------------------------------------------------------------ *
001000 PROGRAM-ID.                              SKELETON-PROGRAM.
001100* ------------------------------------------------------------------------ *
001200*     THE ACTUAL PROGRAM-NAME INDICATED BY THE MODULE                      *
001300*          SPECIFICATION REPLACES THE OPERAND, "SKELETON-PROGRAM"          *
001400*          AND THIS COMMENT IS THEN DELETED.                               *
001500* ------------------------------------------------------------------------ *
001600 DATE-COMPILED.                           TODAY.
001700 AUTHOR.
001800                                          AUTHOR-NAME.
001900     INSPECTED BY.
002000                                          REVIEWER-NAME.
002100 INSTALLATION.
002200                                          INSTALLATION-NAME.
002300* ------------------------------------------------------------------------ *
002400* DATE-WRITTEN.                           DATE-WHEN-CODING-STARTED.        *
002500* DATE-REVISED.                           DATE-OF-REVISION.                *
002600* PROGRAM-STATUS.                         U.                               *
002700*     U=UNMODIFIED SKELETON               M=MODIFIED SKELETON              *
002800*     C=CODED                             T=TESTED                         *
002900*     P=PRODUCTION                        R=UNDER REVISION                 *
003000* ------------------------------------------------------------------------ *
003100/
003200* ------------------------------------------------------------------------ *
003300 ENVIRONMENT DIVISION.
003400* ------------------------------------------------------------------------ *
003500 CONFIGURATION SECTION.
003600* ------------------------------------------------------------------------ *
003700 SOURCE-COMPUTER.                         COPY SRCCOM.
003800 OBJECT-COMPUTER.                         COPY OBJCOM.
003900* ------------------------------------------------------------------------ *
004000 INPUT-OUTPUT SECTION.
004100* ------------------------------------------------------------------------ *
004200 FILE-CONTROL
004300* ----------------------
004400     SELECT      F1-filename-FILE        COPY select-1.
004500     SELECT      F2-filename-FILE.       COPY select-2.
004600/
004700* ------------------------------------------------------------------------ *
004800 DATA DIVISION.
004900* ------------------------------------------------------------------------ *
005000 FILE SECTION.
005100* ------------------------------------------------------------------------ *
005200 FD  F1-filename-FILE                     COPY fd-1.
005300 01  F1-filename-RECORD                   COPY record-1.
005400* --------------------------
005500 FD  F2-filename-FILE                     COPY fd-2.
005600 01  F2-filename-RECORD                   COPY record-2.
005700/
005800* ------------------------------------------------------------------------ *
005900 WORKING-STORAGE SECTION.
006000* ------------------------------------------------------------------------ *
006100 01  W1-filename-RECORD                   COPY record-1.
006200* --------------------------
006300 01  W2-filename-RECORD                   COPY record-2.
```

THE IMPLEMENTATION

The following points should be raised in discussing the program skeleton:

Identification Division.

1. The module overview, taken from the program specifications, will replace a generalized comment occurring immediately after the Identification Division.
2. The term SKELETON-PROGRAM in the PROGRAM-ID paragraph is re-

SKELETON PROGRAM

```
006400* ----------------------------
006500  01  W21-SWITCHES.
006600      03          W21-1-ON                    PIC  X    VALUE "1".
006700      03          W21-2-OFF                   PIC  X    VALUE ZERO.
006800      03          W21-3-END-OF-FILE           PIC  X    VALUE ZERO.
006900          88      CW21-3-1-MORE-DATA                    VALUE ZERO.
007000          88      CW21-3-2-NO-MORE-DATA                 VALUE "1".
010000/
010100* ------------------------------------------------------------------------------------------------------------ *
010200* PROCEDURE DIVISION.
010300* ------------------------------------------------------------------------------------------------------------ *
010400  01-MAIN                                        SECTION.
010500* ------------------------------------------------------------------------------------------------------------ *
010600  0100-START-OF-PROGRAM.
010700* ----------------------------
010800      PERFORM             7000-HOUSEKEEPING.
010900      PERFORM             0200-INPUT.
011000      IF                  CW21-3-1-MORE-DATA
011100          PERFORM         0300-INITIALIZE.
011200      PERFORM             0400-PROCESS
011300          UNTIL           CW21-3-2-NO-MORE-DATA.
011400      PERFORM             8000-END-OF-JOB.
011500      STOP RUN.
020000* ------------------------------------------------------------------------------------------------------------ *
020100  02-INPUT                                       SECTION.
020200* ------------------------------------------------------------------------------------------------------------ *
020300  0200-INPUT.
020400* ----------------------------
020500      READ                input-file-name     INTO  work-area    AT END
020600          MOVE            W21-1-ON            TO    W21-3-END-OF-FILE.
030000* ------------------------------------------------------------------------------------------------------------ *
030100  03-INITIALIZE                                  SECTION.
030200* ------------------------------------------------------------------------------------------------------------ *
030300  0300-INITIALIZE.
030400* ----------------------------
030500* ------------------------------------ interpolate detail coding here ------------------------------------ *
040000/
040100* ------------------------------------------------------------------------------------------------------------ *
040200  04-PROCESS                                     SECTION.
040300* ------------------------------------------------------------------------------------------------------------ *
040400  0400-PROCESS.
040500* ----------------------------
040600* ------------------------------------ interpolate detail coding here ------------------------------------ *
049900      PERFORM             0200-INPUT.
700000/
700100* ------------------------------------------------------------------------------------------------------------ *
700200  70-HOUSEKEEPING                                SECTION.
700300* ------------------------------------------------------------------------------------------------------------ *
700400  7000-HOUSEKEEPING.
700500* ----------------------------
700600* ------------------------------------ interpolate detail coding here ------------------------------------ *
800000/
800100* ------------------------------------------------------------------------------------------------------------ *
800200  80-END-OF-JOB                                  SECTION.
800300* ------------------------------------------------------------------------------------------------------------ *
800400  8000-END-OF-JOB.
800500* ----------------------------
800600* ------------------------------------ interpolate detail coding here ------------------------------------ *
900000/
900100* ------------------------------------------------------------------------------------------------------------ *
900200*                              E N D     O F     P R O G R A M                                             *
900300* ------------------------------------------------------------------------------------------------------------ *
```

placed by the actual program-name indicated in the specifications.

3. The DATE-COMPILED paragraph is unchanged. The computer will insert the actual date at compile time.
4. AUTHOR-NAME in the AUTHOR paragraph is replaced by the name of the program coder.
5. INSTALLATION-NAME will already be that of the specific organization which owns the program.
6. In *DATE-WRITTEN, DATE-WHEN-CODING-STARTED the entry is the month/day/year when the program coder takes possession of this particular copy of the program skeleton.
7. *DATE-REVISED represents the month/day/year when logic changes in the specification occasion changes to the module after it has already been compiled. There will be as many *DATE-REVISED entries as there are revisions.
8. *PROGRAM-STATUS represents the current status of the module.

Environment Division.

1. Configuration Section.
   a. Source Computer. The identity of the source computer is found in the COPY member, SRCCOM. In the event the source computer is changed, only the text within the COPY member SRCCOM will have to be changed. When the standard COBOL Debugging Facility is introduced, this member SRCCOM, can be supplied with the phrase, WITH DEBUGGING MODE.
   b. Object Computer. The identity of the object computer is found in the COPY member, OBJCOM. In the event the object computer changes, only the text within the COPY member OBJCOM will have to be changed.
2. Input-Output Section.
   a. File-Control. Each file for the system is associated with a specific COPY member for expanding the SELECT statement. This assures that a consistent Data Definition Name (DD-name) exists for all references to a given file throughout all job-streams.

Data Division.

1. File Section.
   a. File Description. Each file requires a File Description (FD) which specifies LABEL RECORDS RECORD CONTAINS. For each FD there is a COPY member in the Source Statement Library.
   b. Data Record. Each data record (01) appears beneath the FD to which it is subordinate. The content of the data record is derived via COPY from the Source Statement Library.
2. Working-Storage Section.
   a. Data Records. Each data record (01) is obtained via COPY. In addition any interfaces between sub-programs are obtained via COPY.
   b. Miscellaneous data. Accumulators and switches and any other variables applicable to a program appear here.

Procedure Division.

1. Sections. The skeleton program specifies six sections, all but the first of which are entered via the PERFORM statement.
2. Paragraphs. Each section is followed by a paragraph header.
3. The 01-MAIN section is fully coded. All other sections provide space for sentences to be interpolated by the programmer. Sentences follow a rule of indentation. If a sentence spans multiple lines, all lines but the first are indented 4 columns from Margin B.

Customizing of the program skeletons to meet the requirements of the program specifications is essentially a two-

All we're doing is applying the concept of the assembly line to the manufacture of application programs.

stage process.

The first stage simply entails deleting references to files and records not indicated in the specifications. The program skeleton represents the universe of data structures available to the entire system. Any one module is going to process only a limited subset of this universe, hence the need to delete statements. In addition, there are identifying statements and comments that particularize the program skeleton. These changes and additions are made as part of the coding process.

At the completion of stage one, the skeleton module now contains specific comments, a particular PROGRAM-ID, and is purged of all nonessential COPY statements. This program is then compiled and should be free of all error diagnostics.

Stage two consists of building into the module the logic indicated in the specification. The pattern of development is top/down, meaning that the module as it is constructed is always compiled and executed.

The advantage of having all programs display the same physiognomy will be appreciated by those who work with the system throughout the maintenance stage of the life cycle.

The concept of developing an original program along the lines of a prewritten schematic is sufficiently novel to require some explanation to those whose work must be performed under such a constraint. As part of the orientation, each programmer is supplied a copy of the skeleton program. This reveals the modular programming approach in terms of the use of the COPY statement to supply all entries in the Environment and Data Divisions. Furthermore, the programmers start with a considerable portion of their program prewritten and debugged.

The program skeleton provides a Procedure Division subdivided into sections with a main section performing each of the subordinate sections. This establishes the framework in which a "structured program" is to be completed.

The approach of having all programs proceed from a common program skeleton does inhibit to a certain degree the liberties of the programmer. This is also true when COBOL is designated as the language to be used, as opposed to assembler. The benefit of devising a standard product is more significant than the loss of individual creativity. The system design should be creative. The programming which fulfills the design should be downright dull and certainly predictable. The reader should not only know what is being done by a given program, but also where the function is actually handled. The skeleton program contains a housekeeping section called 70-HSKP. Throughout the system in any module one can find where housekeeping activities are accomplished.

USE OF THE CONCEPT

The skeleton program concept has evolved over the past seven years, during which time it has always met with acceptance on the part of our clients. The approach was first developed for building an equipment leasing system for a major New York bank. The problem was to implement a sophisticated system in PL/1 using Arthur Young auditors and financial planners as the programmers. The decision was made that the application programmers would work only in a subset of the language. All data descriptions would be obtained via %INCLUDE statements; all input-output operations would be accomplished via CALL to I/O modules, which had been previously coded. The system, installed in early 1972, is still operational although the bank has gone off the PL/1 standard thereby inducing a maintenance problem.

One of the most useful concepts to emerge from this experience was that of having all record descriptions stored in a copy library and using a program to compile and cross-reference all the data-names. Part of our approach was to have data-names retain identical spellings in all record descriptions and to use the PL/1 clause, BY NAME (equivalent to COBOL's CORRESPONDING option), to move and convert data in terms of base, scale, and precision. A number of the utility programs devised for this project have been used successfully in other engagements.

The next use of the skeleton program methodology was an accounts receivable subsystem for a leading insurance company. In this case, some of the problems of building modular systems in COBOL were encountered. A utility program that would read the entire source library in order to cross-reference COPY and CALL statements (including argument/parameter lists) was required. This program, COPYCALL, has been used subsequently to manage all programming efforts involving modular applications in COBOL.

Perhaps the greatest success achieved with respect to an ongoing use of the procedure is in conjunction with a unit stock-control inventory system for a major retail jewelry chain. In this instance, the assigned system analyst recognized the skeleton program procedure as a systems analyst's approach to programming and was thus able to build other applications around this methodology, as well as maintaining the inventory system.

In 1975, this approach was used to construct a revenue accounting system for a major shipping company. The application was developed on an IBM System/3.

The next substantial advance in the development of the skeleton program concept came during the detail design of a manufacturing cost system for a publishing house. An analyst saw how the skeleton program was used to verify the accuracy of COPY statements. He suggested that this program be reproduced nine times for each of the nine report programs to be written by subcontractors hired to write the detail code. Their first task was to modify the skeleton in terms of deleting those COPY statements not applicable to their specifications, and then to build their report headings as source library members. Installed in July 1976, this system has done an excellent job of tracking estimated and actual costs for all items in the finished goods inventory as well as work-in-process.

Our latest effort will utilize a top-down approach to the extent of requiring every stage of program development to yield visible output. We are tying in the WHEN-COMPILED and debugging facilities of 1974 ANS COBOL to monitor progress in the building of a general ledger system for a major governmental organization. We anticipate deriving 200 or more modules from the skeleton. In addition, we are using the new replacement macro facility supported by the ANS 1974 compiler.

What we've devised is nothing new. Henry Ford designed the assembly line in the first decade of the 20th century. All we're doing is applying the concept to the manufacture of application programs. ✻

DAVID SCHECHTER

Mr. Schechter is a principal at Arthur Young & Co.'s national office. His 15 years experience in commerical data processing has included a wide variety of experience with managing system design and implementation. He has also specialized in training programmers in COBOL and PL/1.

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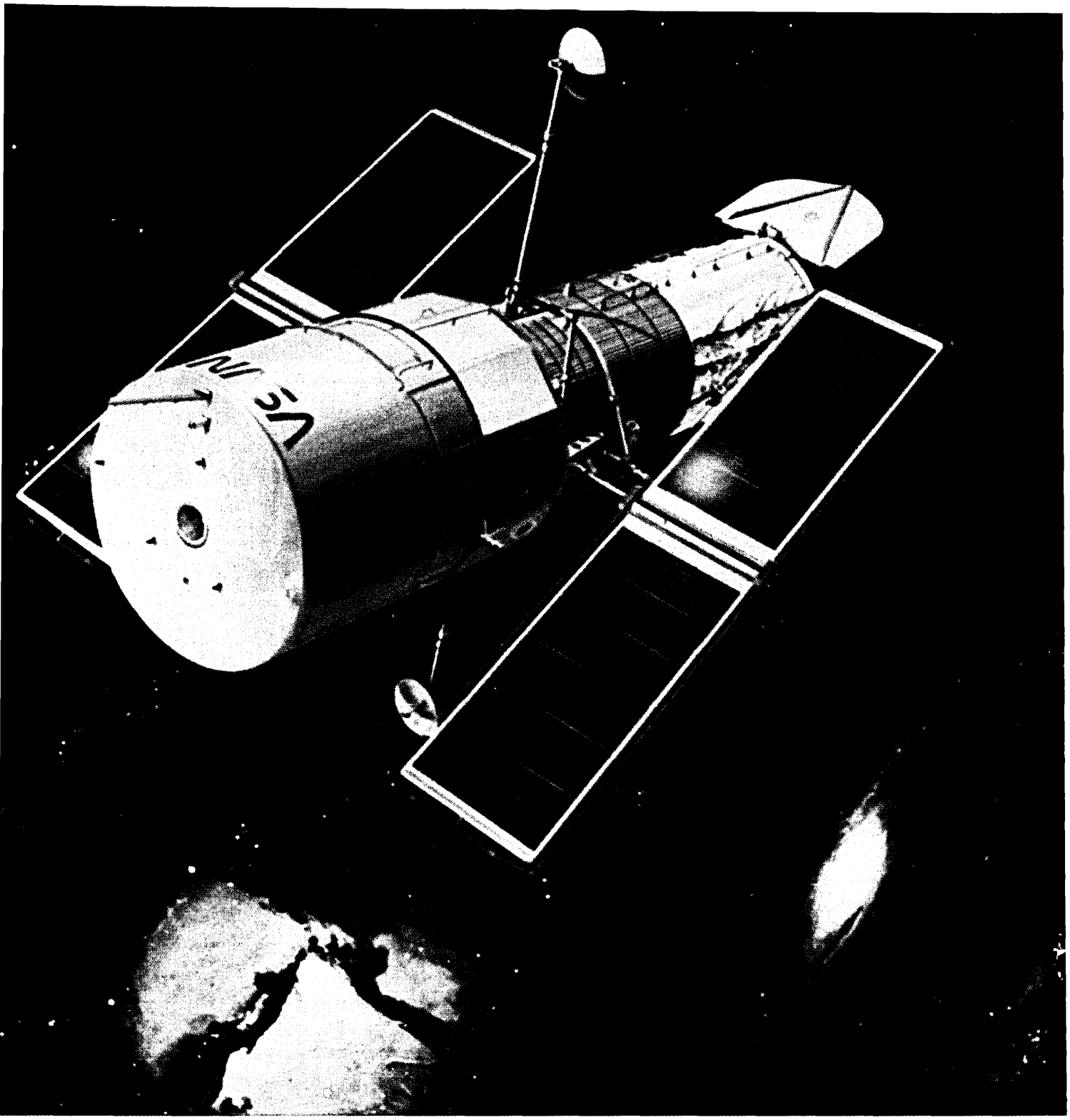

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CIRCLE 39 ON READER CARD

How Lane County created and uses computerized files to aid land use planners.

PLOTTING LAND USE IN OREGON

by Sheila Mahan, Gary Spivac, and Robert Swank

A Geographic Data System in Oregon's Lane County provides accurate and timely information for agencies that make decisions related to land and its use.

Lane County, a 4,610 sq. mi. area in the middle of the state, takes in the cities of Eugene and Springfield that sit on each side of the winding Willamette River. Almost half of its population of 252,500 lives in Eugene, which has grown 30% over the last ten years to 104,000. In an area with such growth, information was needed to resolve issues such as:

—Where are sites with adequate land, water and transportation for future residential, commercial or industrial development?

—Where can the sheriff allocate patrol resources to provide better crime prevention?

—What impact will the development of land, already zoned for development, have on current public services?

Ten years ago the development of land use information for the Eugene-Springfield metropolitan area's master development plan and for the master transportation plan was done manually. It involved a tremendous data collection task in which a set of 750 tax maps depicting every parcel of land had to be collected and then organized by area and planned routes that would allow the viewing of all parcels with as little backtracking as possible.

The manual method was time consuming, inflexible and inaccurate, because it took so long from initiation to completion that significant changes could occur while the study still was going on.

The Geographic Data System project was started in 1971 when a comprehensive land use plan was being developed for the Eugene-Springfield metropolitan area. Preparation of the plan required a tremendous amount of data collection. To facilitate monitoring of the plan, and to support other planning processes such as transportation planning, a decision was made to create a computerized land use file.

Participants in the cooperative development were the Lane County Dept. of Regional Information Systems, the City of Eugene, and the Lane Council of Governments along with federal, state, and local agencies and departments. (The regional information system [RIS] is an IBM 370/158 AP-based facility that provides hardware and system software to public agencies in the county. It is being converted to an MVS operating system. Each department and agency provides its own programming expertise, but the system software and hardware resources are centralized in the RIS.)

The Geographic Data System is not a static system that is fixed in relation to other government processes. It is a dynamic concept that allows geographic analysis of almost any information.

Access to the information is in either batch or interactive mode. Reports and large plots can be produced in batch

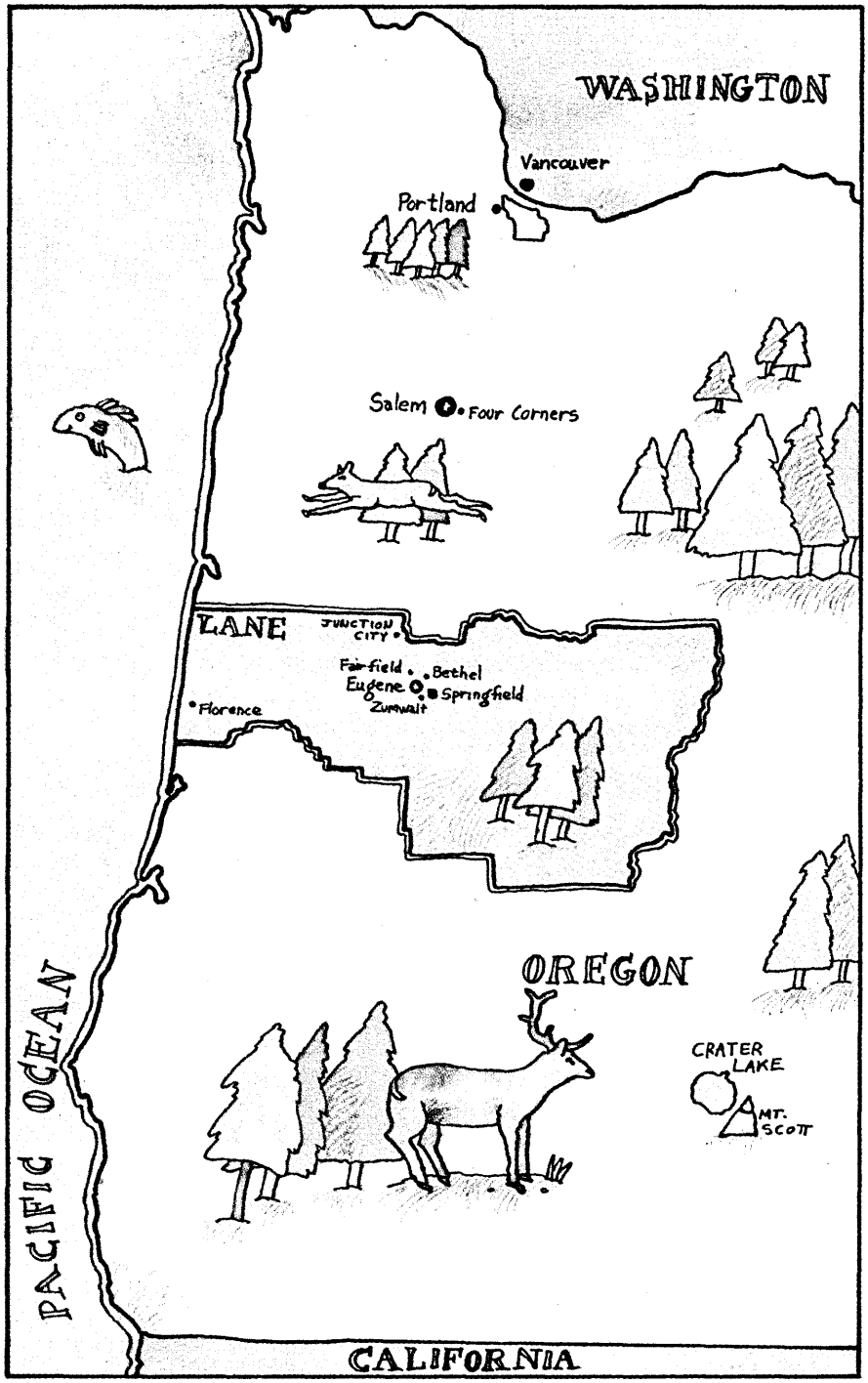


ILLUSTRATION: ©MIKE NICHOLS 1978

When the metro area parcel file was first available the data was two years old.

while queries can be made through alphanumeric or graphic terminals. Continuing input to the system comes from the operational files of various local government agencies and is coordinated by the Lane Council of Government, a central agency. This arrangement is formalized in a Cooperative Project Agreement. Renewed every year, it specifies the project budget and the contribution of each agency, as well as project objectives.

MAPS DIGITIZED

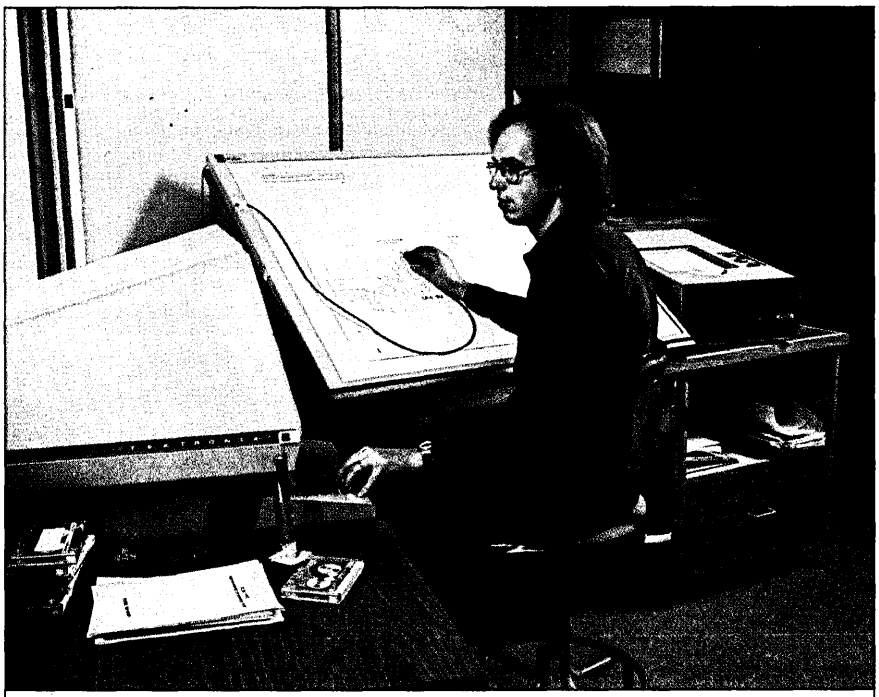
After the decision was made to create a computerized land use file, several alternative systems were investigated, including a grid system and a system from the Census Bureau, called GBF/DIME. It was decided that parcel, or point level, data could best satisfy the anticipated uses. To ensure data consistency, a composite of maps from the Lane County Dept. of Assessment and taxation was used to create a computerized file of all ownership and land use parcels. In two years, some 750 maps were digitized, edited, and compiled into a complete parcel file containing land use data for the Eugene-Springfield metropolitan area. Each parcel file now contains 120,000 records and each record has 100 to 300 bytes.

The data collection effort took five man-years of work and was supported by a $50,000 grant from HUD and $30,000 from the City of Eugene and the Lane Council of Governments. In addition to the data collection effort, a system of computer programs—called the Map Model Systems—was acquired to process the data.

But by 1974, when the complete metro area parcel file was available, the original land use data was more than two years out of date. To protect the investment in the parcel file and to provide the current information necessary for planning decisions, a method was developed to maintain the tax lot, land use, and address information in the parcel file.

Other planning tools grew out of the early experiences with the parcel file. In 1975, a programming team developed an on-line address cross-reference system. Shortly thereafter, a standardized file of boundaries (e.g., census tracts, precincts) was established. In 1977, an on-line system for zoning records was created for the Eugene Planning Dept. Other applications, such as tax assessments and records, are loosely tied to the Geographic Data System.

In 1973, when interest began to be expressed for the use of interactive graphics to provide simpler and faster map drawing services, an interactive mapping system using a Tektronix 4014-1 graphics terminal was developed. Then, in the fall of 1975, a Tektronix 4081 intelligent graphics terminal was purchased to improve these capabilities. A powerful digitizing/editing system was written using this device, and the map drawing system now is being rewritten for the 4081.



Square mile section is digitized from a map that shows tax lots and land uses for an area west of Eugene. A Tektronix 4081 interactive graphics terminal, a model 4954 graphic tablet, and a model 4631 hard copy unit are used in the process.

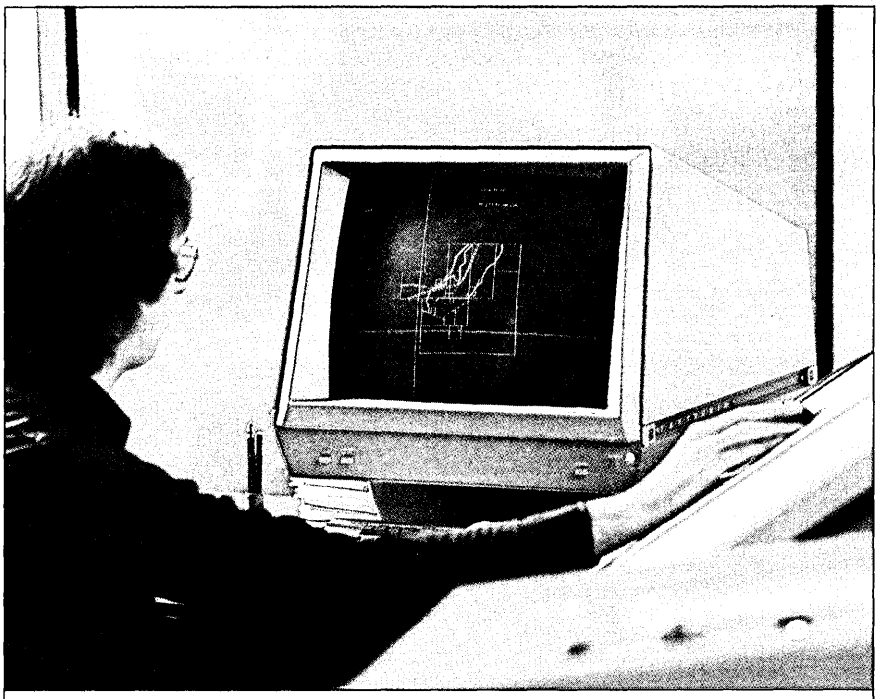
The Geographic Data System has two chief components—data, and the hardware and software tools which manipulate and display that data. The data in the Geographic Data System is identified and interrelated chiefly by geographic coordinates that define the location related to the data according to the Oregon State Plane Coordinate System. For example, a tax lot (ownership parcel) can be identified by assessor's map and tax lot number and by state plane coordinates which define the parcel perimeter and centroid.

THE PARCEL FILE

Foundation of the geographic data base is the parcel file. It contains the digitized perimeters of all land ownership parcels together with "parcels" for streets, rivers, and other features needed to make up a complete map. Each parcel record contains, along with the coordinates, a sizable amount of alphanumeric data: land use, acreage, zoning, property value, and the like. It is collected from a variety of sources and combined by either geographic or alpha matching with the original digitized parcels. It is the source from which other special purpose files are created, and it is used for drawing maps on the plotter.

Keeping the Parcel File up to date is an extremely important function. To date, uses have been almost entirely in planning. For the majority of these applications, data a year or two old has been acceptable, although this is changing. Therefore, the file is on an annual cycle for updates. Building permits are the main source of information on changes in land use. The process is coordinated with the annual update of the real property assessments and the assessor's maps. Changes in these hand-drawn maps are digitized for entry into the Parcel File. This results in the Parcel File being at least one year out of date at the time it is released each year.

An interesting problem that arose in the initial definition of the Parcel File was the distinction between the owernship and use of the land. For example, it is generally necessary to know that a certain tax lot contains both a residence and a store. It also happens that a single use, like a large warehouse, will span several lots.



Seven man-months (three months elapsed time) were necessary to develop an operational interactive digitizer which, on initial cut, more than doubled digitizing throughput at Lane County. Since the operator had feedback available to him when using the graphics terminal, number of errors was reduced.

The solution is to have three types of records on the Parcel File: 1) Tax lots, 2) land uses, and 3) (the majority) tax lots having a single land use. Types 1 and 2, together, are overlapping polygons. However, 1 and 3, or 2 and 3, together, would both form complete maps. The user must decide whether his/her data is needed by land use or by tax lot. Some types of data are only available by tax lot (e.g., land value), while others are available only by land use (e.g., number of dwelling units). This causes occasional confusion, but it seems to be a fact of life and not an artifact of system design.

ADDRESS FILE

The Address Library (ADLIB) file is a particularly useful derivative of the Parcel File. The Address File provides a standardized set of site addresses in Lane County, containing one record for each address. These records are maintained in an address sorted order by city, street, type, direction, and house number. Each record also contains the Oregon State Plane Coordinate point of the address, the tax lot number of the parcel with which the address is associated, the land use at the address, the number of units (for residential parcels), the census tract, and the date the record was created or updated. The same information that is used to update the Parcel File is used to keep the file current.

Primarily a reference file, it can be used interactively through a display terminal or it can be processed in a batch mode. A clerk can quickly validate an address or a planner can find the tax lot or land use for a specific lot by interrogating the file from an on-line display terminal.

As an example of batch use, a law enforcement analyst can match with the Address File police incident records that have an associated address and add the coordinates of the address to each incident record. The software tools of the Geographic Data System then allow the incident records to be aggregated by any reporting district or zones the analyst wishes to use. Summary reports of criminal activity for these zones, police patrol zones for instance, can then be produced.

The development of the Address File was aided by a Lane County project to re-address rural parcels and implement a consistent addressing scheme throughout the county. The Rural Re-Addressing Project, completed in 1976, eliminated the old route and box address system, and assigned a new address based on the Oregon State Plane Coordinate System. The new addresses contain a five digit number corresponding to the east-west or north-south state plane coordinate of the access point to the building, and the road name.

In addition to providing standardized addresses throughout rural Lane County, the system has greatly improved the ability to locate rural residences and has proven to be of particular value to fire departments, law enforcement agencies and other emergency service agencies.

ZONING FILE

The Zoning File contains zoning class information for the Eugene-Springfield metropolitan area. Zoning has not yet been completed for the entire county. The file is similar in structure to the Parcel File. Each zoned area is stored as a record which contains the state plane coordinates of the zoned area perimeter and a code for the type of zoning. It can be overlayed with the Parcel File to produce land use by zoning cross tabulations. In making a decision on a zone change request, government officials find it useful to know the surrounding zoning and land uses. For example if a developer argues that there is insufficient undeveloped residentially zoned land in a particular area, the Geographic Data System can compile the exact acreages and locations of undeveloped residentially zoned land to determine the validity of the argument. The Zoning File is also used to identify and monitor nonconforming land uses within various zoning classifications.

Many other computerized files have been created, including boundary files, files for soil types in the metropolitan area, the metropolitan sewer file and the street files.

The sewer files include both a polygon file, which contains a record for each region served by a sewer line subsystem, and a point file, which contains a representation of the pipes and interconnections in the system. The sewer polygon file has been used to aggregate data such as land use by sewer subarea, to determine load on the system which serves the area. The sewer network (or point) file contains records for the components of the sewer system: a manhole cover, sewer segments, a junction between two lines, a pumping station and other information such as size of pipe and elevation at each end for the segments. The City of Eugene Public Works Dept. uses the sewer data base to plan and monitor their sewer maintenance work.

The street file has been used for modeling travel times for transportation planning and locating additional fire station sites. Eugene Public Works uses it to plan and monitor maintenance on Eugene city streets.

The Lane County Dept. of Assess-

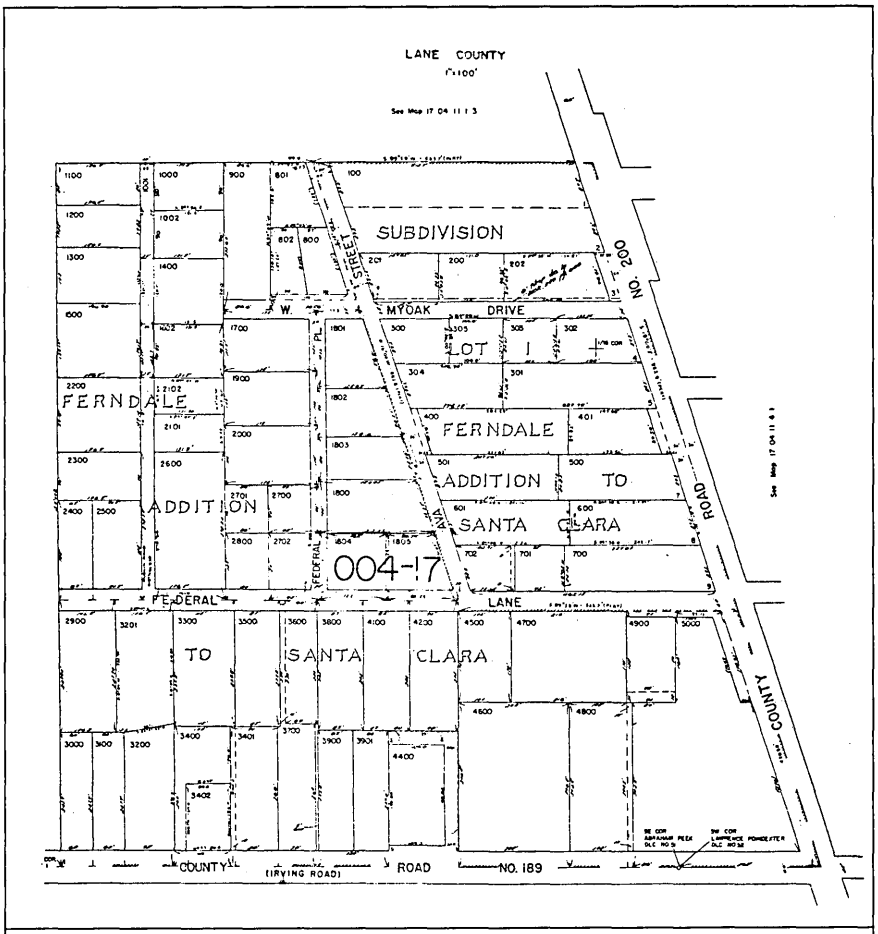
When ruling on a zone change request, officials now know the surrounding zoning and land uses.

ment and Taxation stores information on all real property in the county in a computerized data base. Interrelation of this data with other geographic data can be through the tax-lot number or site address. Real property data can then be aggregated by any desired area of analysis, such as census tract, city limits, special taxation district, etc. The real property information then can be analyzed and compared with other information.

The assessment data offers a wealth of periodically updated information. In addition to its value for geographic analysis, it provides an independent data source to compare with the Parcel File and to validate Parcel File data. The information available from cyclical appraisals is of value to housing and land use planners. For example, many of the housing questions from the 1970 Census, such as value of housing or number of bathrooms, can be answered from the assessment files on a yearly rather than a 10-year basis.

Reports and computer tapes published by the Census Bureau for the decennial census are maintained by Lane Council of Governments and are related to data created locally by the processing programs of the Geographic Data System. Comparisons of the census data with local data can reveal discrepancies. For example, census data indicates the number of dwelling units, by type, for the county, for cities, for each census tract and block. This information can be compared with aggregated data from the Parcel File to determine if a difference exists.

Discovering errors in the census data is important because many revenue allocations are based on census data. Another valuable benefit is the ability to develop statistical relationships between census data, collected infrequently, and local data such as the Parcel File which is updated yearly. By statistical correlations it is possible to estimate other variables, measured only by the census, from trends in the more current local information.



One of 750 source maps Lane County digitized for its parcel file. Each parcel contains the coordinates to identify its location along with such alphanumeric information as land use, acreage, zoning and property value.

HOW IT'S DONE

Digitizing of maps and charts consists basically of entering four "control points" to establish a tablet-to-actual coordinate relationship. This is followed by the entering of discrete collections of points together with their own related alphanumeric data. The collection of points may be closed or open figures and may share common points and boundaries.

The original digitizer was a Calma electromechanical unit, purchased in 1971 for $30,000. A Tektronix 4081 with tablet and 4081-IGT software (cost $35,000), together with already developed graphics support in the host telecommunications monitor TCS, later were used to replace the old digitizing/editing system.

Seven man-months (three months elapsed time) were necessary to develop an operational interactive digitizer which, on initial cut, more than doubled digitizing throughput. Enhancements were added as users became familiar with the system.

The system displays data entered through the tablet, crosshair, function keys, or keyboard immediately on the high resolution screen, together with refresh system messages. Three files are stored at the host: 1) four control points in tablet and real (usually Oregon State Plane) values, 2) a point population file in tablet coordinates, and 3) polygon file indexing into the point population file.

The system allows the user to specify "gravity" whenever matching of a point to one previously digitized is wished, and to edit either discrete figures or points common to several figures. Editing mode can be entered at any time and can be done using tablet, screen, crosshairs, and/or function keys. Maps may be extracted from the master data base at the host and edited at the 4081. This is useful to clean up intermap boundaries and data digitized with the old system. A batch component of the system converts the online files to master data base format using an extremely accurate four-point fit. It also calculates the polygon centroid.

In retrospect, the digitize/edit development was successful and relatively easy to implement, after debugging early releases of 4081 software. There are current arguments as to whether or not Tek-

HOW THE SYSTEM WAS USED

Many Lane County departments have used the Geographic Data System:

—The Assessment and Taxation Dept. compiled maps of recent property sales to highlight real estate hot spots.

—Environmental Management selected the solid waste transfer station site in Glenwood by using geocoded data. It also used maps and reports generated by the system to analyze land characteristics in the Florence/Heceta Beach area.

—The Finance Dept. matched lists of county employees for a car pooling project.

—And when the location for a new fire station was studied in 1976, geoprocessing data including land use by zone, value by zone, geocoded street networks, and speed and direction of travel, told them the coverage in minutes to each intersection for each proposed site. Thus, the fire station location was identified, approved, and funded in three months vs. 12-24 months manually using distance only.

Fewer than 10 local governments in the U.S. are using shared comprehensive information systems. But the interest is there; government officials have come from as far as Annapolis, Md., in the U.S. and from Canada, Denmark, Belgium, Japan, Mexico, Germany, and South Africa to see how Lane County uses the Geographic Data System.

*

tronix 4014s, together with a good minicomputer (PDP-11/34 size), connected to TCS on the 370, would have yielded more for the money overall. The 4081s, however, are in place and digitize/edit has helped to attract more users and continuing funds to the graphics project, besides streamlining existing efforts. Total cost of the digitizing/editing system has been estimated as:

—12 man-months of programmer time—programmers already familiar with the equipment and software

—$100,000 hardware for two work stations—also usable for display and other uses

—A share of use of the IBM 370 host computer for production and development

—Two to three persons full time for digitizing and editing

DATA MANIPULATION

The Map Model System, developed at the Univ. of Oregon Bureau of Governmental Research and Service, provides all basic computer mapping functions (digitizing, editing, combining, overlaying, and plotting) as a series of compatible batch programs. As use of the Geographic Data System became more interactive, portions of the Map Model System such as digitizing and editing were no longer used. Other sections have been rewritten by Eugene and the Lane Council of Governments to tailor them to current Geographic Data System needs. Map Model now provides the basic overlay capabilities and plotter drawn maps when permanent maps are desired.

Other standard software packages support geographic data manipulation. COBOL Architect Program (CAP), developed by the U.S. Department of Transportation, is used to produce reports and tabulations from specially formatted data files. Statistical analyses of the geographic files are facilitated by SPSS (the commercially available Statistical Package for the Social Services), a series of common statistical computation programs.

A problem that arises frequently in manipulating geographic information is how to assign data items or land parcels to larger areas or districts. For example, how many residences are there in a given school attendance area? The technique of assigning items to a given area is called geocoding.

In the Map Model System, there is a program for overlaying two polygon files to produce a geocoded file. A parcel cut by a district boundary becomes two parcels in the new file. While precise, this process is cumbersome. Matching 100,000 parcels against 100 districts literally could take all day, even with a high-speed computer. It was decided that for almost all applications, it is sufficient to consider a parcel to be a point (namely, its centroid). A parcel cut by a boundary is then forced into one district or the other. An efficient algorithm was developed by the City of Eugene for point in polygon geocoding. The program also provides for selecting on the basis of geographic area by simply deleting records not geocoded from the output file.

Each record in the Parcel File carries with it the most commonly used district designators (geocodes). Thus, the residents per school attendance area question requires merely a summation. New or temporary districts can be created at will and easily geocoded, providing a high degree of flexibility in responding to queries.

DATA DISPLAY

Specific programs have been developed for the display of information from the Geographic Data System. These include Map Model programs to produce plots, an interactive graphics display system, and special display programs which access information for display at an alphanumeric terminal.

The address file display program and the zoning file display program provide on-line display for a person at any of the region's 230 IBM 3270 terminals. Users at authorized terminals may also update the data. Both programs use Lane County's locally developed data base system, DMS. The two programs are also linked so that a user can, say, call up an address, then request the zoning history data in one step.

Other programs handling geographic information are more specialized. On-line node-and-link files exist for both street and sanitary sewers. These are primarily used by the City of Eugene's Public Works Dept. to record condition and maintenance information. They update these files either through their 3270 terminal or ocr forms filled out by inspectors. They then can produce a graphic representation of, say, recent maintenance activity or current sewer deficiencies, using the Map Model software described below.

Any person at a 3270 terminal can view the street or sewer data. The street file actually can be accessed either as nodes (the intersection file) or as links (the road file). For example, the police and fire department can use the intersection file to establish the coordinates for incidents stored in their files.

Map Model is used to produce plotter-drawn maps from the Parcel File. Since the complete perimeter of each parcel is digitized and stored separately, it can also be plotted separately. The result can be a fairly sparse plot like streets and vacant lots, or it can be a complete map showing all lots. In the latter case, each line is actually traversed twice by the plotter. At the same time that the parcel boundary is being drawn it can also be annotated. This feature is fairly primitive Map Model; a single character string can be printed at the parcel's "visual centroid." The character string is made up from the alphanumeric data carried in the parcel record.

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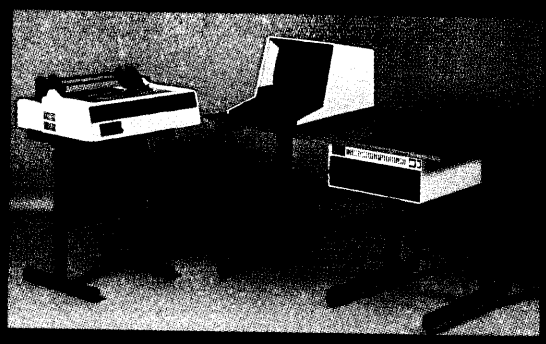

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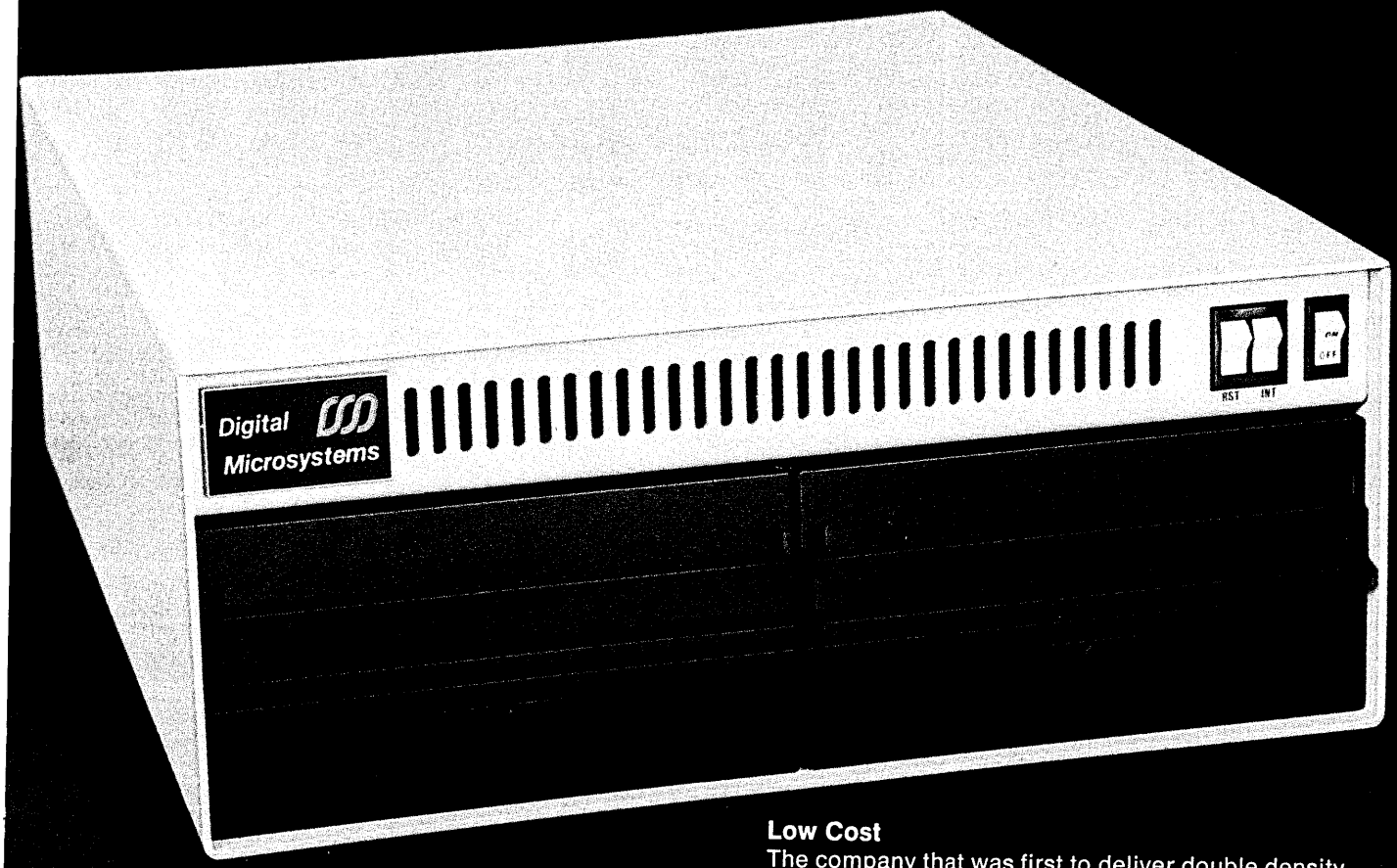

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Planners in Eugene develop twice as many planning studies with the same staff.

The parcel file is processed in a strictly sequential manner by the plot program. The file for the Eugene-Springfield metropolitan area, containing about 30 million bytes, resides on a tape due to a relatively low volume of use (three to five plots per day, typically). In these circumstances, a single plot run requires 8 to 10 minutes of cpu time as a batch job, and total turnaround time for a completed plot is one day. This slow response was the primary motivation for the development of on-line computer graphics. Nevertheless, a 36-inch wide plot has no substitute when a permanent map is desired for an area larger than a few blocks.

A variety of agencies in Lane County have cooperatively developed an interactive graphics display system. The initial versions of the system suffered from inappropriate or untried hardware, overuse of novel aspects of graphics such as menus developed and used where alphanumeric commands would have worked better, and the attempt for one system to meet all agencies needs.

The system currently running uses a Tektronix 4081 display station running in 4014 emulation mode, and host 370 processing capability. It is used primarily by the Eugene Planning Dept. It is display only; update is done using digitize/edit, which is a separate system. The greatest difficulty of the system by far is data base organization and retrieval speed. A special extract query data base was developed for speed, thus adding to the number of forms and places in which geographic data is stored at the RIS.

Although the interactive graphics system is very flexible in its ability to draw and annotate user-specified combinations of data, and is fast relative to a flatbed plotter, a new system is being developed. The replacement system will use the local intelligence of the 4081, together with extract files at the 4081, and will be much faster for the user, as well as reducing host load. This also should allow development of new features for user convenience without seriously degrading performance.

The Eugene Planning Dept. has been one of the heaviest users of the systems. Their comprehensive planning section is producing twice as many planning studies as they did prior to 1971, without a corresponding increase in staff. In addition, there is a feeling that the type of studies they are now doing—in terms of size and amount of data—would, in some cases, have been impossible prior to the use of the computer.

A less tangible benefit is that with simple, clear computer graphics, the work of planners is more comprehensive and more visible to the public. It is hoped that we can improve this service by moving a graphics terminal out to the front counter where the public can share the advantages of rapid response to questions about the land. ✻

SHEILA M. MAHAN

Ms. Mahan is an information systems manager with the Lane County Regional Information Systems Dept. where for three years she has worked as a liaison between the department and users of the regional data center. As a coordinator and internal consultant, she specializes in cooperative projects involving several user departments and agencies, particularly in the Geographic Data System. She's also been a technical writer.

GARY SPIVAK ROBERT SWANK

Mr. Spivak is a programmer/analyst with the City of Eugene's data processing department. In his four years with Eugene, he has had responsibility for design and implementation of computerized geographic information. He is a specialist in the development of interactive graphics software to support on-line digitizing and on-line retrieval and display of geographic information.

Mr. Swank is associate director of research and support services for Lane Council of Governments where he has been responsible for supervising and coordinating the Geographic Data System development, including design of the map preparation, coordinate control and ditizing functions, and final creation of printed and plotted reports for users.

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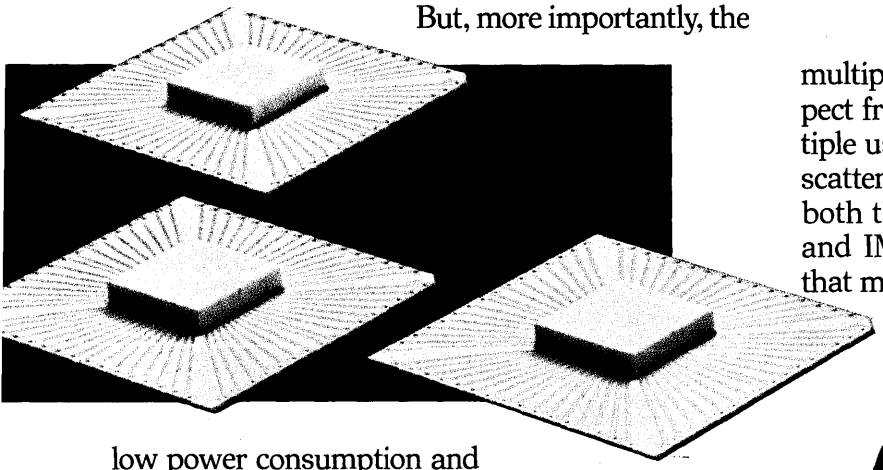

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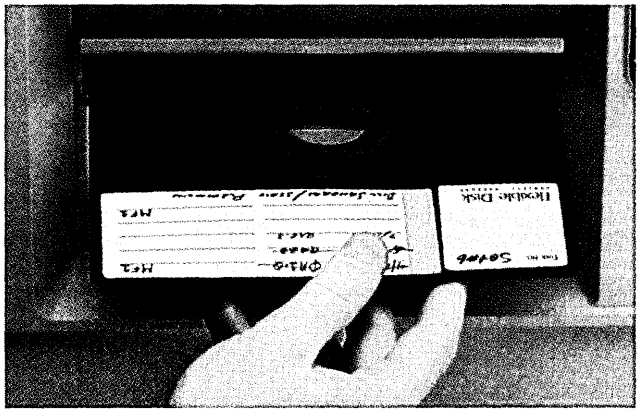

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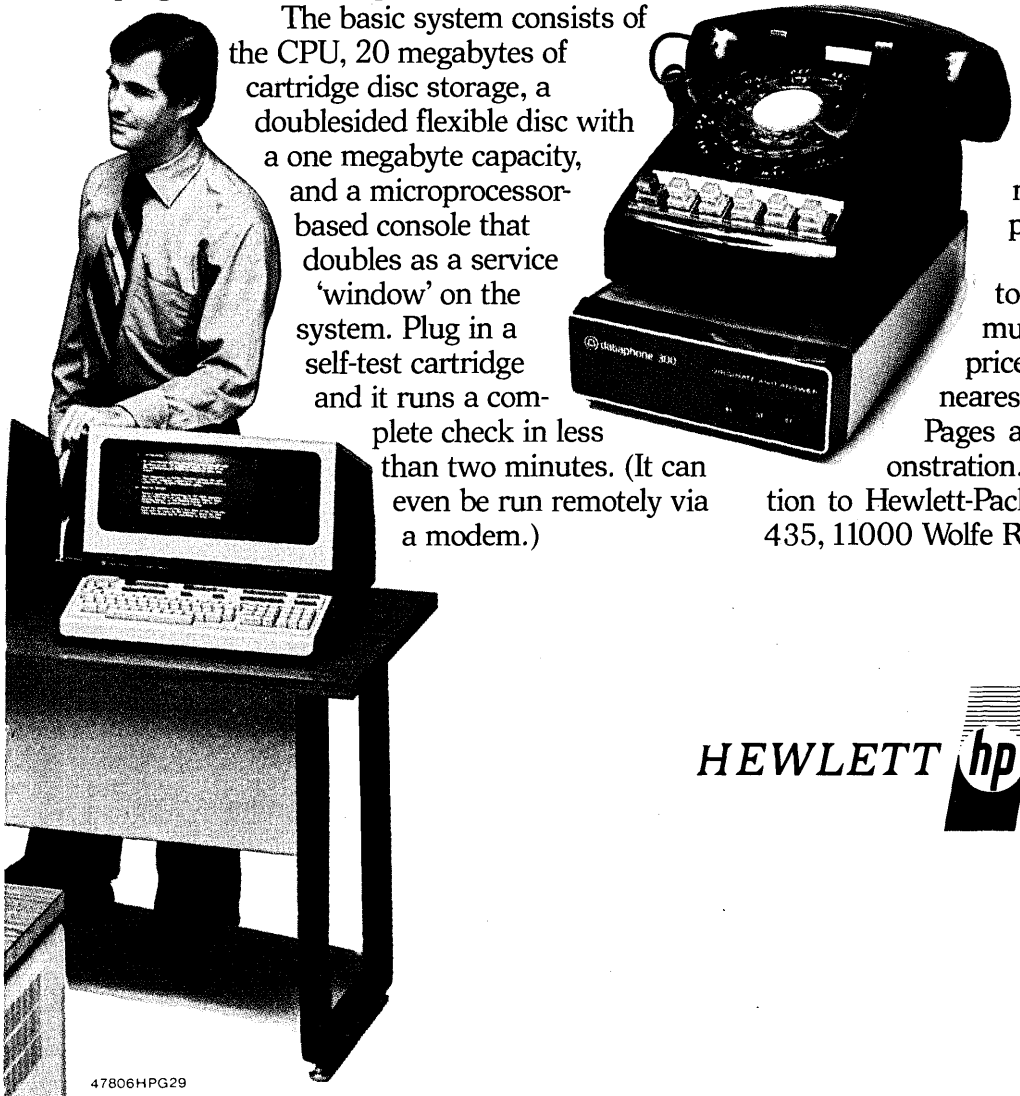

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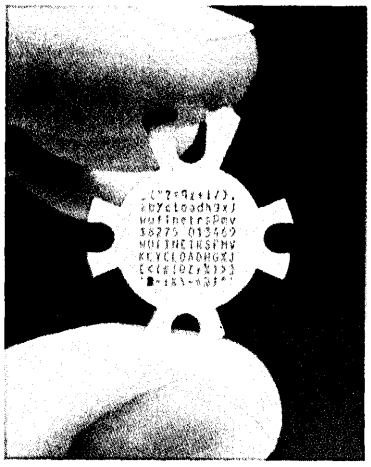

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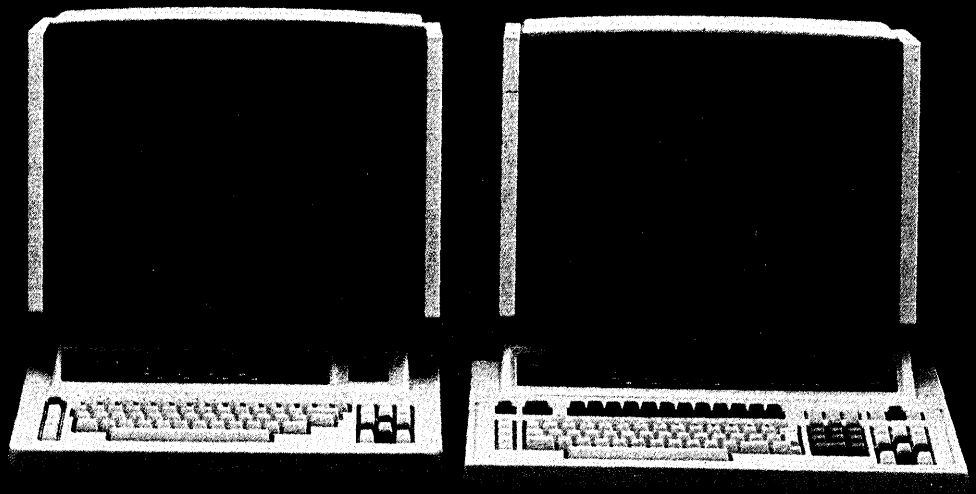

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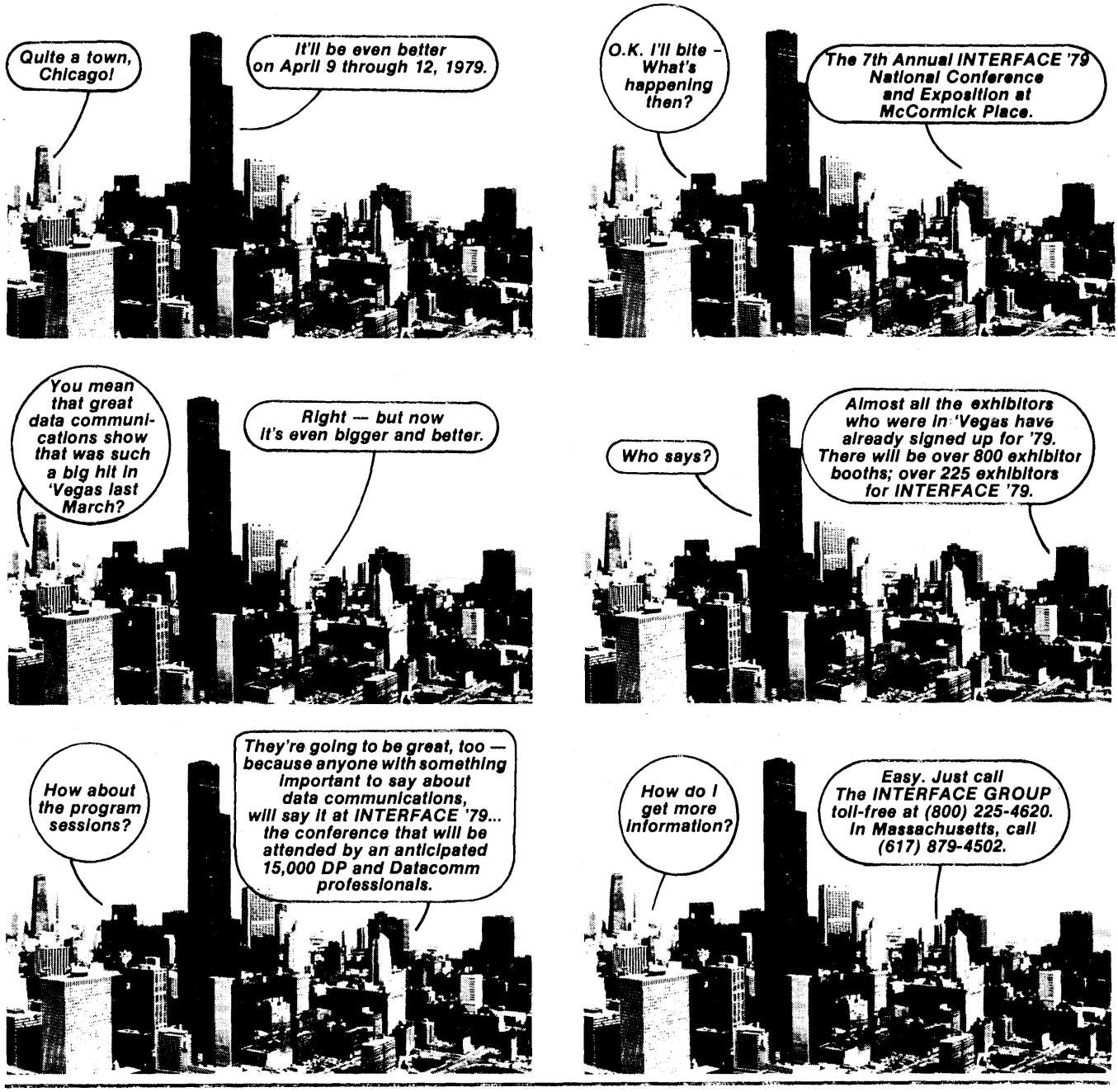

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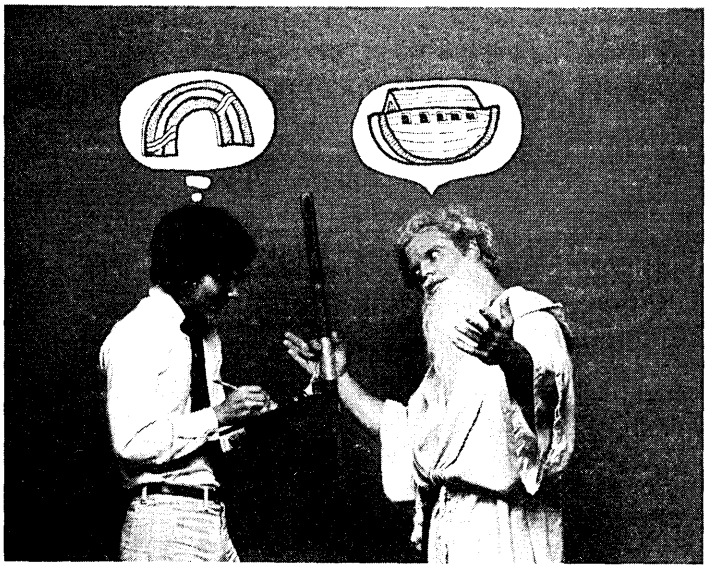

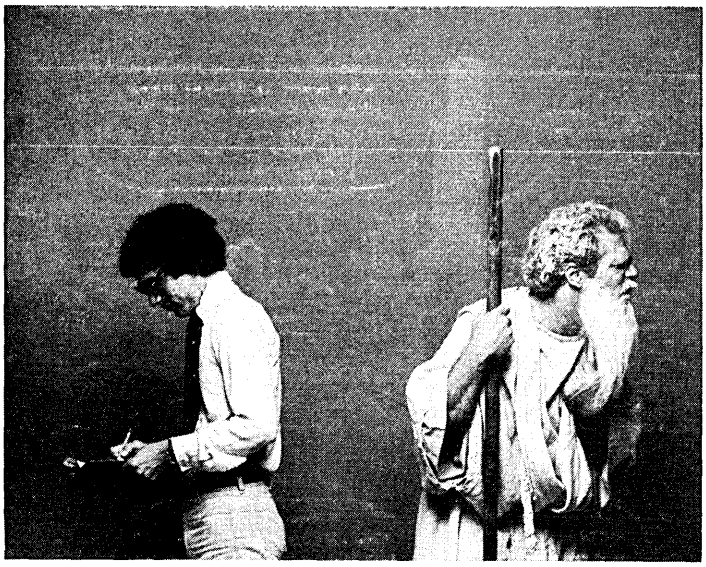

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Require the user to take part in the planning stage when producing a system. Let the clerks, too, see what's ahead.

DP AND THE USER: A MATTER OF PLANNING

by Clement A. Lamb

Why do so many users wait for the implementation phase of a project to start making changes?

Probably because data processing people talk to themselves, to hardware people, software people, vendors, and other technical beings. But we never talk about the user. Problems concerning the user, however, may defy rational analysis because users' problems are people problems. There are certain people in every organization who are excellent in working with the computer. And there are those who will never be able to work with it.

Take the following scenario that is played out countless times with no one taking the time to ask why?

Usually a meeting is called by higher management to determine where scarce computer resources are going to be allocated and the selection is made by the outside party, and imposed upon the data processing group. It is explained that a particular area is having severe problems and it has been decided to put up a system to solve these problems. The dp department scurries around for a period of months and produces a system that, to no one's real surprise, doesn't work.

In such cases, we usually find that all we have done is automate the problem.

There can be many causes for the problem in a department—only a few of which will be solved by the computer. Often a department is in trouble because of poor management. The system will fail whether it's manual or automated. What should be done then?

PRAGMATIC APPROACH?

The first thing is to avoid having your projects selected for you. Dp should take the initiative in directing the allocation of the computer resource to those departments where the greatest use of the tool will be made. Some may consider this too pragmatic an approach. But is isn' t—when one considers the thousands of useless systems that are continuing daily to produce millions of lines of meaningless output?

First thing to be done in the project planning stage is to draw up a PERT chart of tasks and target dates. But remember the production of the chart could be setting the stage for future disaster. Eighty-five percent of these lists concern themselves with concrete measurable dp events. Items such as code programs, write JCL, test, debug, convert files, implement, and document are listed in great

WARN USERS OF THE EXPENSE

Though it makes little sense, it is true in many cases that the implementation phase of a project becomes in reality the user design specification step.

Because the participation and approvals by the user were only cursory, the final outputs were not what he really wanted. Once presented with the working system the user is forced to spend the time that he didn't spend at the start of the project. This "stream of consciousness" system development, as I call it, almost always is a disaster. Long lists of required changes are drawn up the user departments. Data processing says it will take two years for them to do it. Mutterings are heard about system "inflexibility" and everyone generally is unhappy.

Few persons realize the fixed costs that have been sunk into a project by the time output is produced. It isn't unusual to spend $25,000 or $30,000 of data processing salaries and computer time on a relatively small project. Most line departments aren't aware of this. If they were purchasing an asset from their budget in these amounts, they'd spend all kinds of time to insure the best possible results.

At the end of the design specification stage it should be made clear that $25,000 (or whatever the figure is) will be spent constructing a "building" according to their plans. If they later find that the basement is too small it will not be as easy thing to fix. Most do not understand—and possibly they shouldn't have to—that once record lengths, field lengths, and input forms are designed throughout the programs and system, they are very expensive to alter. They should be warned, however, of this fact.

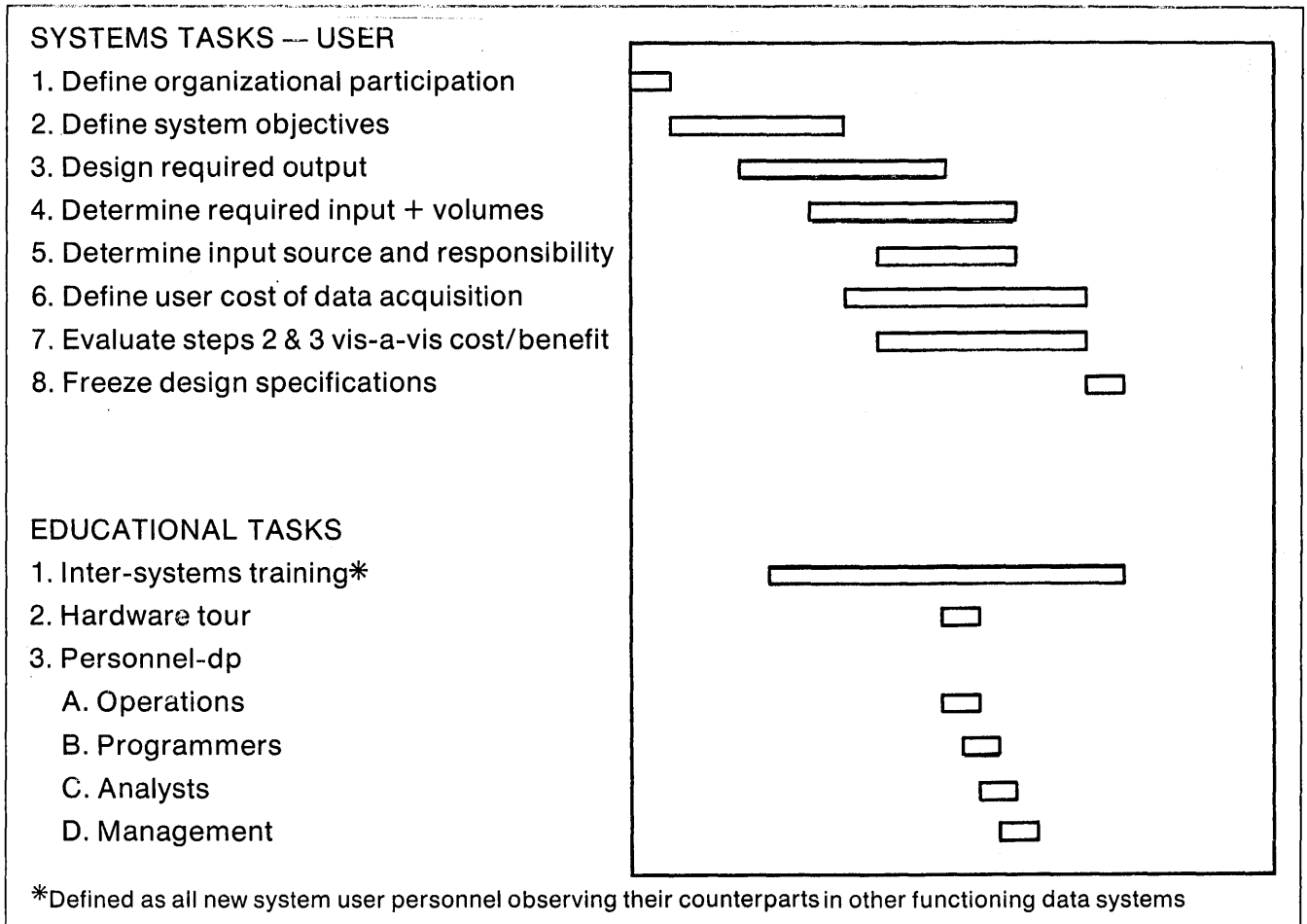

Fig. 1. Some of the types of tasks that should receive PERT chart attention are shown above. The subtle difference in emphasis is that the user department personnel control these aspects of systems development with the data processing people providing support and assistance. Note that the system specification phase is an iterative process that attempts to have the user balance the system requirements against their cost.

Yet they're still stuck with all these dp deadlines. So they allow the user to abdicate their responsibility and take it upon themselves. They draw up their solutions and get a cursory approval from the user. The system becomes less and less the user's and more and more the programmer's.

COMMITMENT FROM THE USER

Several simple things can be done to avoid this chain of events, all of them aimed at obtaining a commitment from the user and educating him about the new tool he will be using. (See Fig. 1.) A clear statement of time he will have to spend on the project should be made as early as possible. Even if it is only an estimate that can be refined later, a statement should be made such as "One full day a week (20%) will be required from the production control supervisor and one half day (10%) will be required from the production control manager for a period of six weeks." After this a record should be kept of the time spent on the project by all parties.

The clerical staff also should not be neglected. No people are more important to the success of a system than those who will be filling out the input forms and working with the output. Remove the mystique from the computer systems. Most people are amazed to find out that you can produce totally erroneous answers on nice-looking, official, five-part computer paper. To introduce an element of reality, these people should be asked to spend time working with and observing their counterparts in already existing systems. And it should be with the worst system in the company as well as the best. Some people are highly irritated with having to put letters in blocks, slash zeros, use codes, and do any of a hundred other things that will have to be done. Getting these items on the table for discussion beforehand is important to the success of the system. Everyone has seen poorly designed systems that run excellently and well designed systems that run poorly. The critical difference usually is the attitude of the user.

What are these attitudes?

The answer to that question of necessity involves generalizations about groups of people. It is dangerous turf because groups of people do not always fit into convenient niches. However, elements of common sense and mature judgment must be applied to interpersonal areas of data processing.

If we put ourselves in the shoes of top management, for instance, we may get a view of ourselves that is alarming. Individuals within dp command high salaries in relationship to their apparent du-

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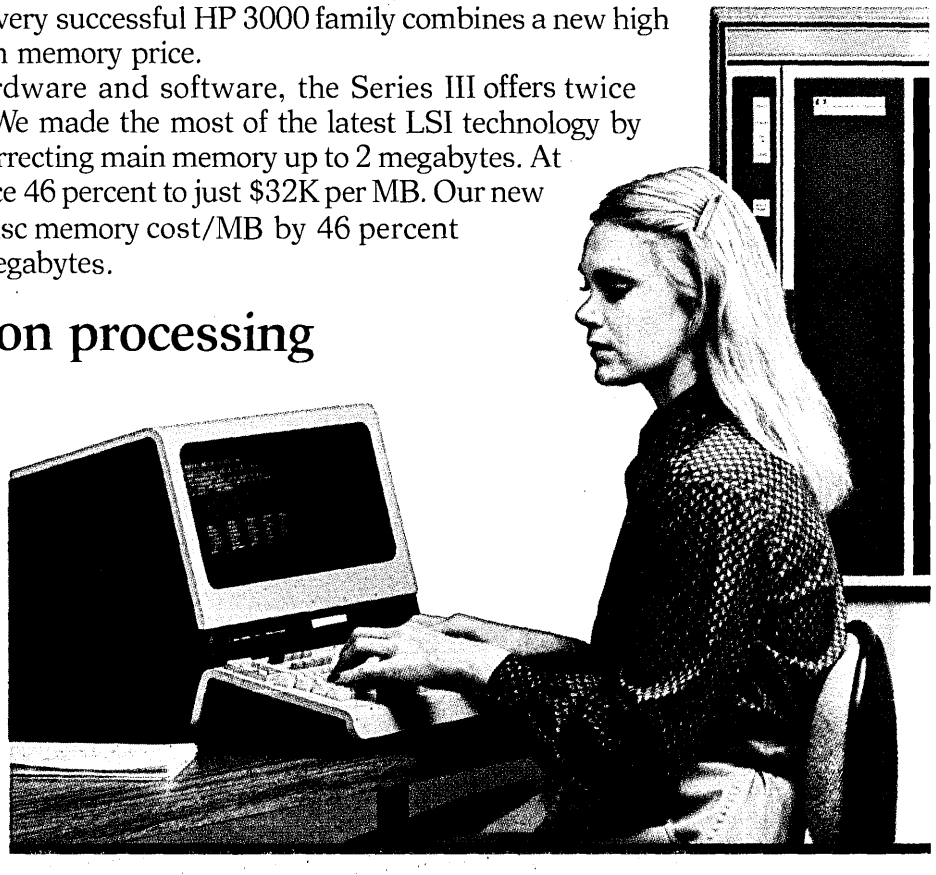

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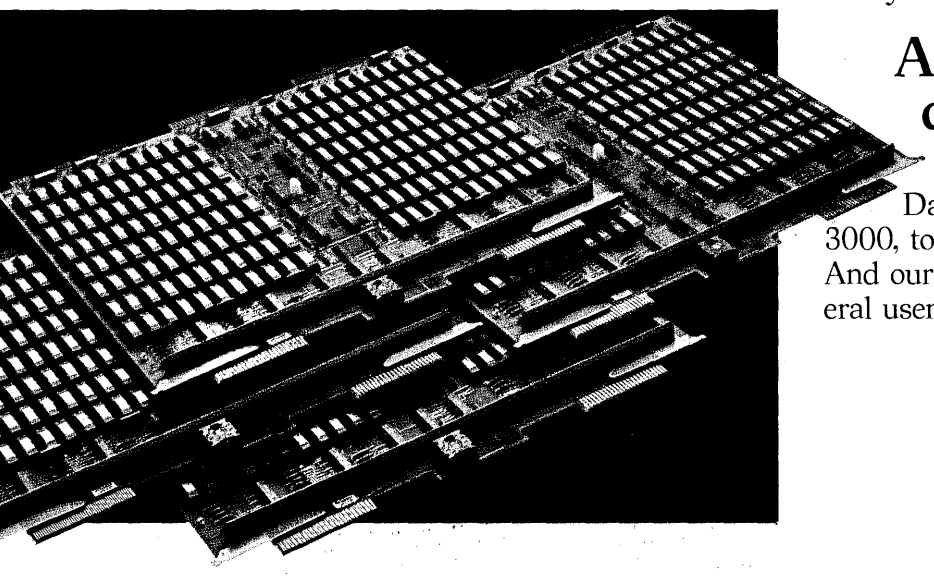

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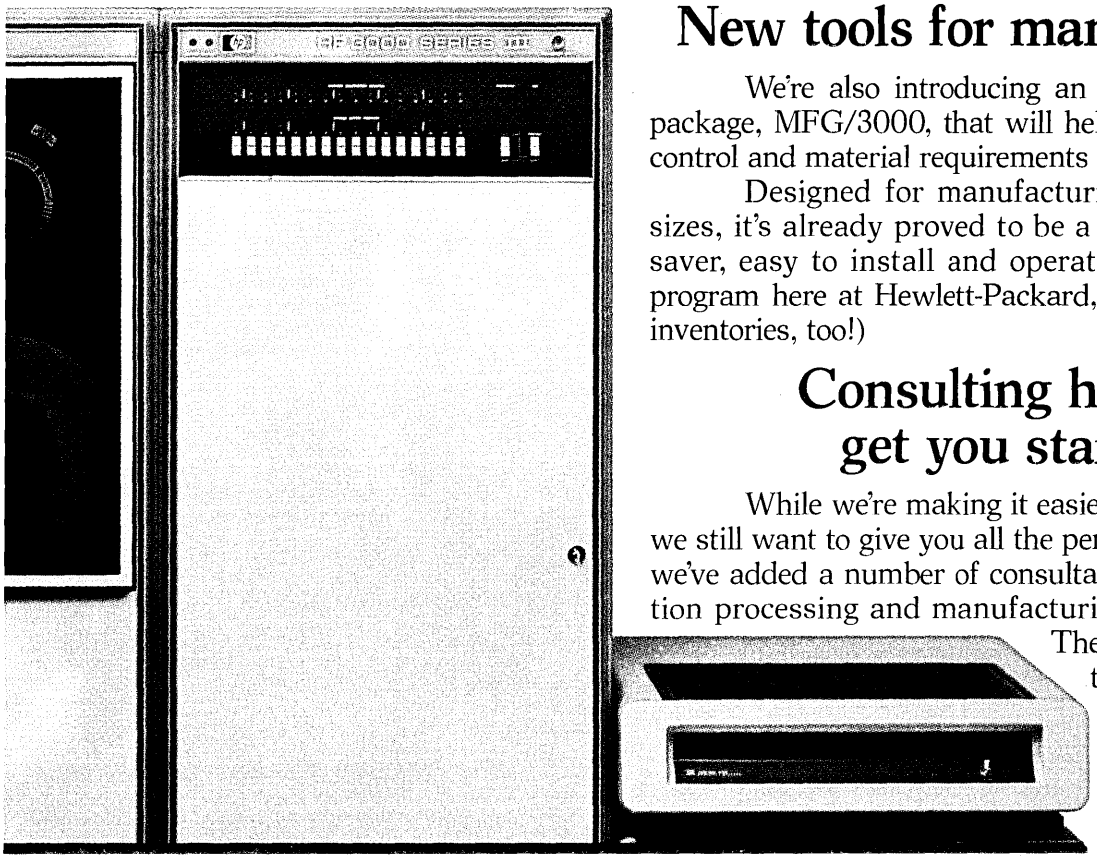
3000 Series III.



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CIRCLE 14 ON READER CARD

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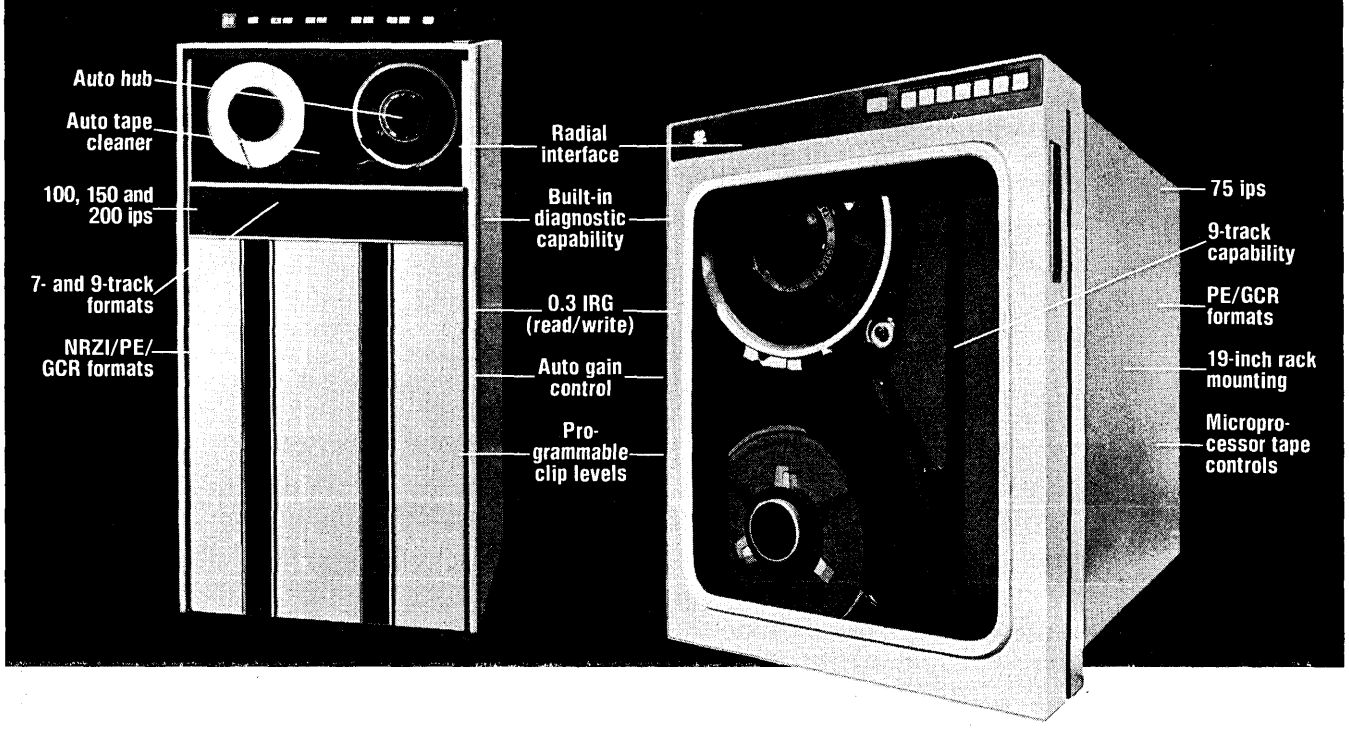

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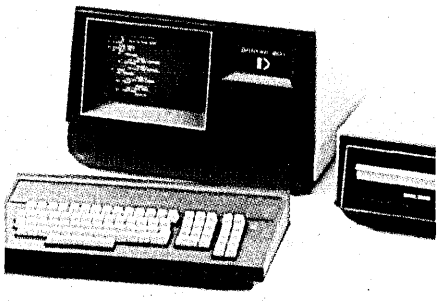

A detachable keyboard with a standard typewriter format allows for easy operator training and ease of use.

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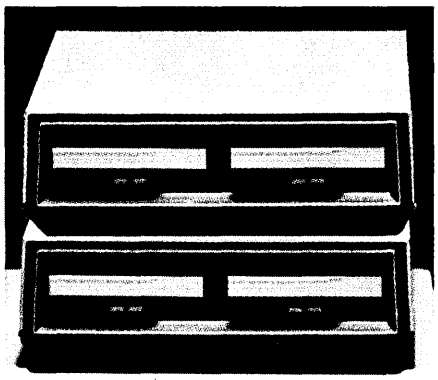

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ties and in comparison with other line personnel. It's also noticeable that the turnover of these high-priced people is frequent and there seems to be little company loyalty. All of this wouldn't be bad if the whole thing worked. However, many CEO'S have a nagging suspicion that they are getting shortchanged. Most are so frustrated they can't even figure a way to dismantle the monster. The majority adopt a policy of benign neglect, containment, and a vague hope that someday it will all work out.

Most believe that if you pay for the hardware, purchase the asset, you automatically get the good systems that other people who have the same hardware have shown you. In its most simplistic form the logic is as follows:

ABC Company has XYZ hardware.
ABC Company has a good computer production control system.

Therefore: If I buy XYZ hardware, I will have a good production control system.

WHO CAN USE THE TOOL?

Of course nothing could be further from the truth. The requirements of playing in a computerized league are very high in terms of dollar cost but even more so in terms of an organizational commitment to use the tool to its fullest potential. CEO'S have to start with the premise that not everyone in their organization will be able to get the most out of the computer tool. The next step is to identify those who will be able to use it. The amazing thing is that in most cases this type of analysis is what top management is very good at! It just never occurs to them to apply this approach to the data processing problem.

Middle and line management's problems with data processing are of a more intimate nature. The largest single fear, which most often is not expressed, is that of allowing an outside third party uncontrolled freedom to roam through their area. The fear that hidden skeletons will become known and possibly exposed by people over which the manager has no authority. Systems personnel should be aware of this fear and use some tact to try to alleviate it. This same symptom will occur in the implementation phase between the user input/output group and the data processing operations group. There's an extreme frustration when an erroneous report is produced because of a keypunch error even though the input sheet was properly filled out.

Most people have pride in their work. To have their reputation tarnished by a nameless, faceless third party called keypuncher turns them against the system. To lessen some of the damage these two groups should meet and know each other's names. A short informal bull session will give them a feel for each other's problems.

Many middle/line managers see the systems department process as one of writing the dp people a one page memo of what they want and sitting back waiting for the finished reports. Unfortunately they feel data processing's job is to *give* them systems much as their job is to produce parts or purchase orders, or whatever. This belief leads the manager to spend little time with the system development. Too often the data processing hotshots lay out the textbook solution to problems that don't even exist. If the user wants to do something in his system that is not state of the art he should be allowed to do so. God forbid, he might even do something simple that works. The systems people should not come on so strong at the start of the project with their solutions. A little time invested with the user can pay enormous dividends.

Over the years there has been an on-going discussion in the trade literature about the concept of the dp professional. There seems to be much confusion over just what professionalism is. Again, most practioners seem to want to equate the doing of complex things with the identification of a profession. Yet there is a clear strain of realization in these letters and articles that this, somehow, is not enough. The image that comes to mind when speaking of a professional is that of doctor or lawyer. Emotionally this connotes a feeling of wisdom and a reliance on these individuals to always tell the truth. Perhaps when our managements feel as comfortable with their data processing departments as they do with their doctors, we will have earned the right to be called professionals. ✻

CLEMENT A. LAMB

Mr. Lamb, manager of management information systems with the Aerospace Div. of UOP, Inc., Bantam, Ct., has headed the installation of gross material and capacity planning systems for his company. He's also worked with Traveler's Insurance Co. and Torin Corp. and received an MBA from Univ. of Hartford in 1973, with a major in data processing.

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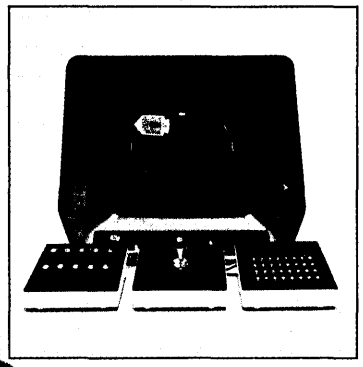

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CIRCLE 68 ON READER CARD

Despite a pressing need, there are still very few security devices on the market that can identify an individual based on a unique personal characteristic.

POSITIVE PERSONAL IDENTIFICATION

by D. J. Sykes

In spite of the many advances in computer technology and the trend to on-line systems with remote access, there is one fundamental problem which has not been fully solved. That problem can be stated as: "How do we know that the person at a remote terminal is really who he says he is?"

There are well established methods of controlling access to the system and to the data base, but all basically are dependent on first correctly identifying the user.

There are three basic ways in which a person can be identified:

(a) by some object in his possession such as a badge, key, or credit card;

(b) by something memorized such as a user ID, password, or personal identification number;

(c) by some physical characteristic unique to the person such as a fingerprint, "voiceprint," signature, or hand geometry.

Since the first two methods can be transferred from one person to another (with or without help from the legitimate user) there is a growing concern to adopt some method of identification based on unique personal characteristics. This is known as "positive personal identification" and has applications beyond remote access to a computer, such as access control of secure areas.

In spite of the apparent need for positive identification systems, there are very few devices on the market. The only devices available today are based on fingerprints or biometrics (hand geometry) and, while these find application in controlling access to secure areas and in secure time-sharing, it is unlikely that their use will be extended to applications like point of sale terminals because of expense.

Satisfactory voice recognition systems have been developed for in-house use but are not now commercially available.

There are many situations where access to a certain area must be controlled without the presence of a guard. Typical examples are computer rooms, drug storage areas, bank vaults, and aircraft maintenance areas. The number of authorized persons usually is low (several hundred at most) but control generally has to be exercised 24 hours per day.

The risks involved in allowing an unauthorized person into these areas are significant, ranging from theft of material or information, to sabotage, to the creation of a "trapdoor" in a computer system through which an adversary can subsequently access the computer without reentering the room. At stake in these situations are considerable amounts of money, possible $ millions.

In such a situation, we are concerned with restricting access to certain

"The databank would be glad to give you information about yourself, but, unfortunately, the databank is not convinced that you are really you."

Research has shown that almost 100% of forged signatures are accepted by retail clerks and bank tellers.

employees. Traditionally, this has been done by keys or combinations, both of which can be transferred. A transfer can be done without the knowledge of the authorized person or it can be done with his full cooperation as a result of a bribe or coercion.

If guards are employed for seven days each week, 24 hours per day, the cost could be $50,000 a year. Even then, guards can be deceived and bribed.

Fraudulent use of credit cards and bank checks is becoming an increasing problem to merchants, banks, and credit companies. Although the dollar amount of each transaction is relatively small ($ tens or $ hundreds), the volume of transactions is very high and increasing. As we move to a cashless society, the amount of money lost by business due to the abuse of these facilities will become tremendous.

This problem is very different from the one described above because of the number of places where protection is needed. If one thinks of all the stores, banks, gasoline stations, restaurants, etc. where credit cards or checks are used, the coverage required is immense. Research has shown that almost 100% of forged signatures are accepted by retail clerks and bank tellers. It was estimated that, in 1974, bank losses through forgery of stolen checks were $50 million. This exceeded the total amount of money lost through bank robberies.

Because of the large number of places where transactions are performed, any solution to this problem must be inexpensive and very reliable. The merchants and financiers might as well write off the losses due to fraud as part of the cost of doing business, unless the identification devices save more than they cost.

A further constraint on this type of identification is that the method used must be acceptable to the customers. Most people are basically honest and resent being treated as criminals. Also, we are not just concerned about the theft or loss of credit cards and checks. People have been known to sell credit cards to accomplices, knowing that their own liability is limited to a nominal amount.

Problems involved with unattended cash dispensing terminals are similar to those at point of sale except that there is nobody present at the terminal to supervise the operation. The criminal therefore is free to tamper with the terminal or try obvious methods of impersonation which an attendant would prevent.

Today, the terminals will dispense cash to any person with a bank card who knows the corresponding personal identification number (assuming there are adequate funds in the account). It frequently happens that these numbers are revealed (possibly with help from someone on the inside) and fraudulent use can continue until the bank is informed.

This method of 24 hour cash dispensing is gaining acceptance with the public because of the convenience it offers. Most banks, on the other hand, are not rushing to provide this service because of the risk of abuse of the system.

In the case of time-shared systems, many systems used for scientific time-sharing or business transaction processing have a need for restricting access to specific data and programs to authorized persons. This is particularly true in military systems with classified data. Persons are granted access based on a "need to know." The technology for protecting information in computers and data bases is well established. However, the problem of positively identifying the person at the terminal still is not truly solved. This is true even in situations where all terminals are in a secure area, because of the individual differences in "need to know."

Today, most systems rely on a user identification combined with a password to allow access to the system. Many military installations are actively seeking positive personal identification devices and are prepared to pay a significant sum for a suitable device.

There are many personal features that are unique to an individual. Since a commercially viable system is needed, we will rule out such things as footprints, teeth, enzymes, breath, facial lines, etc. and concentrate on items whose use as identifiers is acceptable to the persons involved. "Acceptable" features include: fingerprints, hand geometry, voice prints, and signatures.

RIDGE ENDINGS AND JOINS

Fingerprints have long been accepted as a principal means of uniquely identifying an individual. However, in a relatively inexpensive product it is not possible to compare all the details of the print with a reference print as is done by police detec-

SINGLE FINGERPRINT

Fig. 1. Fingerprint identification is based on the relative positions or ridge endings and joins, called "minutiae." It is necessary to story only the x-y coordinates of some 12 points as reference data, requiring less than 100 bytes per person.

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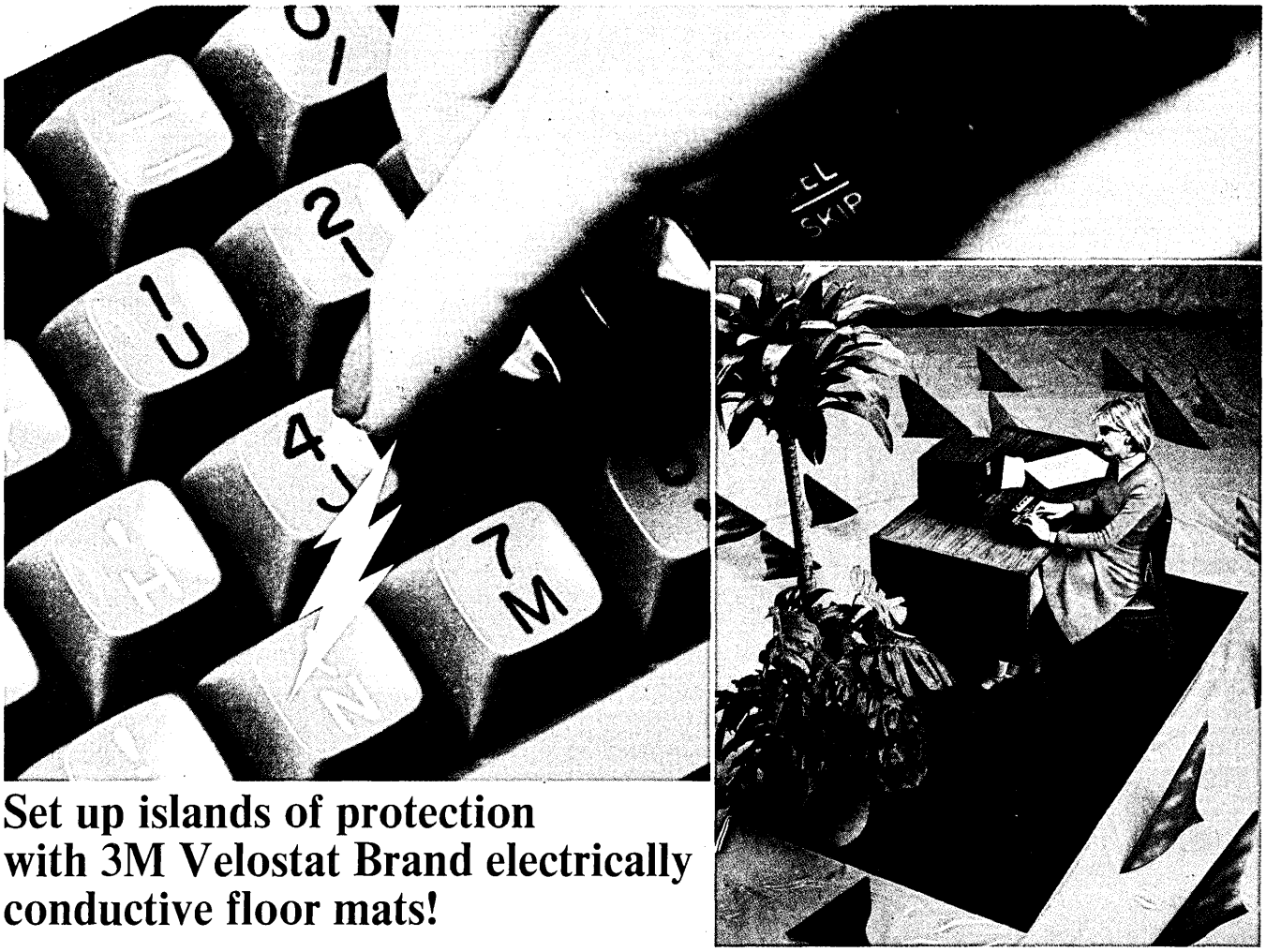

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CIRCLE 37 ON READER CARD

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CIRCLE 46 ON READER CARD

Combinations of individual finger lengths vary from person to person. This variation in hand geometry can be used as a positive identifier.

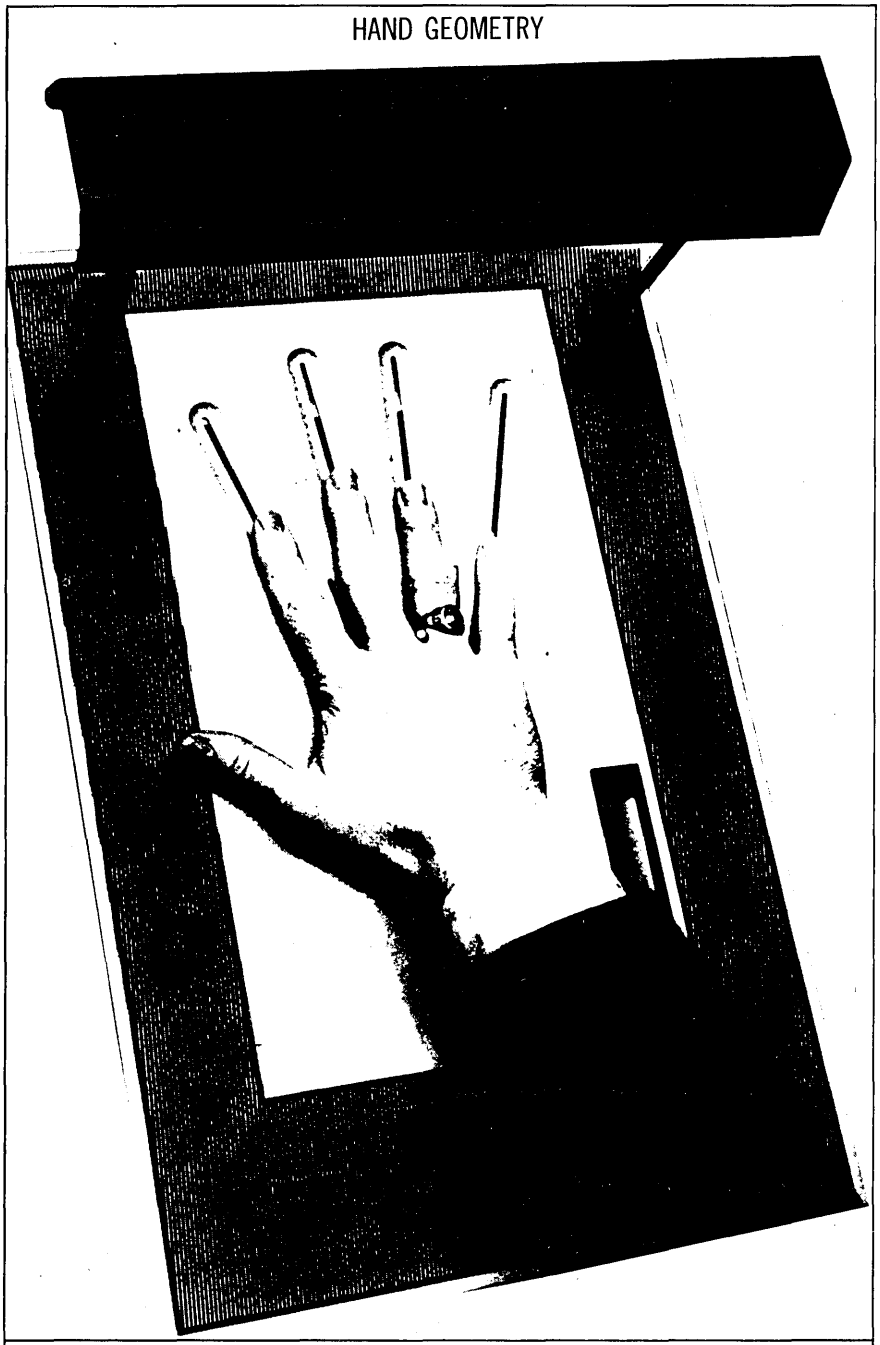

Fig. 2. Because hand geometry varies from person to person, a product has been developed which has been successfully used in the field. A person places his hand on top of four arrays of photocells. A high intensity light shines down onto the hand; the amount of light registered by each photocell is a function of the finger lengths and the translucency of the fingers. The "digitized" output is used to produce a 20 byte identifier for each person.

tives. Instead, the identification process is based on the relative positions of ridge endings and joins, called "minutiae." A practical automatic fingerprint system is based on testing to see if minutiae of the person being identified exist at the same places as in the reference data for that person. It is only necessary to store the x-y coordinates of some 12 points as the reference data. This can be achieved with less than 100 bytes per person.

To read the fingerprint of a person in question, an inkless process has been developed. This is based on a large change in reflectivity of a thermochromic material (suprous mercuric iodide) with a small temperature change. A layer of this material is heated to above body temperature and the finger is placed on the surface. The thermal conductivity of the ridges in the finger locally reduces the temperature to 35°C where contact takes place. Consequently the reflectivity of the surface will be different where the ridges are in contact. Optical scanning now can take place based on the different reflectivity and the minutiae located.

An obvious difficulty with this system is the registration of the finger on the plate so as to achieve repeatable results. Also, cuts, dirt, blisters, etc. will interfere with the comparison. To avoid this, data is stored on an alternate finger.

In the case of hand geometry, a U.S. Air Force study showed that the combinations of individual finger lengths vary from one person to another. This variation in hand geometry has been used in a personal identification product.

A person places his hand on top of four arrays of photocells. The hand is accurately positioned by guides so there are minimal registration problems. A high intensity light shines down onto the hand and the amount of light falling onto each photocell will depend not only on the finger lengths but also on the translucency of the fingers themselves. The individual photocell outputs are digitized and the resulting bit patterns are concatenated to produce a 20 byte identifier for that person. During enrollment, this bit pattern is obtained and used as a reference for subsequent identification of that individual. A perfect match is not expected each time due to variations in photocell sensitivity from unit to unit and from time to time. The unit is designed to be insensitive to length of fingernails but it can detect an artificial substitute "hand" made to the same dimensions as the hand of the authorized person. Good results have been experienced with these devices in the field.

In everyday life it is possible to recognize people by their voices and this attribute is a natural candidate for automatic identification. One person's voice is different from another's because the relative amplitudes of the different frequency components of the speech are different. A method of identification using voice depends on the quantification of the sounds of a particular person when speaking certain words and comparing

Fingerprints are associated with criminal activity and a business might lose customers if such a system were introduced.

the observed results with reference data for that person.

In one method of performing this quantification, a person reads a sequence of words from a display and speaks them into a microphone. The words are chosen to use a variety of phonetic sounds. The audio signal is filtered into several bands, each about 300HZ wide, so that the relative amplitudes of the different parts of the spectrum are available. The output of each filter is sampled at a rate greater than twice the maximum frequency involved and each sample is then quantized to the required precision. Each speaker's voice is then represented by a matrix relating amplitude, frequency, and time for each word spoken. At enrollment time, several measurements are made and the mean amplitudes at each point are used in the reference matrices.

When verification of a person's identity is required, the reference matrix is obtained from a disk and a minicomputer compares the current input matrix with the reference. Time registration is achieved by continuous comparison of the two matrices while shifting the relative timing until a minimum difference is detected using a least squares method. If this minimum difference is below a certain threshold, the person is considered to be who he claims to be.

To prevent an imposter using a recording of the real person, the words to be spoken are displayed one at a time in a random sequence. It is not known ahead of time what the sequence will be so a usable recording cannot be made.

The voiceprint is resistant to mimicry by other human beings because it is much more sensitive to amplitude/frequency variations than is the human ear. There are problems, however, with rejection of authorized users due to voice variations as a result of laryngitis, colds, etc. or emotional stress.

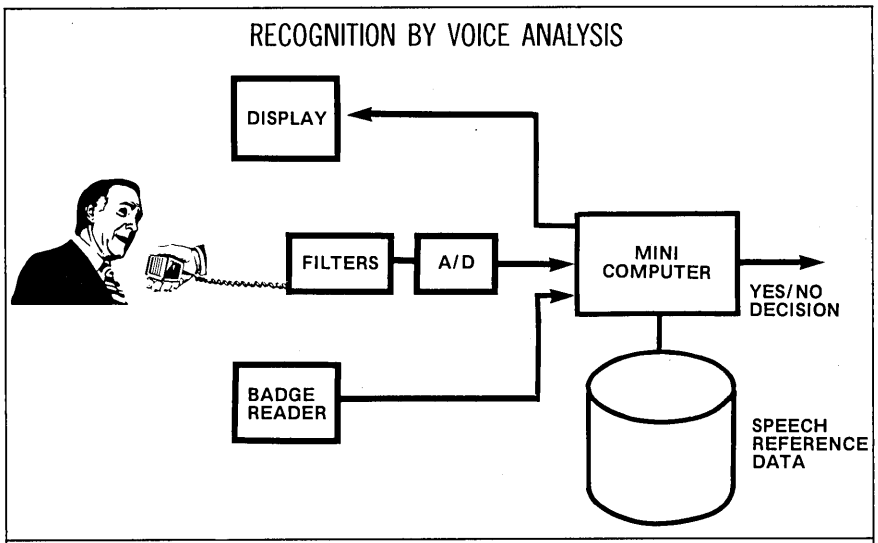

Fig. 3. In this method the individual reads a sequence of words into a microphone. The signal is filtered into several bands of the sound spectrum, each about 300HZ wide. Each filter's output is sampled at a rate greater than twice the maximum frequency involved. Each sample is then quantized to the required precision. A matrix relating amplitude, frequency, and time for each word spoken is created, and a minicomputer is used to make the comparisons at the time of identification.

SIGN HERE, PLEASE

Automatic signature verification as a method of identifying individuals has probably been given the most attention of all techniques during the last few years. Signature verification is the most acceptable method as far as the general public is concerned, which accounts for the many research projects in this field.

The basic principle involved in signature analysis is that there is a great deal of consistency in the way individuals sign their names. No two genuine signatures are precisely the same, however, so the problem is to discriminate between normal variations of the real signature and a forgery. We will exclude means of checking a signature after the event by optical scanning and pattern recognition on the grounds of expense. Viable methods for large volume applications will be based on verification of the signature at the time it is written, by measurements of pen acceleration.

Pens are available which contain a two-dimensional acceleration transducer. The problem of pen orientation is solved by making the pen cross section triangular with the correct position clearly indicated to the user. In addition to the two horizontal axes, there is the option of measuring the vertical force by means of a pressure transducer in the writing tablet. The start of signature for time registration purposes is obtained from the closure of a switch in the tablet when the pen is on the paper.

There are two methods of comparing the signature of the person being identified with the reference signature.

The first method is a comparison of the acceleration amplitudes every 5 to 10msec in two or three dimensions. There is a basic difficulty in this, however, because the spaces between the names and initials show some variation. Correlation must therefore be on a regional basis whithin the signature, and this takes some elaborate computation. Storage of the reference signature in this case takes approximately 2,000 bytes.

The second method uses a simpler approach based on average values of some 10 parameters such as total time of the signature, fraction of time the pen is on the paper, fraction of time the pen is off the paper, average acceleration, velocity and displacement in the X and Y dimensions, average force in the Z axis.

A template vector is obtained at enrollment time. The template is a set of parameters, each being the mean and standard deviation derived from five or more signatures. Some 200 bytes of storage is needed per template.

In considering selection of a personal identification device, a maximum cost should be established based on the anticipated reduction in exposure (interpreted as cost savings) when the devices are installed. This cost should include the cost of computer support, enrollment of users, training, etc. as well as the cost of procuring and maintaining the devices.

The probability of accepting an imposter (a Type II error in statistical terms) should be as low as possible. A practical goal for this probability is 0.001 or 0.1%. This means 1 in every 1,000 attempted accesses by unauthorized persons will succeed.

The probability of rejecting an authorized person (a Type I error) should also be as low as possible, having a goal of 0.001. If this goal is not achieved, the situation is not as serious as accepting an imposter since the authorized person can be accepted by other means. If it happens too often, however, a considerable amount of inconvenience will result.

Most devices can be adjusted to optimize both of these probabilities, but generally as the former is reduced for safety, the latter is increased.

An acceptable time to perform an identificaton as 10 to 15 seconds. The average time should include the effect of required repeats which should not be more than 20%.

The device should operate for several months without failure and should not need frequent adjustment and calibration.

ENCRYPTION MAY HELP It should be difficult for the device to be modified or tampered with so as to permit a false response to the system. Encryption of the messages to and from the device may be necessary in some situations to prevent false messages being generated externally to the device and injected into the system.

User acceptability is probably the most important feature, particularly considering a method of identification to be used with the general public. Fingerprints are associated with criminal activity and a business might lose customers if such a system were introduced. Some trials of the proposed system should be undertaken before a full commitment is made.

Current activity includes:

Fingerprint method: Calspan Technology Inc. of Buffalo, N.Y., has a system called "Fingerscan." This has been on the market for several years and costs $53,000 for the central controller and $4,000 for each station.

Hand print method: Identimat Corp. of New York has been marketing a device for several years at a cost of $3,000 per unit (there is no central station as in the Calspan device).

Voice print method: Texas Instruments, Dallas, has implemented a system for protecting its own computer room. This system is not available commercially.

Signature analysis: The following organizations are known to be working on automatic signature verification (there probably are others who are not advertising the fact): IBM's Thomas J. Watson Research Center; Stanford Research Inst.; Sandia Laboratories; Nippon Electric Co.

There are problems inherent in automatic signature verification and they have not been solved. The general opinion is that a viable product is not likely to be available for several years.

What is needed is an inexpensive and reliable device suitable for use in stores, banks, restaurants, and gas stations. Although the electronic equipment is available, suitable correlation algorithms have not yet been developed to determine the weights of accepting an imposter as opposed to rejecting an authorized person. Because of the variation in the signature of an individual, the feasibility of the basic technique is questionable without some effort toward consistency on the part of the individual.

Without automatic signature verification, it still is possible to cut losses in point of sale situations by the following means:

(a) providing on-line checking of the card number to ensure against lost or stolen cards or accounts over the limit;

(b) adding the photograph of the individual to the card;

(c) making use of the memorized personal identification number in conjunction with the card number in supervised point of sale situations.

Finally, there always is an economic trade-off to be made between the cost of fraud and the cost of preventing it. These trade-offs can only be made when estimates for a specific business situation are available. ✲

D. J. SYKES

Mr. Sykes' present position is as manager of communications system design for Honeywell Information Systems in Phoenix. His responsibilities include the system level design and specification of data communication processors and associated software for front-end and remote applications. Prior to this he was responsibile for minicomputer system design.

Before joining Honeywell he was with RCA Defense Electronic Products in Princeton, engaged in the design of equipment for data communications associated with spacecraft.

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PORTIA ISAACSON, CONTRIBUTING EDITOR

PERSONAL COMPUTING

FOOD FOR THE HOME COMPUTER

Home computers are hungry—hungry for the data that will broaden their use to news selection, shopping, want ad scanning, stock market analysis, and myriad other applications that require access to a timely computer-processible data base. Here and there sources for such data bases are appearing. We might call each of these widely varying sources of publicly accessible digital information a digital information utility.

The union of home computers with the digital information utility came when Apple Computer recently announced an arrangement with Dow-Jones which allows accessing current stock quote information.

A digital information utility can be accessed by a home computer in two fundamentally different ways. The most flexible way is the dial-up telephone network which allows point-to-point interactive communication. Using the telephone network a home computer can talk to another computer or simply access a data base. A less flexible method of transmitting digital information to a home computer is to broadcast the information using radio or television. A look at a few of the emerging digital information utilities gives us a glimpse of the future when vast stores of information will be available for display and processing by the home computer.

The union of home computers with the digital information utility came when Apple Computer, Inc. recently announced an arrangement with Dow-Jones & Company, Inc. which allows accessing current stock quote information in the Dow-Jones data base using the Apple Computer and programs supplied by Apple. The cost of the service is an initial $25 one-time contract fee and a $3 log-in fee for the first three minutes plus $.50 per minute usage fee thereafter for each session.

Apple Computer is preparing a large series of programs which use the Dow-Jones service. The first program in the series is the Apple Stock Reporter which enables the user to obtain quotes on any stock listed on any of the six major exchanges in the United States.

The Personal Computer Network (PCNET) activity is supervised by the

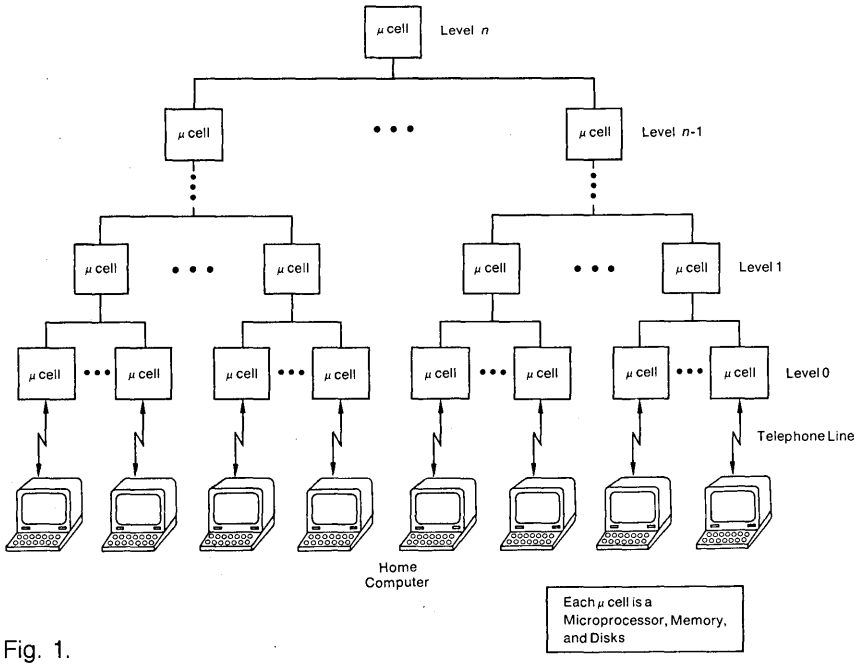

Fig. 1.

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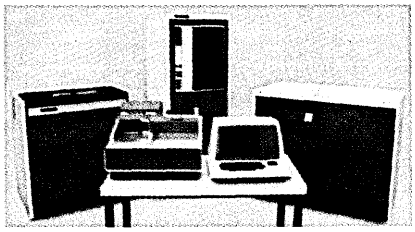
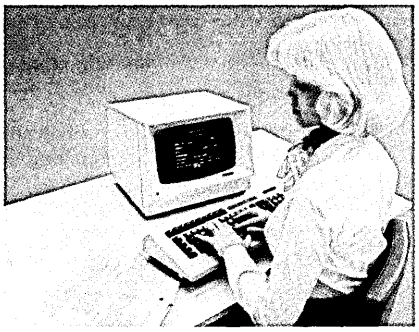


HARRIS 1620 remote batch terminal.

tiprogramming capability. One large Harris 1600 can support up to four communications jobs concurrent with other tasks such as media conversion. The 1600 already supports virtually every communications protocol in wide commercial use today and will soon support full SNA capability. Communications interfaces are available up to 56 Kbps.

Interactive Terminals.

Our interactive terminals give you features that you can't get elsewhere. Plus-compatible 3270-mode units in our 8000 series can be easily upgraded to offer local format storage, queued transaction handling, (and spooled print available soon). These features can be combined in any mix to improve efficiency and productivity at remote 3270 sites. Our software also allows the 8000 series to emulate

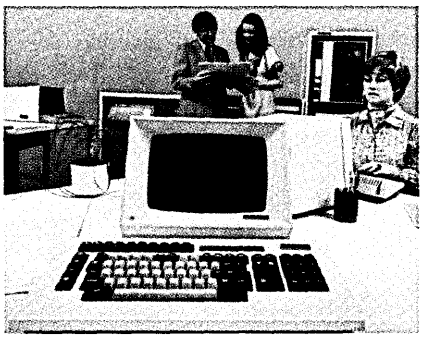


HARRIS 8000 series interactive terminals.

Honeywell, Univac and Burroughs interactive protocols.

Distributed Data Processing (DDP) Systems.

Harris DDP systems combine the proven performance of both our batch

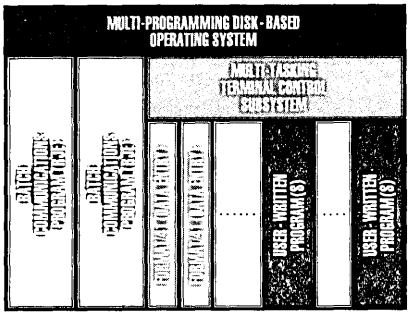


New HARRIS 1670 distributed processing system.

and interactive products into a single multi-function terminal. As a result, Harris systems can provide all five basic DDP functions *concurrently:* local or remote batch; data entry; local interaction and remote interaction. All of these functions operate under the control of sophisticated software providing flexibility normally found only on larger mainframes.

Software.

Every data communications terminal we make is software-driven and is kept up to date through new software releases. That's one reason why Harris terminals continue to perform with extremely high efficiency over long periods of time.



Sophisticated software architecture of Harris 1660 Distributed Data Processing (DDP) System supporting multiple RJE links, data entry, and user-written interactive programs concurrently.

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HARRIS
COMMUNICATIONS AND INFORMATION HANDLING

The only source you need.

PCNET Committee which formed as a result of a Personal Computing Network Session at the first West Coast Computer Faire in 1977. Since then, protocols have been specified for the communication between personal computers using the dial-up telephone network. The items communicated between computers are not restricted and commonly will include text, mail and programs. PCNET was demonstrated at the second West Coast Computer Faire in April 1978, and again at the National Computer Conference in June 1978. Most users of PCNET are in the San Francisco area; however, there is no restriction and a user can be anywhere that a telephone is located.

In Chicago there is a computerized bulletin board system operated by computer hobbyists. It can be called by anyone with a computer terminal and an acoustic coupler and a telephone. Its functions include entering messages, retrieving message summaries, and retrieving messages. The system invites one to leave any kind of message of interest to computer hobbyists. A scan of recent messages included sell and swap ad for hardware and software, information about various computer clubs, get acquainted invitations, job ads, and looking for people with interests similar to ones own.

The Washington, D.C. Amateur Computer Society has a publication called, *Electronic Journal*. Now in its second year of publication, this journal is available via computer link to anyone possessing a terminal and the telephone coupler. No password or account number is necessary.

The Digicast Project, directed by Jim Warren in the San Francisco area, proposes to transmit digitally encoded alphanumeric information on FM radio subcarriers. The hardware necessary at the transmitter costs well under $10,000. The receiving hardware, exclusive of the receiving computer, is producible for about $50 to $100.

A company with a nationwide sales force could broadcast messages from the home office to the desk of each salesman in minutes for less than the cost of mail.

One application includes newscasting. News is presently delivered to newspapers and broadcasters by wire services in machine readable form. Little additional effort is necessary to digicast that data. A receiving computer can scan the digicast news for items of interest. Another application of digicasting is buy and sell ads.

How will digicast make money? Advertising can be handled much the same as newspapers by forcing it into articles. Buy and sell advertisements can be paid for by the person placing the ad. Subscriptions can be implemented through encryption of the data being transmitted and selling of monthly encoding keys that need only be typed into the receiving computer.

Digital Broadcasting Corp. of McLean, Virginia has long term financing of $25 million from Consolidated Industries of America for an ambitious nationwide project to broadcast digital messages to inexpensive printers over FM radio subcarriers. This is not a general electronic mail system since messages can be organized from only the message origination terminals.

A simple attachment to home computers would allow them to operate as a message receiving unit or a message origination terminal. The primary market for the message broadcasting capability will be corporations. For example, a company with a nationwide sales force could broadcast messages from the home office to the desk of each salesman in minutes for less than the cost of mail. The initial uses of the message broadcasting capability is expected to be intra-company.

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A line printer must fit all its intended applications. Standard #2. NEC's Trimliner family comes initially in two models—300 and 600 LPM. 48- to 128-character fonts. The five most popular interfaces. Result: use it anywhere.

A line printer must enhance your system. Standard #3. NEC's Trimliner printers offer more operator ease-of-use features as standard equipment. 6 or 8 LPI. Electronic vertical format control. Up to 136 characters per line. Forms length switch. Automatic band alignment. Single or double line feed. Audio alarm. All standard. Result: your systems product becomes more attractive.

A line printer must be inexpensive—to buy and to use. Standard #4. With all their extra features included in the basic price, NEC's Trimliner printers provide the best value-per-dollar in the industry. They cost the same as competitive printers. And they offer 90 per cent parts commonality for lowest-cost sparing. Modular design that delivers a 30-minute MTTR. Ribbon life of 500,000 impressions. Result: a new standard in printer economics.

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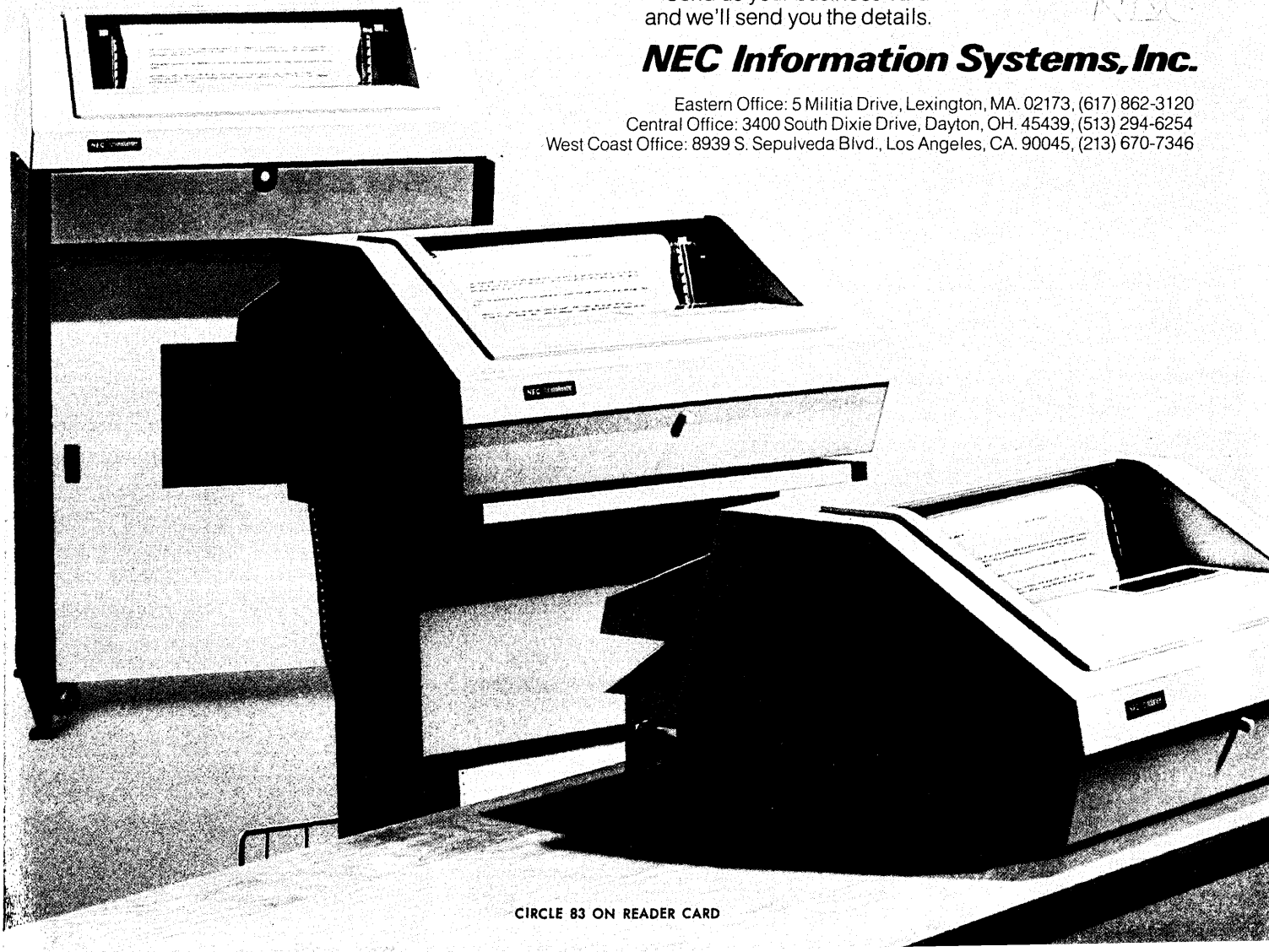

CIRCLE 83 ON READER CARD

PERSONAL COMPUTING

The U.K. Post Office, which also operates the telephone system, has implemented the Viewdata system, now called Prestel in the U.K. Massive stores of information, such as news, airline schedules, want ads, public welfare information, and educational information, is housed in a central computer system. A page of this information can be requested from a home or a business via a small calculator-like terminal connected to the telephone line. The requested page is returned over the telephone line to a receiving tv set with a special Viewdata modification where it is displayed in full color. The Post Office is paid by the information requestor for use of the telephone line on a per minute basis as in a normal voice call in the U.K. Further, the information provider, such as a travel agency, pays the Post Office to offer its data base on the Viewdata system. The information provider can charge the customer for viewing a page. The charge is added to the telephone bill of the requestor; the Post Office does the necessary accounting and pays the information provider.

A limited electronic mail capability is planned which will allow the display of messages on the Viewdata tv. This capability will be especially useful for the deaf who cannot use the normal telephone.

The Viewdata system terminal is probably the wrong choice in the now emerging era of home computers since the $1,000 price tag of today's home computer is about the same as the cost of the calculator-like Viewdata terminal and the incremental cost of the Viewdata modified tv set over a normal tv. Not only can a properly designed home computer serve as the Viewdata terminal and color tv interface, but it is capable of many standalone functions.

The two U.K. television broadcasting authorities (BBC and IBA) are offering the capability of broadcasting digital data during normal television broadcasting by transmitting the data during the otherwise unused vertical retrace period (the time during which the scan resets from the lower right of the screen to the upper left). A small number of pages, say 100, is broadcast repeatedly in a loop. A simple receiver in the tv and a handheld calculator-like terminal is used to select the page to be displayed. Information such as news, sports, and buy and sell ads are broadcast. There is no charge to the user for the service.

Compared with Viewdata, Teletext offers a relatively small amount of information and, unlike Viewdata, is not interactive.

In the United States, a Teletext-like service is most likely on cable television which offers enough bandwidth to transmit large loops of information on dedicated channels.

One of the primary problems in public access to vast stores of information is that the central data base computer will be required to handle very large numbers of connections simultaneously, exceeding the limits of present-day time-sharing computers. Perhaps, rather than building even more massive and expensive monolith computers, we should use inexpensive microprocessors as building blocks. Dr. David Chung of UMTECH recently made just such a proposal in an article "Timeshare at Home" (IEEE Wescon Proceedings, September 1978). By configuring microprocessors, each with main memory and disks, in a pyramid structure (Fig. 1), a very high bandwith structure can be achieved that is capable of handling a predetermined but unlimited number of telephone lines at a very low cost—just what's needed for tomorrow's public time-sharing.

The emergence of the digital information utility clearly answers the question, "What do you do with a home computer?" The home computer that some people view today as a sophisticated toy will tomorrow be the gateway to the world's information resources. ✲

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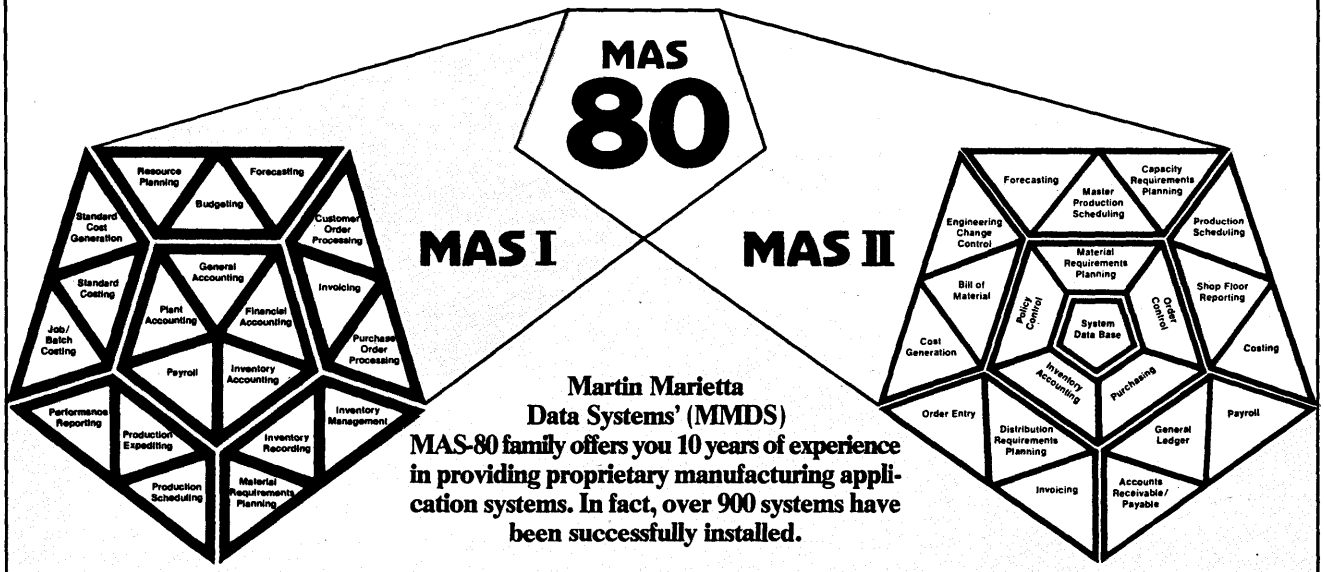

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MAS I PROVIDES . . .

□ On-line capability on such minicomputers as the HP-3000.

□ Batch processing capability to run on mainframes such as IBM, Honeywell, Univac.

□ 20 individually purchasable elements.

□ Functional compatability with MAS II.

MAS II PROVIDES . . .

□ Full data base capability with the independence to utilize the DBMS of your choice: IMS, TOTAL, ADABAS, IDMS and others.

□ A totally transaction driven and oriented system that provides the ability to grow your system in a centralized or distributed processing mode, including on-line functions.

□ Individually purchasable elements, including necessary data base control and maintenance functions.

WRITE ON . . .

MAS-80 has already proven its worth as the manufacturing application system for the future. It's the world leader in **comprehensive**, proprietary manufacturing systems software.

To learn more about how MAS-80 can assist you in meeting your **Materials Management** and **Shop Floor Control** needs, write for our free MAS I and MAS II brochures. If it's easier, call Marketing Services at MMDS headquarters . . . (301) 321-5744. (Carl Smith)

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CIRCLE 50 ON READER CARD

HARDWARE

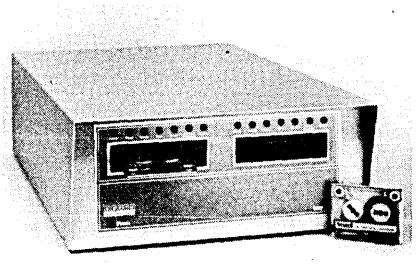
OFF-LINE

Do IBM Selectric typewriters have minds of their own? Or, as our resident paranoid suggests, does the Grey Giant of Armonk hide some very small microcomputer inside the typewriter, a micro with cutting edge state of the art natural language recognition capabilities? The question came up two days before deadline, in the midst of writing the item, a page or so on, describing Cambridge Memories' 370 look-alike processors. We typed "goes for;" the golf ball printed "jses =s'." The four-week old typewriter had nothing more to say. Undaunted, we commandeered the receptionist's nine-year old Model D. The mature machine had no objections to finishing the item. But, within 500 words, its carbon ribbon spoke its last. A little rummaging through the desk and we found part #1010760 (open other end) Film Carbon Ribbons. The ribbons turned out to be simply wound on a bobbin, just what old butterfingers needed. Ten minutes after dropping the ribbon and watching it unwind like serpentine on New Year's Eve, things were under control. We've learned our lesson: next time we'll keep the right tools handy. A tire iron and a pipe wrench should do the trick. They won't help fix a typewriter, but they certainly should suffice in tranquilizing a rampaging editor.

The CRAY-1, held to be the most powerful number cruncher ever put into commercial production, will be available on a remote computing service, United Computing Systems, according to that firm's president, G. J. Lorenz.
In what may be the largest order ever placed for shared-logic word processing equipment, the Social Security Administration has ordered 546 stations, valued in excess of $5.5 million, from Four-Phase Systems.

CARTRIDGE TAPE SYSTEM

An 8080-based controller runs the one or two data cartridge drives in this vendor's line of tape subsystems. Intended for use as cassette or paper tape replacements, the units offer a bidirectional parallel interface and an RS232 interface. Data transfers can run at 2400 bytes per second, while the RS232 interface can operate

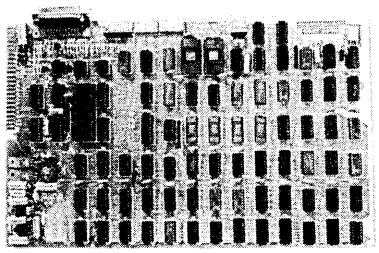


at speeds ranging from 110bps to 9600bps. The storage capacity is in excess of 100KB per 3M DC100A data cartridge. The model 200 desktop dual drive sells for $3,550; a single drive desktop unit with room for a second drive, the model 100, sells for $2,495. Rackmount versions sell for $50 less. HEFTE INDUSTRIES, Los Gatos, Calif.

FOR DATA CIRCLE 449 ON READER CARD

CRT TERMINAL BOARD

The ESAT 200B is a single board building block that forms the basis of an 80 character by 24 line crt terminal. The board features split speed data transmission and reception (up to 19,200bps), dual fonts in



ROM (upper/lower case ASCII is supplied as standard equipment), and three interfaces: RS232, 20mA current loop, and TTL. The keyboard input expected is 7- or 8-bit (with negative strobe) and video outputs are RS170 composite video or separate horizontal and vertical video drive. Intelligent enhancements are planned; one will provide IBM 3277 emulation. The board sells for $329; an additional custom font goes for $50 including the EPROM. ELECTROLABS, Stanford, Calif.

FOR DATA CIRCLE 450 ON READER CARD

STATISTICAL MULTIPLEXOR

Offered in four- and eight-channel versions, the Supermux 480 uses statistical multiplexing techniques allowing up to eight asynchronous terminals to share a single 9600bps line. Inputs may be dial-up or dedicated at standard synchronous speeds ranging from 50bps to 9600bps; characters may consist of 5, 6, 7, or 8 bits. The units can work with any synchronous modem at speeds of up to 9600bps, so long as the Supermux can use the modem's transmit and receive clock signals. When the application permits, a 103 or 202 modem can be used for communications at 300bps, 1200bps, or 1800bps. The microprocessor based unit provides CRC error checking, with automatic retransmission of incorrectly received data. A four channel Supermux 480 sells for $1,500 and an eight channel unit goes for $2,500. Deliveries take 90 days. INFOTRON SYSTEMS CORP., Cherry Hill, N.J.

FOR DATA CIRCLE 451 ON READER CARD

LIQUID CRYSTAL DISPLAY

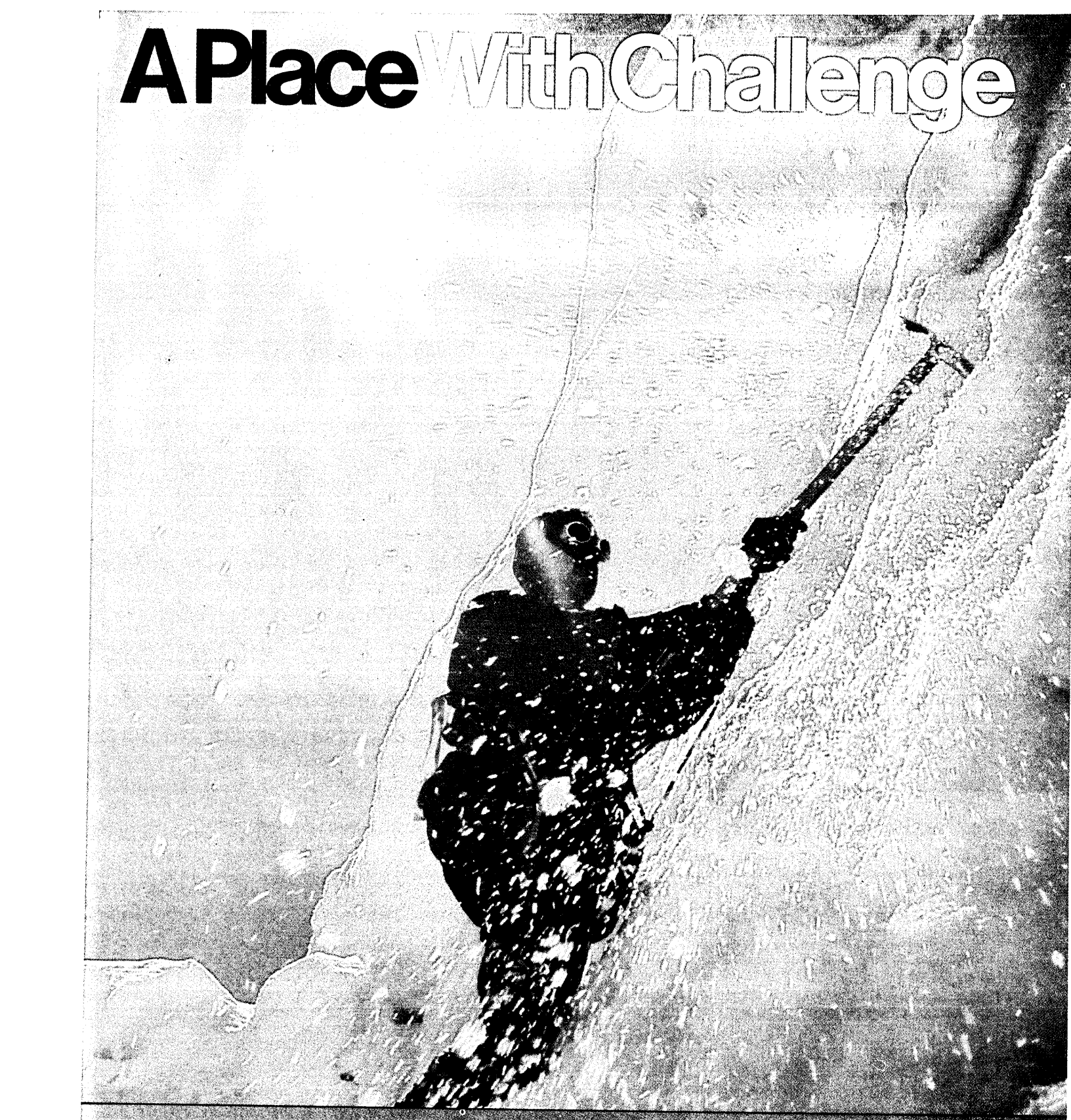
Intended for use with microprocessors and terminals, the Alpha I is a 32 character liquid crystal display. A programmable controller allows interfacing to microcomputers via an 8-bit bidirectional port for data transfers and a 4-bit control port. The controller is capable of generating 64 ASCII characters, clearing the display, and shifting the display left or right. The unit requires a 5 volt 80mA power supply. Complete controller/display packages sell for $395, the display alone sells for $75; both prices are for quantities of one to nine. CRYSTALOID ELECTRONICS CO., Stow, Ohio.

FOR DATA CIRCLE 452 ON READER CARD

IMAGE SENSOR CAMERA

If your application calls for getting image data into a computer where it can be processed, then the MC520 self-scanned Matrix Camera may fill the bill. The

A Place With Challenge



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camera uses a 100 x 100 photodiode array image sensor providing 10,000 pixels; they can scan at rates of up to 5MHz (500 frames per second). A controller, the RS520, sits between camera and computer. It has a 6-bit analog-to-digital converter for digitizing the image. A 16-bit parallel interface connects the RS520 to the com-

puter; two 6-bit data are packed into a 16-bit word for transfer to the computer. The MC520 camera sells for $3,475; for $1,975 the company will sell an MC520 with nine or fewer inoperatiave pixels. The RS520 controller sells for $1,250. We're told a PDP-11 interface is on the drawing board. RETICON CORP., Sunnyvale, Calif.

FOR DATA CIRCLE 453 ON READER CARD

COMMUNICATIONS CONTROLLER

Designed to function as a standalone communications computer or as an intelligent slave to other single board computers in a multibus-structured system, the iSBC 544 Intelligent Communications Controller can fit applications ranging from communications concentration to message switching. Packaged on a 6.75 x 12-inch printed circuit board, the iSBC 544 has four synchronous/asynchronous serial I/O channels, an 8085A microprocessor, 16KB of RAM, sockets for as much as 8KB of ROM, four programmable baud rate generators, and 10 programmable parallel I/O lines compatible with Bell's 801 Automatic Calling Unit. The iSBC 544 sells for $1,545 in singles. INTEL CORP., Santa Clara, Calif.

FOR DATA CIRCLE 454 ON READER CARD

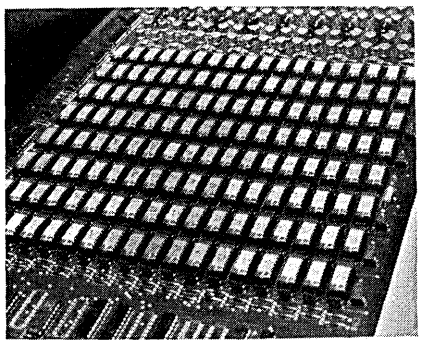
SMALL BUSINESS SYSTEM

The MicroStar/45 system includes a singleboard microcomputer with a 64KB of memory, dual double-sided 8-inch floppy drives, and three RS232 interfaces with programmable asynchronous or synchronous data rates. Of course it's the software that turns a piece of iron into a useful small business system: MicroStar runs a multiuser time-sharing system called Stardos, and a data base management/report writing system named Update. Applications can be programmed in BASIC, with support for sequential, relative, and indexed sequential files. Appli-

HARDWARE SPOTLIGHT

SOLID STATE DISK

Big IBM and plug-compatible users, particularly those running MVS and VM, can replace their 2305-2s with faster and potentially more reliable solid state 4305s. Built around charge-coupled devices (CCD), the 4305 comes in four models with capacities ranging from 11.25MB to 45MB. The 4305 is said to totally emulate the operation of the drum it replaces; it operates with all releases of OS, VS1, VM,

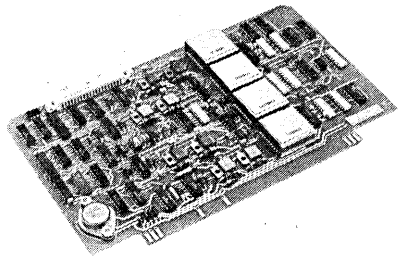


and MVS and requires "absolutely no software modifications." And for the numbers that count, the 4305 has an average access time of 0.7msec and can operate with transfer rates of 1MBps, 1.5MBps, or 3MBps. Pricing for fully configured systems ranges from $150,000 to $400,000. Deliveries are scheduled to commence in the first quarter of next year. STORAGE TECHNOLOGY CORP., Louisville, Colo.

FOR DATA CIRCLE 447 ON READER CARD

BUBBLE MEMORY

After 10 years of research and development work, and delivering specialized systems including a spacecraft recorder based on a 100-megabit bubble memory delivered to NASA's Langley Research Center, this vendor has released three levels of bubble memory devices for general consumption. The nonvolitile solid state memory offerings are organized in what amounts to a pyramid, with each higher level built on those below. At the bottom of the pyramid, there's the RBM256, the basic 256K-bit bubble memory device in a dual in-line package. Next, there's the 1M-bit linear bubble memory module (RLM658) and its associated control module, the programmable RCM650. And on top, there's the ¼MB development system, comprising two linear modules, a control module, and the vendor's System 65 microcomputer development system. The basic RBM256 chip uses a major loop/minor loop and provides an average access time of less than 4msec. The chip operates with a transfer rate of 150KHz. The megabit linear module uses four RBM256 chips and offers bus compatibility with the System 65, and we're told it's also compatible with the bus structure of many systems built around Motorola's M6800. The programmable RCM650 control module can handle up to 16 of the linear modules, for a maximum capacity of 2MB. In lots of one to ten, the basic RBM256 bubble memory chip sells for $500; RLM658 linear modules go for



$2,500 each, in the same quantities. RCM programmable control modules sell for $1,000 in quantities of one to three. A System 65 with a ¼MB of bubble memory sells for $11,400. And the vendor says it will package the bubble memory chips in linear modules best suited to oem customers' specific design needs. ROCKWELL INTERNATIONAL, Electronic Devices Div., Anaheim, Calif.

FOR DATA CIRCLE 448 ON READER CARD

cations packages for order entry, invoicing, general ledger, and accounts receivable are offered. The system also supports CP/M, which in turn allows programming in BASIC, COBOL, FORTRAN, and PASCAL. Intended for sale through independent dealers and oem's, MicroStar/45 sells for less than $10,000 when configured with a crt and a 132-column line printer. Maintenance will be provided through Calcomp's network of 47 service centers. MICRO V CORP., Irvine, Calif.

FOR DATA CIRCLE 455 ON READER CARD

MICROCOMPUTER DISK

Although intended for use with this vendor's microcomputers running its AMOS operating system, the 10MB AM-500 should find a place in systems configured around other processors due to the disk's S-100 bus compatibility. Built around a

Control Data Hawk drive, with 5MB of fixed disk and another 5MB of removable cartridge disk, the subsystem will require a "very simple interface" to the operating system when used with non-AMOS systems. The unit transfers data in blocks of 512 bytes. Up to four drives can be daisy-

chained on one interrupt driven controller. The unit price is $7,995, and the subsystems are sold through retail dealers. ALPHA MICRO, Irvine, Calif.

FOR DATA CIRCLE 456 ON READER CARD

NETWORK PROCESSOR

The 6010 intelligent Network Processor (INP) represents the newest member of this vendor's 6000-series. The 6010 INP provides error-protected concentration of asynchronous data streams in point-to-point networks, as a feeder to a network based on the vendor's 6030 or 6040, or connected directly to a port on a commu-

nications front end processor. The 6010 uses dual microprocessors and statistical concentrating to combine data streams from as many as 30 asynchronous devices. A full duplex link protocol, compatible with CCITT X.25 Level 2, provides error protection. To ensure the 6010 INP's integrity, it runs diagnostics as a background function. Terminals may operate at speeds of up to 1200bps, and link speeds can run up to 9600bps. Dual port interface modules are offered for RS232, current loop, and MIL-STD-188C terminals. A 6010 INP sells for $4,250, and each dual channel module sells for $325. Deliveries begin in the first quarter of next year. CODEX CORP., Newton, Mass.

FOR DATA CIRCLE 457 ON READER CARD

CRT TERMINAL

Mime-I is a rather appropriate name for a terminal that mimics the characteristics of four other terminals (Lear Siegler's ADM3A, Hazeltine's 1500, DEC's VT52, and the vendor's own ACT IV). The terminal can display 24 lines of 80 characters; the character set includes 96 upper and lower case ASCII characters and 32 graphic symbols. The unit has cursor positioning capabilities, protected fields, underlining, graphics mode, and an RS232 interface. It can operate in full-or half-duplex modes, communicating at switch-selectable data rates ranging from 100bps to 9600bps. Single units sell for $795; in lots of 25, the price drops to $595. Non-glare screens are offered as options. MICRO-TERM, INC., St. Louis, Mo.

FOR DATA CIRCLE 458 ON READER CARD

A MAGNUM OF MAINFRAMES

3031 ATTACHED PROCESSOR

This is the real one, the one from White Plains, the one with the IBM stamp of authenticity emblazoned on its console. Dubbed the 3041, use of the 3031 Attached Processor is said to provide 1.6 to 1.8 times the performance of a single 3031. As would be expected, the 3041 shares 3031 specs for cycle time (115nsec) and cache (32KB). An Attached Processor system consists of a 3031 and a 3041, dual 3017 power units, and a shared 3036 console. Operating system support consists of OS/VS2 MVS or VM/370. With first shipments scheduled for the third quarter of next year, Attached Processing Complexes carry price tags ranging from $1,375,000 to $1,830,000. Upgrades, available in the same time frame, go for $375,000. Complex rental prices range from $41,239 per month for a 2MB installation to $56,949 for a 6MB system. The upgrade rents for $13,742 per month. Systems can be leased for monthly payments ranging from $37,500 to $51,810; the upgrade leases for $12,500 per month. INTERNATIONAL BUSINESS MACHINES CORP., Data Processing Div., White Plains, N.Y.

FOR DATA CIRCLE 445 ON READER CARD

LOW END PLUG COMPATIBLES

Although this company may not head your list of plug compatible mainframers, it's had involvement (but no product until now) for several years. Steve Ipolito, a former employee, now heads IPL Systems, a spinoff from this firm, which makes Control Data's Omega-series. And this company owns 40% of IPL. After a joint development program with IPL, this vendor has committed to manufacturing a set of three processors said to span the 370/115 to 370/135 range.

The systems are heavily microcoded, and are built around ECL and TTL circuitry. IBM operating systems, in the public domain, such as DOS/VS, VS-1, VS-2, and VM run with one modification. The IBM EREP module, which records system error layout data, will need to be replaced by this vendor's SEREP program. User-written applications will require no changes.

The Model 1, with a 480nsec cycle time, and memory capacities ranging from 256KB to 768KB, represents the smallest member of the new family. It has one byte multiplexor channel and two sector/block multiplexor channels. A 256KB processor goes for $120,000. Model 2 cycles at 300nsec, has the same channel complement as Model 1, and can support memories ranging from 512KB to 1MB. A 512KB unit sells for $185,000. The 180nsec cycle time Model 3 can have two additional sector/block multiplexor channels. Its memory capacity ranges from 512KB to 2MB. Model 3 also has VM Assist as standard equipment. With a full megabyte, it lists for $265,000. Deliveries are scheduled for the first quarter of next year. CAMBRIDGE MEMORIES, INC., Bedford, Mass.

FOR DATA CIRCLE 446 ON READER CARD

LARGE AP'S AND SMALLER CPU'S

Two days prior to IBM's announcement of its 3031 Attached Processor, this plug compatible vendor introduced its AS/5 Model 7031 Attached Processor in direct competition with IBM. And, it promised deliveries would begin in the second quarter of next year, before IBM's commitment. Two weeks before its AP introduction, the vendor also broadened its product line with 138 and 148 equivalents, the AS/3 Models 3 and 4.

The 7301 AP is said to be 1.5 to 1.8 times as powerful as the 7031 (the 7031 is rated by the vendor at equal to or greater than the 3031). The 7031 AP cycles at 100nsec, and sports expanded Reloadable Control Storage. Each processor in an attached processor configuration can have from one to eight megabytes of main memory. Attached Processor system pricing starts at $1,570,000.

The AS/3's have processor cycle times of 115nsec, and memories ranging from 1MB to 4MB. The vendor says the model 3 provides 40% to 80% more kick than a 138, while the model 4 is at least as powerful as a 148. With deliveries slated to begin by year-end, a 1MB model 3 sells for $490,000, while a 1MB model 4 goes for $600,000. ITEL CORP., Data Products Group, San Francisco, Calif.

FOR DATA CIRCLE 463 ON READER CARD

TELECOMMUNICATIONS MANAGEMENT

The analysis and reporting capabilities of this vendor's Infoswitch telecommunications control monitoring system have been greatly increased by the introduction of facilities allowing the system to participate in the vendor's Attached Resource Computer (ARC) systems. The data base maintained by Infoswitch's host computer can be made available to other processors in an ARC, allowing processing which previously had to be done off-line to proceed concurrently (on another processor) with communications management. A high speed printer available on an ARC applications processor could be used for printing communications reports, instead of investing in a line printer solely for the Infoswitch host. Prices for an Infoswitch system, including a printer,

HARDWARE

start at about $65,000; the capability to participate in an ARC adds nothing to the price. DATAPOINT CORP., San Antonio, Texas.

FOR DATA CIRCLE 464 ON READER CARD

TAPE DRIVE

The MTUO610, for use with this vendor's Series 60, Levels 66, 66/DPS, 68, and 68/DPS mainframes, is a 200ips, dual density (800bpi/1600bpi), nine-track magnetic tape unit. The NRZI/Phase Encoded unit can transfer data at up to 320,000 bytes per second at 1600bpi; at 800bpi the transfer rate is halved. The unit also has automatic head and tape cleaners, automatic cartridge load, and automatic threading and column loading features. Its purchase price is $25,800, with a monthly maintenance fee of $136; it can be leased on a five-year plan for $658 per month. HONEYWELL, INC., United States Information Systems Group, Phoenix, Ariz.

FOR DATA CIRCLE 461 ON READER CARD

WORD PROCESSOR COMMUNICATIONS

Wordstream word processing systems now have the capability of communicating among themselves. The optional communications interface allows users to transmit documents over phone lines; the interface is compatible with Bell's 201C Data Set. The interface can be purchased for $1,600, or leased for $37 per month on a three year lease. WORDSTREAM CORP., New York, N.Y.

FOR DATA CIRCLE 462 ON READER CARD

BUSINESS COMPUTERS

Several new entries beef up this vendor's series of PDP-8-based business systems. Intended for sale to both oem and end user alike, the new systems include the entry-level DECstation 78/50, three mid-range DECstation 88 models, and the larger

DECstation 88/90 series. Languages offered include the vendor's proprietary DIBOL, as well as commercial BASIC, and FORTRAN IV.. In a new marketing move, the vendor now supplies two operating systems with each system. The COS-310 commercial operating system is primarily for DIBOL users, while the general purpose OS/78 will take care of FORTRAN and BASIC users. The 78/50 uses a VT78 video data processor and the vendor's new RX02 double density floppy drive. It uses an LSI implementation of the venerable PDP-8 with a fixed memory capacity of 16K words. A single 78/50 sells for $8,250. The 88-series uses a 32K word (expandable to 128K word) PDP-8A processor. It includes a VT100 terminal and a choice of disks. The 88/50 has two floppies, the 88/70 has four. Two floppies and a 5MB rigid disk come with the 88/80, while the 88/97 has a 64K word memory and two 5MB drives. Single unit pricing on the 88-series ranges from $11,500 to $25,100. Deliveries start next month. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 459 ON READER CARD

SPEECH SYNTHESIS

The S100-VSK combines a Votrax VSK speech synthesizer with an S-100 bus compatible interface and an amplifier ready to drive an 8-ohm speaker. A driver program, written for 8080s, is included, as is a sample BASIC demo program and a 500-word dictionary. Completely assembled and tested, the S100-VSK sells for $695. JHM MARKETING ASSOCIATES, Newport Beach, Calif.

FOR DATA CIRCLE 460 ON READER CARD ✲

SOFTWARE

UPDATES

Benchmark analyses of small computer systems have been commissioned by the independent Association of Small Computer Users. After polling its members, ASCU has determined the most popular systems which will be benchmarked first. These include IBM's 5110, as well as machines from DEC, Wang, Hewlett-Packard, Data General, and Datapoint. The three-phase analyses will be performed by Real Decisions Corp. of Stamford, Conn. The studies will comprise three major categories: execution time of specific repeated tasks, running time for actual user programs, and an evaluation of the systems' editing software. The first analysis, covering the 5110, will be printed in this month's issue of the ASCU newsletter. The ASCU is located at 75 Manhattan Dr., Boulder, CO 80303; its phone number is (303) 499-1722.

ANSI/X3/SPARC has set up a new data base management system study group "seeking a fresh, new examination of the issues in standardizing data base management facilities." The group's charter, partially inspired by ISO's work on an international standard for DBMS, calls for helping provide U.S. positions and representation to the ISO/TC97/SC5 Working Group on Data Base. The group also will work with other related ANSI X3 (computers and information handling) subcommittees. Individuals interested in participating in the group's work can contact Acting Chairman John L. Berg at the National Bureau of Standards, Technology, A-265, Washington, D.C. 20234

Early returns indicate that the joint Datamation/Datapro Research Corp. software package ratings, to be published in December, will cover more than 250 packages from over 100 vendors. More than two dozen packages are expected to make the coveted Honor Roll.

CALCULATOR

A reverse Polish programmable scientific calculator program, said to combine the best features of Hewlett-Packard's 97 and Texas Instruments' Programmer pocket calculators, runs on the Commodore PET personal computer. The program handles single-key execution of more than 50 arithmetic, algebraic, trigonometric, and exponential functions. Calculations may be done in binary, octal, decimal, or hexadecimal, with radix conversion available at a single keystroke. The program, dubbed Pro-Cal-I, displays 10 memory registers, five stack registers, and the 14 most recent I/O operations on the PET's crt. Programs can be stored on cassette. The package, written in BASIC and machine language, sells for $26, including manual. APPLICATIONS RESEARCH CO., Los Altos Hills, Calif.

FOR DATA CIRCLE 401 ON READER CARD

PRINTING SERVICE

You don't have to be a big shop to get your printing done on the $295,000 Xerox 9700 laser printer (July 1977, p. 162). This New York-based service company will take your print image tape and give you the hard copy within 24 hours. The service offers output on 8½ x 11 inch paper using a variety of type faces and sizes, and they'll develop forms to be printed at output time. They've got one machine installed, another due the first of this month, and two more slated for delivery next year. Service is offered 24 hours a day, seven days a week. Courier service can be arranged for users in other areas. Charges are based on monthly volume; figure on paying about $300 if you're in the 5,000 page a month class. COMVESTRIX CORP., New York, N.Y.

FOR DATA CIRCLE 402 ON READER CARD

APL APPLICATIONS

A pair of APL programs, one a terminal input monitor, the other a report generator, can run under many APL implementations, including VSAPL and APL SV for IBM equipment, and the APL's running on DEC and Hewlett-Packard equipment. The Conversational Terminal Input can provide a standardized man-machine interface for applications programs. The package handles prompting, input, validation, and analysis of user responses. The program leases for $100 per month for the first year, after which charges are waived. The Analyst is intended for use by both APL programmers and business analysts, and is said to require no programming experience. It provides facilities for extracting information from a data base, manipulating the data in a spreadsheet format, and subsequent printing via a report generator. It carries a $300 per month lease charge, which is waived after the first two years of use. NUMERTIX LTD., Toronto, Ontario, Canada.

FOR DATA CIRCLE 403 ON READER CARD

MICRO PROGRAMMING UTILITY

Innova-Stak can help programmers implement reentrant code and recursive procedures on M6800-based microcomputers. Two stack-handling routines (Push and Pop) provide memory allocation, parameter passing, and error checking functions. Macros take care of subroutine calling and receiving sequences; a third macro provides stack initialization. Innova-Stak comes in relocatable format for inclusion in the user's code, where it occupies less than 400 bytes of memory. The package, distributed on diskette in MDOS format, includes the Push and Pop routines, calling and initialization macros, and a validation program. A user's manual also is included in the $35 price tag; purchasers get a perpetual license and explicit permission to use the package in other program products. INNOVA SYSTEMS INC., New York, N.Y.

FOR DATA CIRCLE 404 ON READER CARD

SERIES/1 RPG

SRPG/1 runs under this vendor's TSS operating system on IBM Series/1 minicomputers. Occupying less than 16KB of memory, SRPC generates single-line per record reports on forms of variable width and length. Users can define up to three detail report headings, up to three optional legends (printed above the headings on all pages of the report or just the first page), up to 15 report columns per line, and up to five optional report breaks. SRPG/1 sells for $2,500 per machine license. SPAN MANAGEMENT SYSTEMS, INC., Series/1 Div., East Providence, R.I.

FOR DATA CIRCLE 405 ON READER CARD

asi/inquiry

The IMS DB/DC QUERY LANGUAGE

USED BY MORE IMS INSTALLATIONS THAN ANY COMPETING PRODUCT

ASI/INQUIRY is an IMS DB/DC query language that operates completely as an interactive Message Processing Program. The design of ASI/INQUIRY is such that the *structure of the data base is transparent to the user*. Moreover, one need not have familiarity with DL/1 segment logic or the complexities of multi-pathing. Extremely rapid response time is assured.

MAJOR HIGHLIGHTS

- ☐ End-user oriented
  - —Easy-to-use language
  - —Requires no knowledge of IMS
  - —Comprehensive diagnostic messages
- ☐ Rapid response time for even the most complex queries
- ☐ Dynamic priority scheduling to maximize system performance
- ☐ Availability of default as well as user-defined screen formatting

Additional features and functions include:

- Supported under both IMS DB/DC and TSO
- Full support of IMS/VS secondary indexing
- Open-ended computation facilities
- Ability to SORT display output
- Complete security through password protection
- Comprehensive log of all session and run statistics
- Unlimited data base concatenation and referencing
- Optional usage of qualified SSA's

In summary, ASI/INQUIRY represents the state-of-the-art product in an IMS/DC or TSO-supported environment. Contact us and learn why organizations such as *Hughes Aircraft, Standard Oil of Indiana, Hydro-Quebec* and *EXXON* are processing queries like "What if . . . . " and obtaining a return on their investment many times over.

asi

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CIRCLE 77 ON READER CARD

SOFTWARE

MICROPROCESSOR LANGUAGE

PL/65, a high-level language resembling ALGOL and PL/1, can help programmers develop applications for this vendor's R6500 microprocessor. Compilers are available for use with the vendor's System 65 development system or DEC PDP-11's running RT-11. In addition to allowing programming at a high-level language, the compiler allows the use of assembly language instructions when needed for timing or code optimization. High-level language constructs are provided for assignment, integer arithmetic, conditional execution, linear array manipulation, block structures, subscripts, and parenthetical expressions. The compiler outputs assembly language for the System 65's resident assembler or, in the PDP-11 case, for a cross-assembler. Either version of PL/65 sells for $500, the PDP-11 cross-assembler sells for $600. ROCKWELL INTERNATIONAL, Electronic Devices Div., Anaheim, Calif.

FOR DATA CIRCLE 406 ON READER CARD

PDP-11 DISK DRIVER

A high-performance disk driver, written to satisfy the needs of a consulting client, provides RSX-11M users with overlapped seeks, dual porting capabilities, and use

SOFTWARE SPOTLIGHT

NETWORKING

Through a very logical extension of its operating system, this vendor now offers networking under the trade name of Expand. Logical, because the vendor's system already contains from 2 to 16 processors that can communicate between each other via the file system; transparent networking comes by removing the restriction that intercommunicating processors must physically reside in the same system. Transparency, in this case, stems from the method adopted for interprocess communication. All the communication is handled by the file system with the use of logical file names. This, in turn, means that extending the "message system" used by the vendor's Guardian operating system lets processes talk over communications links as easily as they now talk over the interprocessor bus. Want to use the editor at the San Francisco node? Type /SF EDIT.

Consistent with the vendor's original design goals for its NonStop fail-safe systems, Expand provides Arpanet-like routing capabilities which recognize downed links and attempts to find secondary paths. Expand tries to send messages by the fastest route. Rerouting occurs even if the link fails during transmission. Dynamic rerouting ensures a message will always get to its destination in a ring network even if one link fails. Ring networks aren't the only type allowed, though they require the fewest links to interconnect a number of systems.

On the nuts and bolts side, communications can occur at speeds of up to 56,000bps; X.25 is available to installations wanting or needing it. Connection to a mainframe is possible with the vendor's existing emulator packages, although this won't be transparent. As many as 255 systems (up to 4,080 processors) can participate in a network. Users must install the vendor's synchronous communications controller on each system participating in the network. Expand has a license fee of $10,000 per customer. Also, a microcode extension must be installed in each processor; this goes for $1,500 per processor. TANDEM COMPUTERS, INC., Cupertino, Calif.

FOR DATA CIRCLE 416 ON READER CARD

of the search command (reducing controller-busy time). In cases where concurrent tasks access data spread over several drives, this driver is said to accomplish two to three times as many accesses as would be possible with serial seek. No changes to existing programs are required, as the driver recognizes requests written for the DEC driver replaced. The driver works with DEC's RK06, RK07, RP04, RP05, RP06, RM02, and RM03 drives. A one-time license fee of $2,100 is charged for the first copy, with subsequent copies available at discounted prices. CYTROL, INC., Edina, Minn.

FOR DATA CIRCLE 407 ON READER CARD

MICROPROCESSOR FORTRAN

FORTRAN IV has joined this vendor's software offerings for its Z80-based MCZ-1 series of microcomputers and ZDS-1 family of development systems. The compiler is said to comply with the 1966 ANSI X3.9 FORTRAN IV standard, with the exception of the exclusion of complex numbers. Several enhancements have been added including mixed mode arithmetic, logical operations on integer data, and the ability to use logical variables to represent integers between -128 and +127. The compiler applies statement-by-statement optimization, eliminating common subexpressions, evaluating constant expressions at compile time, and optimizing branches (a branch to another branch instruction gets changed to a direct branch to the final destination). Intended to run under the RIO operating system on machines with at least 48KB of memory, the compiler sells for $750 on diskette. ZILOG, Cupertino, Calif.

FOR DATA CIRCLE 408 ON READER CARD

COMMUNICATIONS MANAGEMENT

The Multinode Tandem Optymizer, an interactive FORTRAN program, can help manage and design tandem multipoint switched networks for users currently spending upwards of $100,000 per month on long distance calls. The program is said to offer a potential savings of up to 25%. The program helps determine the locations to be included in a multipoint network, major switching hubs, on-network access circuits, intermachine circuits, and off-network WATS/FX/ specialized common-carrier circuits. The program provides cost optimization for a user-specified grade of service. Capable of analyzing two-wire or four-wire switches, the Optymizer is said to be "specifically useful" for networks using any of the following switching equipment: ETS Dimension Feature Package 8, ROLM, Danray, Action Plantronics, CCSA, EPSCS, WESCOM, Collins, Automatic Electric, or Stromberg Carlson. The Optymizer runs in 40KB, with prices ranging from $30,000 to $60,000. It will be available on the Tymshare network for those who don't need an in-house installation. TELCO RESEARCH CORP., Nashville, Tenn.

FOR DATA CIRCLE 409 ON READER CARD

SPOOLING

This vendor now provides an optional spooling package for its System III business computer systems. The $1,000 package runs on configurations with a 10MB disk and at least 64KB of memory. Output is spooled to disk (with trailing space compressed) for subsequent printing on an appropriate printer. The print queue can be inspected and modified from a crt terminal. If a number of reports require a special form available on a given printer, the package will route all of these reports, one after the other, to that printer, reducing the need for operator intervention. Spooling is available simultaneously to both foreground and background programs. LOCKHEED ELECTRONICS CO., INC., Plainfield, N.J.

FOR DATA CIRCLE 410 ON READER CARD

PAYROLL

A pair of payroll packages, written for Wang equipment, can help even very small firms bring their payroll processing

inhouse. The programs, which have been checked out of all current Wang processors save the VS series (and that's pending), require either dual floppies or a hard disk, and 8KB to 16KB of memory, according to the vendor. Features include accounting reports selected from a menu, tax table maintenance, check and/or stub printing, and a report generator to satisfy user-specific needs. On a dual floppy system, 255 employees can be accommodated; with rigid disk this limit increase to several thousand. The first package, dubbed #401, sells for $750. For $900, users can get #402, which includes labor distribution (job costing) capabilities. DATA TRAIN, INC., Grants Pass, Ore.

FOR DATA CIRCLE 411 ON READER CARD

FORTRAN PREPROCESSOR

FPL, a FORTRAN preprocessor for PDP-11's running RT-11, adds several new constructs and source listing capabilities to DEC's standard compiler. It also allows variable names of up to 24 characters. New language features include IF ... THEN ... ORIF ... ELSE ... END IF, DO ... END DO, and WHILE ... END WHILE. A COPY function allows the user to simply and accurately duplicate code segments, such as COMMON declarations. "Pretty Print" listings with indentation, user specified segments surrounded by blocks, and page ejects at user selected points are other features of the package. The FPL package, which runs "easily" in 32KB, sells for $495 on floppy diskette or $595 on RK05 cartridge. PROGRESSIVE ELECTRONIC PRODUCTS, INC., Janesville, Wisc.

FOR DATA CIRCLE 412 ON READER CARD

BASIC

An extended conversational BASIC compiler, said to offer a high degree of compatibility with the Dartmouth College BASIC system, runs on this vendor's 90/25, 90/30, and 90/40 systems under OS/3. The compiler provides file support for sequential and direct access files, formatted output, improved string handling support, and matrix arithmetic. Existing BASIC programs that run on the vendor's systems will compile under extended BASIC without modification. Use of Extended BASIC require the BASIC Edit Monitor ($75 per month); Extended BASIC has a monthly fee of $60. SPERRY UNIVAC, Blue Bell, Penn.

FOR DATA CIRCLE 413 ON READER CARD

MICROCOMPUTER STRING HANDLING

If your micro runs CP/M, and you choose to program in FORTRAN, this set of character handling routines may save you a lot of tedious coding. The package of FORTRAN subroutines include those to find, delete, fill, move, separate, concatenate, and compare characters and strings. Substring handling is included, as is character to numeric conversion. Another routine counts the occurrences of one string within another. Input and output routines also are included. An interactive demonstration program demonstrates each routines' capabilities and limitations. The package, known as The String Bit, sells for $45 on diskette. KEY BITS INC., Miami, Fla.

FOR DATA CIRCLE 414 ON READER CARD

MICROPROCESSOR DEVELOPMENT AID

Pivot 9900 lets users of Intel microprocessor development systems create and debug code for Texas Instruments' 16-bit 9900 microprocessors. The package runs under ISIS-II on MDS-800, MDS-888, and Series II models 220 or 230 systems having at least 48KB of memory and dual diskette drives; it can also burn PROM's on a Universal PROM Programmer. Users create and modify assembler source files using the ISIS-II text editor. Then the Pivot 9900 cross-assembler generates object code for the Pivot linking loader. A 9900 simulator provides error diagnostic, debugging, and performance measurement

capabilities. Once the user is satisfied with the program, a PROM programming utility can be called up to create files formatted for Intel's Universal PROM Mapper software. At this point the user can burn the program into PROM's using Intel utilities. Supplied on a single or double density floppy, the Pivot 9900 package license fee for a single development system is $1,500. Documentation consists of an installation and user's manual, an assembly language programming manual, and a simulator programming manual. The license fee includes a one-year update service. PROCESSOR INNOVATIONS, Red Bank, N.J.

FOR DATA CIRCLE 415 ON READER CARD

MICROPROCESSOR BASIC

"The advantages and excellent features of Fairchild's F8 microprocessor probably have been underutilized because of the lack of a readily available higher level language," opines this vendor. To fill the void, the vendor has developed a BASIC interpreter for the F8.

The interpreter reportedly runs in under 9KB of memory and provides nine-digit precision in floating point operations. Integers range from less than -4 billion to greater than 4 billion. The interpreter includes string manipulation capabilities, and most features expected of BASIC. Among the omissions (and slated for fourth quarter availability) are computer GOTO's and GOSUF's, trig functions, and LOG and EXP functions. The BASIC package sells for $179.95. MICRO BUSINESS SYSTEMS, INC., Boston, Mass.

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WORD PROCESSING

Primacs-I is a word-processing system written for Prime 300 (and larger) time-sharing systems. It supports creation of documents, insertion and deletion of text, pagination, scrolling (forward and backward), right and left margin alignment, paragraph and decimal tabs, and underscoring. The software is designed to work with Perkin-Elmer's Model 1200 editing crt and a 45cps printer. The system also includes document indexing and retrieval capabilities. The software sells for $15,000. ACS AMERICA INC., New York, N.Y.

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SECURITY

Secure-IMS prevents unauthorized access to on-line data bases accessible via IMS DB/DC. It's said to adhere, all the way down the line, to the "Privacy Protection Study Commission Report of 1977." Attempted violations are reported in real-time, and hard-copy reports give audit trails of all system activity. The audits are broken out by time, operator, terminal ID, and type of activity. Operators are allowed to work only in preauthorized areas—customized menus limit their access. Secure-IMS is priced at $30,000. SOFTWARE MODULE MARKETING, Sacramento, Calif.

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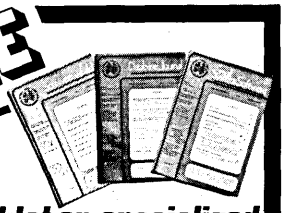

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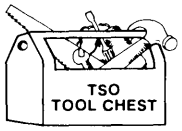

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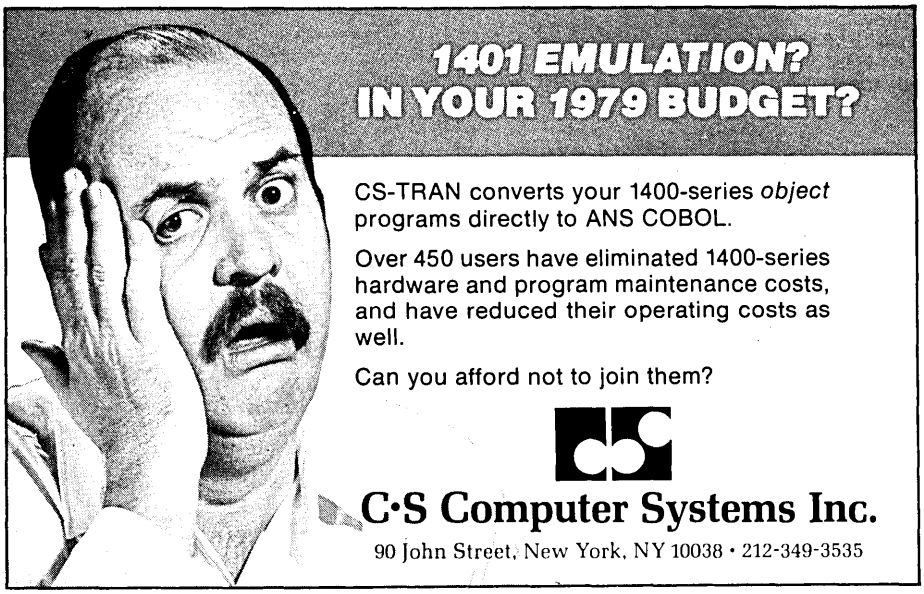

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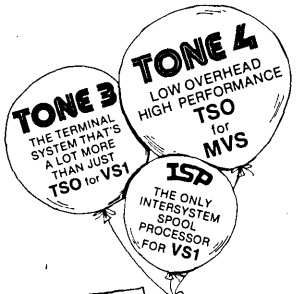

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SOURCE DATA

BOOKS

MANAGING MANAGEMENT INFORMATION SYSTEMS by Phillip Ein-Dor & Eli Segev

INFORMATION SYSTEMS CONCEPTS FOR MANAGEMENT by Henry C. Lucas, Jr.

At first glance these two books seem to cover the same territory. It only goes to show how titles can be misleading. Or, is it possible that we are running out of words to define our activities? Lucas has written a one-semester course textbook to give noncomputer scientists a whiff of information systems. Ein-Dor and Segev have produced a serious discussion of the management level issues in building and operating large-scale information systems.

Lucas spends over 100 pages giving some elementary computing system concepts heavily loaded toward IBM's view of the world. One wonders if management students need to know how a core plane works or the way the recording tracks are laid out on a magnetic tape. The text is loaded with "Management Problems." These over-simplified problem statements are sure to mislead a prospective manager into trying to isolate data processing from the real world that surrounds it. One searches Lucas for any understanding of the politics of large corporations, a highly constraining factor in much decision making. Lucas has taken the academic approach to corporations. A certain sympathy must be granted to students of this text who will come face to face with the power struggles that exist within structured organizations.

By contrast, Ein-Dor and Segev acknowledge the pull and tug management approaches that are less than scientific. In a real corporation inhabited by real "hunters" and "fast trackers" (to steal from several management texts), things are not always clear-cut and straightforward.

Ein-Dor and Segev delve deeply into the critical areas of project development and management, interactions with senior corporate management and users. They live in a world where not all programmers are "good," where designs are imperfect and objectives sometimes murky. And that's the way it is! They even seem to know that good programmers are unlikely to perform satisfactorily as analysts (different temperaments), that some well done systems fail (conflict with vested interests), and that hardware selection is an uncomplicated process (it's all pretty much the same anyhow).

Does management skill require an understanding of absolute programming? Assembler? One doubts it. Yet this is covered in the Lucas volume that is supposed to "... help students of management learn about the concepts of computer-based information systems." Starting from a nearly identical statement of purpose, Ein-Dor and Segev diverge rapidly from Lucas and dig far harder into concepts of vital importance to corporate management.

Both books are well-written and cleanly printed. Some of the diagrams presented by Lucas are slightly dated and one can question computer flow charts to document the manual flow of office processes; however, this is not a serious difficulty. Both books include many important bibliographic references although most readers would prefer the Lucas form of collecting the most important volumes in one place.

Ein-Dor and Segev (Lexington Books, Lexington, Mass., 191 pp., $15.00) are recommended to those who have been through the Lucas volume (McGraw-Hill Book Co., N.Y., 360 pp., $18.00) and now have to learn what is really happening within complex organizations that are trying to build systems. It shouldn't take a bright management student too long to forget most of the technical details that Lucas presents and get down to the fundamental issues revolving around the control of projects and people.

—Philip H. Dorn

DATA BASE SYSTEMS: DESIGN, IMPLEMENTATION, AND MANAGEMENT by Ronald G. Ross

In terms of a good real world evaluation of the state of the art of the data base field, this book is probably the best available.

As rapidly as this field is moving, obsolescence is difficult to avoid in a work describing current capabilities. However, I was unable to discover any material in the book that is not current through mid-1978.

Because of the book's limited size, many sections are necessarily treated superficially with conclusions being given without the rationale for those conclusions. However, this is a function of space: a more detailed presentation of proofs would have require 450 instead of 220 pages. The approach taken proves to be eminently readable.

The book is presented in four sections. Section I is introductory and covers the concepts of data independence, data structures, and data management. This is followed by a good discussion and categorization of different types of DBMS into physically linked, inverted DBMS, inverted DMS, and file-pass DMS. Finally, a good model on how to compare, evaluate, and choose a DMS is presented.

Section II is concerned with the evolution of data base concepts. A history and analysis of IDS is presented followed by an explanation of the CODASYL concepts. Other important concepts covered here include the relational model, minicomputer DBMS, the back-end processor, and the subject of distributed data bases. None of these subjects is covered in enough detail for a thorough understanding. All are readable, however, and covered in sufficient detail for an overview.

Section III discusses implementation and management of data base systems. It begins with a discussion of data base administration concepts and also covers data modeling, data structures, and data accessing. DBMS support functions, such as logging and concurrent access, are discussed.

Section IV is a 30 page qualitative overview of 22 different DBMS packages that are actively marketed in the U.S. and Canada. System backgrounds and key points as well as types of uses for each of the systems are discussed (briefly).

The book concludes with a useful bibliography, an excellent glossary of slightly over 200 terms, and a list of vendors addressed for the systems discussed

in Section IV. The book is strongly recommended for a fine overview of what is happening in the world of data base. AMACOM, N.Y. (1978, 220 pp., $19.95).

—George Schussel

DECISION SUPPORT SYSTEMS: CURRENT PRACTICE AND CONTINUING CHALLENGES by Steven Alter

Historically, most computer-based systems have been established to address problems which have a specific procedure to be followed, and which were previously considered clerical work. Increasing interest is being placed on the management decision-making process, in which problems are more often those which you cannot solve with some predetermined algorithm or sequence of algorithms, but which you must solve by feeling your way through each step, choosing subsequent paths based on previous results and intuition.

In formalizing this distinction, H.A. Simon distinguished between "structured" and "unstructured" management decisions in 1960 (H.A. Simon, *The New Science of Management Decision*, Harper and Row, 1960). Since the computer has freed management from direct involvement in most structured decisions, attention is now focusing on the unstructured problem areas. In 1971 Gorry and Scott-Morton defined a Decision Support System (DSS) in the *Sloan Management Review* ("A Framework for Management Information Systems," Fall 1971) as an information system to support largely unstructured decisions. Steven Alter, in this book, has expanded the definition to include both structured and unstructured decisions, excluding only systems belonging in the dp domain, such as transaction processing, record keeping, and business reporting.

Alter provides neat cubbyholes for categorizing DSS's in seven classes ranging from "file drawer" single item data retrieval to "suggestion models" providing actual operational decisions. (This taxonomy closely follows Alter's article "A Taxonomy of Decision Support Systems" in *Sloan Management Review*, Fall 1977.) He then divides DSS's into model-oriented systems and data-oriented systems. If one assumes, even in a general sense, that decisions are made based on the results of applying some model to some data, it would appear that Alter has not provided a reasonable framework on which to investigate DSS's. He has divided the domain into two pieces, neither of which is broad enough to support the DSS.

If we ignore Alter's title and assume his book to be relevant to computer based systems in general, there is a significant amount of interesting information. A chapter is devoted to describing how computer-based systems can increase an individual's effectiveness. Another chapter (based largely on Alter's article "Why Is Man-Computer Interaction Important for Decision Support Systems?" in *Interfaces*, February 1977) describes the advantages of interactive facilities in terms familiar to managers and organizational behaviorists.

Four chapters (Part Three) provide a reasonably good background in the trials and tribulations of systems development and implementation, again from a organizational behavior viewpoint. Alter fails, however, to adequately establish a meaningful bridge between the relatively new systems development field and the well-established field of organizational behavior. The remainder of the book is occupied by eight lengthy case studies presumably included to qualify this book for use as a text.

The book contains a fair amount of material useful in bridging the gap between systems designers and implementers and management-level requestors and users. It is unfortunate that Alter ties the book to the term Decision Support Systems, which he thoroughly misuses. Alter reports elsewhere "... DSS is a buzzword whose time has arrived." Although much attention is being given to the term DSS, it is to the term as defined by Gorry and Scott-Morton, and as interpreted by Carlson, Sprague, Sutton, Donovan, and others in many more interesting works, rather than to the term as used by Alter. Addison-Wesley, Reading, Mass. (due to be published October 1979. Approx. 286 pp., $15.95).

REPORTS AND REFERENCES

PROTOCOL PROCEEDINGS

The proceedings of a symposium on computer network protocols held February in Liège, Belgium is now available. The opening address of the symposium is entitled "Computer Network Protocols —Their Place in European Strategy for Computer Communications." Papers are arranged under the following topics: public data networks, private data networks, X.25 and the transport protocol, application-oriented protocols, protocol implementation, protocol definition and verification, and protocol performance. The proceedings sells for 1,200 Belgian francs (approx. $39) and is available from M. M.C. Rouchet, Computer Network Protocols Symposium, Institut d'Electricité Montéfiore, B28, Université de Liège au Sart Tilman, B-4000 Liège, Belgium.

MASS STORAGE SYSTEMS

"The Information Technology Service Survey Report: Mass Storage Systems" is based on a survey followed by interviews with prospective and actual MSS users as well as companies that decided against MSS. The study shows a variety of negative factors; among them, that the systems are still too expensive, that users have consistently underestimated conversion cost, that many feel that improved data base management systems are required before present mass storage *devices* become true mass storage *systems*, and that lack of security is still seen as a major drawback. Regarding IBM's 3850, the most widely installed MSS, the report found that the most common hardware failures were related to the Data Recording Devices and media, and that the requirement of a VS operating system and the recommended use of VSAM for control purposes has apparently turned some prospective users to the CDC alternative. $200. H. F. SHERWOOD & ASSOCIATES, Louisenstrasse 67, D-6380 Bad Homburg v.d.H., Bundesrepublik Deutschland.

HP SPL

A report containing guidelines on the use of SPL for HP 3000 COBOL installations is available free from this consulting firm when requested on company letterhead. (SPL is HP's machine-dependent systems programming language, based on ALGOL.) The report covers advantages, disadvantages, control structures, simple and complex data structures, common programming errors, and customizing techniques. The report is also said to demonstrate how to gain the efficiency of SPL without sacrificing COBOL's ease of maintenance. ROBELLE CONSULTING LTD., 130-5421 10th Ave., Delta, B.C. V4M 3T9 (604) 943-8021.

TELEPHONY

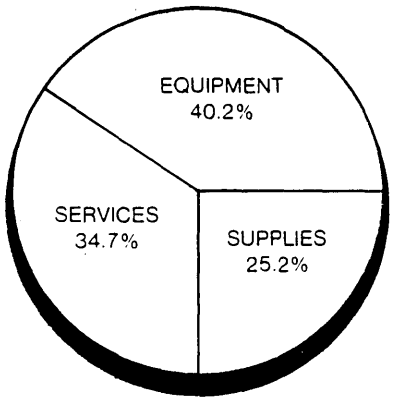
"Communications is too important to be left exclusively to professional communicators," says L.F. Goeller, Jr. in the introduction of his report from Probe Research Inc., "The Digital Future of the Telephone Network."

Potential fragmentation of the telephone network due to conflicting impacts of new Bell developments is discussed in detail. The evolution of switching and the interaction between switching and transmission are considered. Chapters are also included on fundamentals of speech transmission, the stored program controlled network, levels in the switched digital network, "all those other networks," and "some possible shortcuts to the digital future." $150. PROBE RESEARCH, INC., P.O. Box 251, Millburn, NJ 07041 (201) 376-7730 or (212) 227-4628.

REPORTS AND REFERENCES

MICROGRAPHICS MARKET

A report on the micrographic industry detailing equipment sold under federal contract is now available. Sales breakdowns are provided by type of equipment, type of supplies, and type of service. Market segment shares of vendors are said to be given and graphs and tables included, such as this pie chart. The report also includes description of this company's



available consulting services, which include market information and custom research. $25. MICRONET, INC., 14501 Carrolton Road, Rockville, MD (301) 460-6783.

CRYPTOGRAPHY

Whitfield Diffie, who works with Professor Martin E. Hellman on cryptography at Stanford Univ., has written an overview of the subject for SBS Publishing, entitled "Data Security for EFT and Automated Business: New Problems, New Solutions." The report reviews the history and future directions of cryptography, including the increasing use of microwaves, various kinds of potential security threats, and the new Data Encryption Standard, which is included in the report as an appendix. The discussion also covers technical fundamentals, a short market forecast written by Lawrence Dietz of SBS Publishing, and includes a 12-page listing of suppliers of commercial cryptographic equipment (addresses and descriptions of products available). There is a seven-page glossary and a five-page bibliography. The report is priced at $1,000. SBS PUBLISHING, 4320 Stevens Creek Blvd., Suite 190, San Jose, CA 95129 (408) 243-8121.

PACKET DATACOMM

"Packet Data Communications 1978" is a 318-page report covering the basics of packet switching technology, status and plans for public packet switching networks, interfaces for packet-switched networks, pricing, and examples of applications. Featured are cost comparisons between packet switching and long distance telephone, TWX service, and private-line service. The report was put together by Future Systems Inc., which provides engineering systems design and consulting services in the telecommunications field. FSI, 4 Professional Drive, Suite 141, Gaithersburg, MD 20760 (301) 840-0320.

OFFICE AUTOMATION

"Automation of Administrative Systems" is a three-day course designed for "corporate executives and administrators responsible for the planning, design and management of integrated administrative systems." The impact of office technology on organization structure, jobs and attitudes; equipment requirements, including an overview of printer technology, micrographics technology, software, optical scanning, and reproduction; and the relationship between executives, management, and office support personnel will be discussed. $560. Dec. 18-20 in Los Angeles, Feb. 26-28 (1979) in Atlanta, and April 23-25 (1979) in Chicago. Contact: NYU Conference Center, 360 Lexington Ave., New York, NY 10017 (212) 953-7262.

VENDOR LITERATURE

INDUSTRIAL SYSTEM

A set of data sheets enclosed in a four-page brochure describe this vendor's SAFES software for manufacturing applications. The brochure gives an overview of the modular system which runs on the vendor's System Ten 220 small business system. Data sheets explain the software modules: bill of materials processor, factory costing system, inventory control, factory documentation and loading, and requirements planning. Another data sheet covers implementation. ICL, INC., East Brunswick, N.J.

FOR DATA CIRCLE 432 ON READER CARD

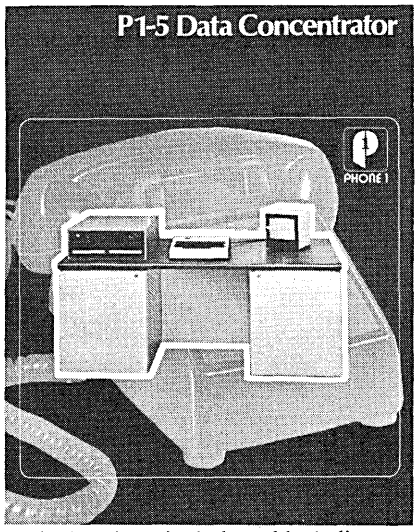
PERSONAL COMPUTERS AND MORE

The 1979 Radio Shack catalog contains entries for the TRS-80 personal computer and related equipment, in addition to the firm's broad line of electronics products for home entertainment, hobbyists, and experimenters. The TRS-80's are described, and the advanced features of the Level-II BASIC are explained. Peripheral offerings include two printers, an expansion interface, and a minidiskette system. For those interested in packaged systems, the catalog offers four to choose from. Twelve program packages, including business applications, games, utilities, and a computer assisted instruction course to teach Level-I BASIC, are covered. RADIO SHACK, Fort Worth, Texas.

FOR DATA CIRCLE 433 ON READER CARD

DATA CONCENTRATOR

The P1-5 data concentrator stars in a four page, illustrated brochure from its manufacturer. In addition to describing the P1-



5, the brochure includes a block diagram and brief description of a typical installation. Specifications also are provided. PHONE 1, Rockford, Ill.

FOR DATA CIRCLE 434 ON READER CARD

SMALL BUSINESS SYSTEM

A six-page brochure describes this ven-

dor's recent entry into the small business systems market. The basic VDP-1000 Data System is detailed, and expansion options—both hardware and software—are listed. LEAR SIEGLER, INC., Data Products Div., Anaheim, Calif.

FOR DATA CIRCLE 435 ON READER CARD

SUPPORT SERVICES

"Seven Ways to Get the Most Out of Your System," describes the variety of support services provided by this mini maker. The illustrated brochure covers systems engineering, special systems, customer education, user's group, hardware subscription service, software subscription service, and field engineering. A map pinpoints the vendor's field service offices throughout the country, and a telephone directory to established offices is provided. A postage-paid post card is provided for requesting more information on any of the topics covered in the booklet. DATA GENERAL CORP., Westboro, Mass.

FOR DATA CIRCLE 436 ON READER CARD

360/370 ELECTROSTATIC PLOTTING

Three electrostatic printer/plotter output systems for IBM mainframe users are described in a 16-page brochure. Three configurations (on-line, off-line, and remote job entry) are discussed, and specifications are provided for 47 printer, plotter, and printer/plotter models available for use in these configurations. The brochure explains electrostatic output, and discusses turnaround, throughput, and computer overhead. Tables summarize the specs for each printer/plotter and the emulation modes available on its remote batch interface. Supporting software is covered with text and diagrams. A postage-paid action card is provided so readers can request further information. VERSATEC, Santa Clara, Calif.

FOR DATA CIRCLE 437 ON READER CARD

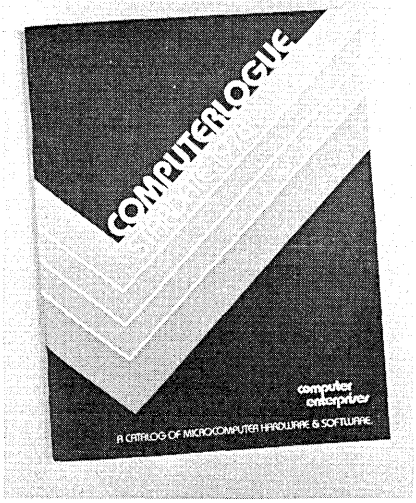
SATELLITE COMMUNICATIONS

Satellite communications, using small Earth stations located on the customers' premises, are described in an eight-page, illustrated brochure from this communications vendor. The system, called Satellite Data Exchange Service, can be used in business, industry and government applications. The brochure describes and pictures system components, including Earth stations and satellite delay compensation units. Typical applications, comprising two or three locations, are discussed. AMERICAN SATELLITE CORP., Germantown, Maryland.

FOR DATA CIRCLE 438 ON READER CARD

PERSONAL COMPUTERS

The Computerlogue includes offerings from IMSAI, Cromemco, North Star, Vector Graphic, Xitan, Micropolis, and Exity. The catalog's 44-page listing of products from these vendors and more comprises completely assembled systems, and the bits and pieces necessary to mix-and-match. Software and media offerings are included. Pricing information includes the manufacturer's retail prices along with this vendor's discounted prices for credit card and cash customers. The illustrated catalog includes order forms



and instructions for ordering by telephone. COMPUTER ENTERPRISES, Fayetteville, N.Y.

FOR DATA CIRCLE 439 ON READER CARD

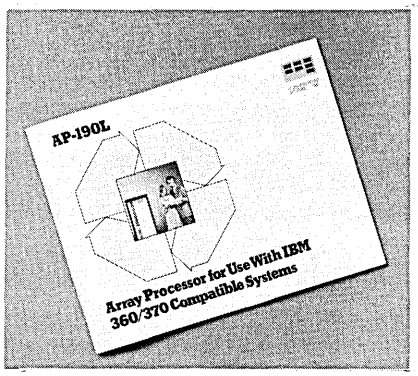
MARKETING

"Profits & Pitfalls," a 16-page illustrated booklet, explains why computer and business machine dealers should consider selling this vendor's turnkey small business systems. Subtitled "A Dealer's Guide to Selling Small Business Computers," the booklet contains many suggestions applicable to dealers selling systems from any manufacturer (Is the manufacturer financially stable? What sort of support can the vendor provide? How comprehensive are the vendors applications packages?). The booklet also covers the investment necessary to become a dealer for this manufacturer, including startup costs and personnel requirements. Marketing support services from the manufacturer are described. INFOTECS, INC., Manchester, N.H.

FOR DATA CIRCLE 440 ON READER CARD

ARRAY PROCESSORS

The benefits of using a special purpose array processor for number crunching in parallel with a 360 or 370 mainframe are examined in a brochure from this vendor. The brochure explains how an array processor can reconcile the conflicts between cpu availability for time-sharing and cpu usage for scientific processing. Software considerations, including how the array processor's capabilities can be integrated into the host's operating system, also are discussed. FLOATING POINT SYSTEMS, INC., Beaverton, Oregon.



FOR DATA CIRCLE 441 ON READER CARD

CLUSTERED TERMINALS

A slick, six-page flier describes this vendor's System 4000 intelligent clustered terminal system with text and photographs. Topics discussed include adaptability, compatibility, expandability, programmability, and reliability. System components, such as the system controller, mass storage, and keystations, are pictured and described. The brochure provides a brief overview of System 4000 software, including the operatng system, application programming language, and communications emulators. RACAL-MILGO INFORMATION SYSTEMS, INC., Miami, Fla.

FOR DATA CIRCLE 442 ON READER CARD

TAPE MAINTENANCE

A color-illustrated data sheet describes this vendor's Masteranalyst intelligent magnetic tape maintenance system. Features and options are summarized for the Masteranalyst in both its cleaner/reconditioner and analyzer configurations. DATA DEVICES INTERNATIONAL, Woodland Hills, Calif.

FOR DATA CIRCLE 443 ON READER CARD

COURSES

SNA USE & INTERFACE

A one-day in-house course for managers and senior dp staff will present concepts, terminology, elements, functions, operational capabilities and limitations, real resource requirements/overhead, implementation problems, and reliability/availability concerns of IBM's Systems Network Architecture. Also to be discussed are market acceptance, internal conflicts, SBS, unreleased products and

capabilities, and alternatives to changing host and FEP software for SNA. Case studies are to be presented. $750 plus round trip travel expenses of instructor from Washington, D.C. Contact: R.C. Sander, 346 Prestonfield Lane, Severna Park, MD 21146 (301) 647-8718.

NEW FROM YOURDON

Yourdon offers a new curriculum of courses in the area of structured techniques, to be held around the country in major metropolitan areas. Prices have been revised to suit Yourdon's new flexible approach to seminar presentation; available are one-day courses in the Executive Series priced at $250; two-day courses in the Intensive Series, priced at $450; five-day courses in the Composite Series, priced at $700; and five-day Mastery Series courses, which include a day of consulting at the work site of the student, priced at $800. For details, contact Yourdon inc., 1133 Avenue of the Americas, New York, NY 10036 (212) 730-2670.

COMPUTER GRAPHICS

Frost & Sullivan is offering a three-day course in computer graphics. Applications, technology, software, and systems elements will be discussed. Dec. 13-15 in Chicago and Feb. 5-7 (1979) in New York. $495. Frost & Sullivan, Dept. C-2, 106 Fulton St., New York, NY 10038.

PERIODICALS

COMPUTER CASSETTES

A new quarterly publication lists cassette computer programs for the Radio Shack TRS-80, Commodore PET and Apple Computer Co. Apple II. The list includes the supplier's name and address, and a one-line description and price for each program. Also included is a (short) list of companies that buy software for manufacture and sale. Anyone with original programs for sale or trade is encouraged to submit information; listings are free.

Starting with the February (1979) edition, feature articles about useful software will be included. The editor is looking for articles (preferably written by the author of the software) explaining why and how the software is useful, and dealing directly with the software's application or need. The article should be no more than one typeset page; camera-ready pieces will be given preference.

The November issue will sell for $2; single issues will then be priced at $4. Yearly subscription rate before Nov. 15 is $9, $12 thereafter. ROBERT PURSER'S REFERENCE LIST OF COMPUTER CASSETTES, P.O. Box 466, El Dorado, CA 95623.

OFFICE AUTOMATION

Officemation Reports is a new monthly publication with the stated purpose of evaluating "existing computerized systems that process office-generated data and textual material, store and retrieve material, and permit intra- and interoffice communications." The first issue evaluates IBM's Office System 6, mentions new products from Olivetti (the TES 401), Context Corp. (a Redactron-compatible page reader), Wang (the System 5), IBM (the electronic typewriter), and NBI (the System 3000 "Paperwork Processor"). Also featured is conference coverage of Syntopican VI. $70 for a one-year subscription. MANAGEMENT INFORMATION CORP., 140 Barclay Center, Cherry Hill, NJ 08034 (609) 428-1020.

TRADE PRESS TOPICS

A new monthly newsletter, *Computer Business*, indexes by subject recent articles in computer and communications publications. Articles are summarized in a sentence or two. A one-year subscription is $48 in North America, $60 elsewhere. Contact Michael J. Townsend, 2909 Oregon Ct., Suite C-11, Torrance, CA 90503 (213) 320-6599. ✻

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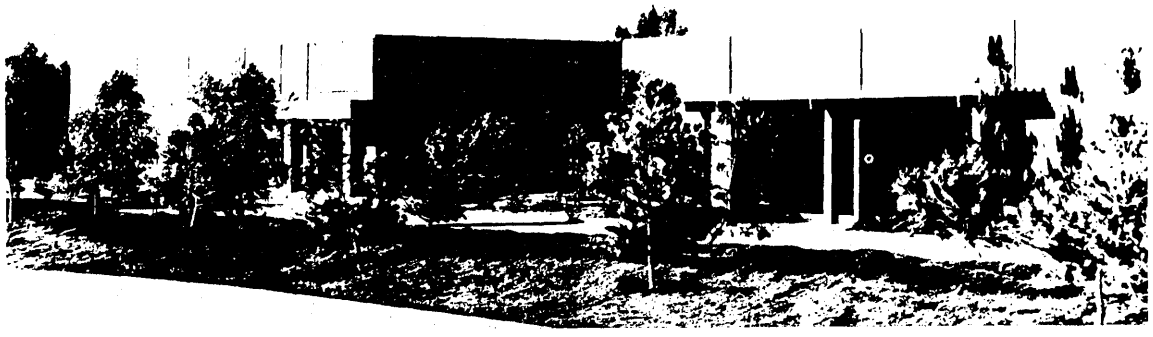

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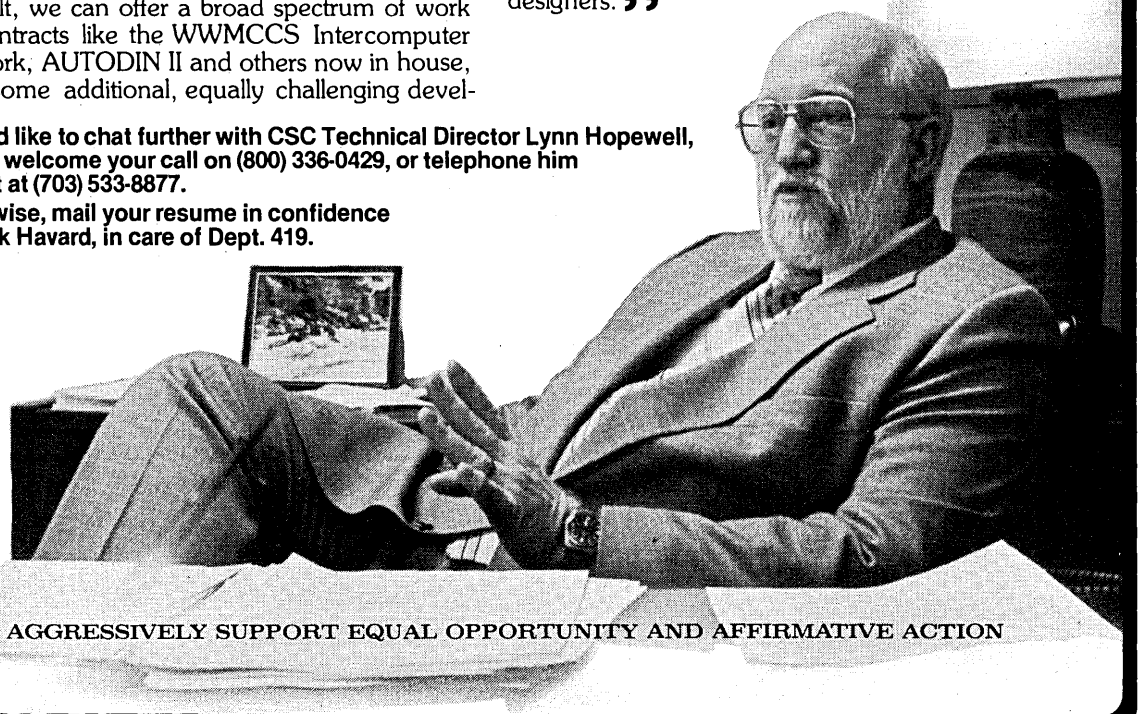
If you'd like to chat further with CSC Technical Director Lynn Hopewell, he will welcome your call on (800) 336-0429, or telephone him collect at (703) 533-8877.

Otherwise, mail your resume in confidence to Mark Havard, in care of Dept. 419.



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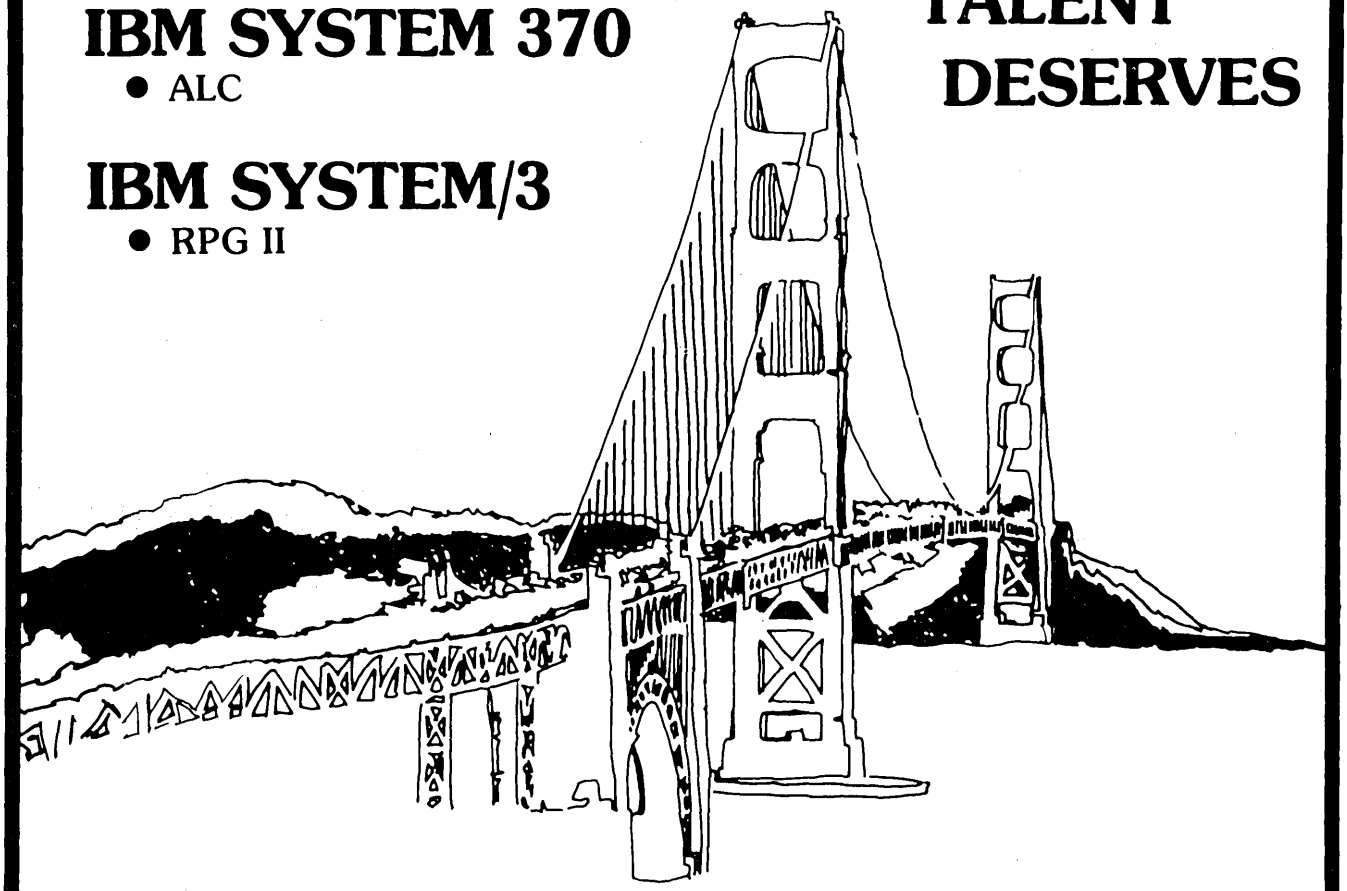

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FORUM

UP FROM PROGRAMMING

Like many other computer people of my age (21+), I met data processing by chance while on the way to a completely different career. Looking for a way to exploit my mathematics degree that would get me out of the rut of technical assisting but not into teaching or actuarial work, I came upon a promising help wanted ad. It was in the Help Wanted Women section of the New York Times. In those days it was permissible to specify either women or men without risking legal action and there were separate ad sections to make the whole thing nicer. The ad had been placed by a computer consultancy "in formation." The requirements were a mathematics degree and, of course, female sex. The rewards were challenge and training in computer programming, then still somewhat arcane.

Apparently I integrated correctly the differential equation that was my interview test—I soon found myself in a small classroom with three other girls learning the fundamentals of programming on a nonexistent machine devised for teaching purposes. Once we had mastered the basics we were sent off, by special agreement, to IBM to learn to program the just-announced 704, along with their own staff and a client programmer. It was like being set down in the middle of an army dressed in gray flannel.

We wondered why the ad asked for women. There were several reasons that came to mind. First, of course, the company was new, with limited funding, and women cost less than men (then as now). Then there were considerations like career opportunity. Who knew, in those days, where programming could lead? Women, of course, especially young single ones (as we were), were only interested in catching husbands, so career wouldn't matter. The managers, or, I should say, founders, of the new firm naturally gave us more flattering reasons. They alluded to the attention to detail characteristic of the feminine psychology which would make us less prone to clerical errors of omission and oversight that would waste the client's machine time in assembling. They alluded to the patience of women (a masculine way of saying, "You do the dull jobs, you're only a woman"), which would stand us in good stead in waiting for machine time and in handling the frustrations of long delays caused by down time (you can always knit).

When we all finally went to use the 704—working at IBM for different clients but sharing an office—we felt like a circus attraction. It was not only because of all those male heads peering round our office door and saying, "Sorry, I thought this

was keypunching." It was also simply that we were four girls in the midst of technical staff, operators, salesmen, and other client programmers who were all men. Whenever one of us was on the machine the others would go along to help mount tapes, set up card decks, watch the printer, dismount tapes, etc., etc. to save client money on setup and tear down. We soon became aware that other user programmers stayed around to watch us scurrying about to our various stations, exchanging orders. Some of them stayed to help, so it didn't matter to us if the others just stayed to laugh.

We lost our feeling of oddity, and some of our "help," with the arrival of the programming team of a new user, a major electrical manufacturer. There seemed to be a swarm of them, but there were probably only about 20 who came and went between the parent company and IBM. They were all women with mathematics or physics degrees, and unmarried, of course.

We soon became quite at home in the labyrinth of machine command structure, programming languages, and the intricacies of oil production and satellite tracking. One of the four in our original group even discovered a new instruction on the 704. Relying on her long fingernails, she patched the binary card she had mispunched by replacing the little card chip in the mispunched hole. Her fingernails must have been short that day because the chip fell out in the card reader and the card was read with the erroneous op code she had punched. She didn't get the "invalid operation" halt (machines halted in those days) that should have occurred. Her program went gaily on to give her some rather surprising results. She thus discovered that the 704 accepted a code it shouldn't have, according to the manuals, and that it performed a reasonable operation as a result. It took a bit of convincing with octal dumps to get the customer engineers to accept her carefully reasoned explanation of what the instruction must have been and to try it. After all, what would a woman know about machine behavior? Finally, they did as she suggested and a new instruction was added to the 704 set. She, incidentally, was warned about being careful with her card chips; they could jam the card reader.

This was not the only contribution to IBM's evolving technology and literature made by the "girls" in our firm. The firm had hired an eccentric, but extremely gifted, woman who had programmed the 650 for a chain of clothing shops. Her talents were such that she was assigned to work on a contract to assist in the development of the first interpretative business language ever produced: PRINT for the 705. Along with a remarkable ability to write tight, elegant and error-free code, she brought an infectious enthusiasm to her work. When we met for lunch in IBM's enormous, crowded cafeteria (people from nearby firms sneaked in because the food was good), she would hail me joyfully from a distance as soon as she saw me, to share her latest discoveries. Her greetings usually went along the lines of: "Dorothy, you'll never guess what I did this morning! I wrote a divide routine that's 15 times faster than the goddamned machine instruction." Many a manager cringing over his lunch must have wondered whether the advantages of the interpretative language outweighed the disadvantages of the language in which it was being described. Apparently so. Nothing was ever said about her vivid comments.

Seeing that all technical staff—programmers, analysts, salesmen, librarians, etc.—working for computer manufacturers seemed to be men, we were quite impressed when another former technical assistant was hired by a manufacturer of relatively small machines as an assistant to the sales staff. She had, of course, her degree in mathematics, but it may have been her long blonde hair and trim figure that really counted. She demonstrated and explained the solutions to a number of common computational problems in physics and chemistry, using her firm's machine. But, as she said, the problems were simple, and she was sure that straight stocking seams (stockings had dark heels and seams in those days), and fresh makeup were her

real qualifications. Although she never actually heard the words herself, she is ready to swear that salesmen in inviting potential customers to demonstrations ended with "... and the machine is so simple to wire and run that even the dumb blonde we've got in the demonstration center has no problems".

Staff additions at our firm continued to be all women. We ran up an impressive record of first-time clean compilations, short debugging sessions, and fast production runs. This was no mean feat. (In those days programming languages were like cryptograms, and Argus would have been hard put to spot all the key punch errors.) Our willingness to work together to help one another solve our individual design and programming problems enabled us to find effective solutions to the technical problems that arose in our several projects. We scorned the famous masculine competitiveness which can mean putting personal recognition before common goals. Cooperation is far more natural to women, as a result of a constant education for service to others. Thus, we stayed well within costs for development, test and production, while the consulting firm found itself growing rapidly, and with an enviable reputation.

The growth of the firm soon required new divisions and new management. New managers were added from without—all men, of course. The senior women were made project leaders. With a very small raise, they could be given (in addition to technical responsibility for design, programming standards and conventions, and the accuracy and completeness of documents), the responsibility for scheduling, meeting deadlines and budgets, and keeping both the staff and clients happy. The age-old tradition that expects women to play several different roles concurrently and well (wife, mother, mistress, sister, family accountant, baby sitter, etc.), made our acceptance a foregone conclusion. Our experience and attention to administrative detail made our success in doing so an equally foregone conclusion. However, we noted that our success in managing all aspects of software projects never seemed to be taken as indicative of ability to manage divisions or departments. As a result we grew restless.

Having been made, for the third time, assistant to a man hired to head a new division, I decided to give up wet nursing, woman's role or not. Therefore, with several others, I began to seek both the position and the salary that went with the work I was doing, rather than with my boss' title.

As is always the case when demand exceeds supply, we women who were experienced in dp were able to obtain recognition in our new environments. And the promise of salary. Two of us became vice presidents, each of a different software firm, and each with the responsibility for project management: design, programming, etc., etc., etc. In the long run, we found our new firms to be pretty much like the old. There was the basic force of women programmer/analysts, far outnumbering men at that level, and a small number of men who were upper management. One woman who couldn't be kept at a lower level any longer *was* added to the ranks of upper management. And some changes were taking place in staffing requirements. The requirement that applicants be math majors had given way to requests for holders of any degree at all, which in turn gave way to the requirement of success in an aptitude test.

THE PRICE OF BEAUTY

An attractive fashion model, tired of hot lights and runways, was hired as a trainee. In a short time she proved conclusively that having posed nude for calendars doesn't have an adverse effect on programming aptitude, or on the famous feminine capacity for meticulousness, either. The project manager for her first project was one of the few men at that level. His report on her ability was received with knowing smiles by upper management. Not until one of the women project managers rated her more valuable than a much senior and far less attractive female coworker, was

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her worth accepted. Nonetheless, she was rarely sent to client sites, and, of course, management was out of the question for her. Who would ever believe that such a beautiful girl had gotten her position on technical or managerial merits?

Sometimes, it should be admitted, special allowances were made for women. One woman who had married and had a child was given a home writing assignment—an act of human kindness to permit her to stay with her baby in his earliest months, and still earn some money. She turned out an excellent book on programming. It was published under her boss' name, and he got the royalties, of course. But then, she had been given special treatment and privileges in her role of mother.

As dp expanded and areas of application grew, so also did the numbers of male programmer/analysts and women project leaders. This turned out to pose no problems. Women managers were accepted by junior male staff for a number of psychological reasons. To begin with, there were always sufficient numbers of junior women around to avoid a feeling of discrimination against men. Further, junior men could always aspire to upper management positions in the future, a possibility not open to the women in the same degree. Another factor is best summed up in the reply of a foreign client's senior analyst who came under my supervision for a time. When asked if he, or any of the other men on the staff I managed, resented having a woman as a manager, he replied: "Oh no. It is no problem. No competition arises. We know that we are basically superior to women, so their accidentally being in charge at times doesn't matter."

His attributing women being in charge to accident could not be further from the truth. Women have never achieved positions of importance in the business world by accident. They have attained such positions by being clearly and undeniably far more qualified for them than any of the men who might represent alternate choices. The women one finds in positions of importance in dp are all outstanding. A number of them have attained international recognition. Among the latter, one might place Dr. Ruth Davis, of NBS, for example, or Dr. Marisa Bellisario-Cantoni of Olivetti.

Women have shown that they are capable workers in the field, that they find it an area of interest, and that they are competent to manage its activities. It is to be hoped that the equality women are earning will lead to a change in the qualifications for women dp managers. It would be quite a victory for women's rights if women could be made managers even when they are only equal (not clearly superior) to male candidates. After all, if equality of capability poses a problem, one can always toss a coin.

—Dorothy A. Walsh

Ms. Walsh is a dp consultant currently working out of Rome, where she is professor of computer science at John Cabot International College. Much of this article was originally given as a paper at the Association of Computer Programmers and Analyst's Sixth Annual Conference. ✻

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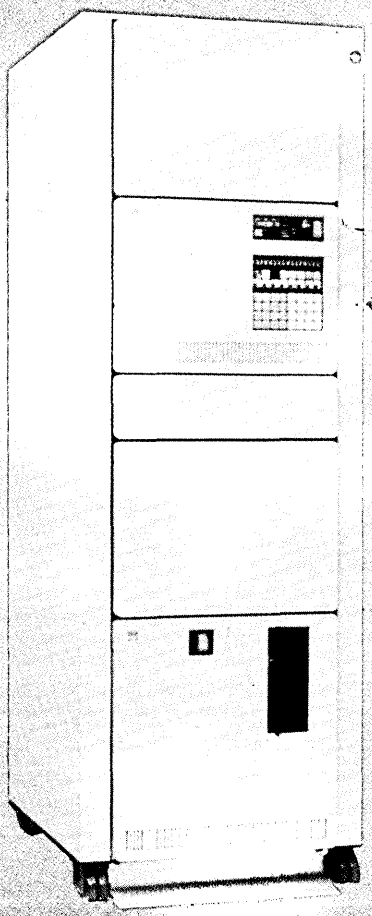
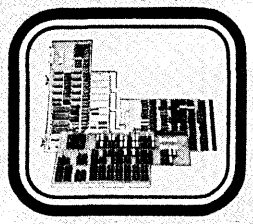
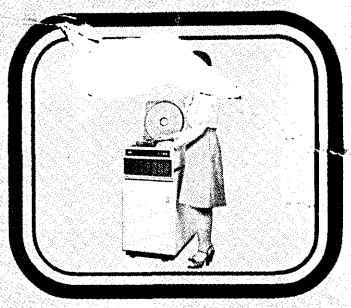
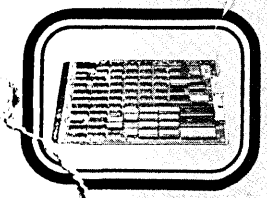


STORAGE MODULE SYSTEM
40 to 300 megabytes

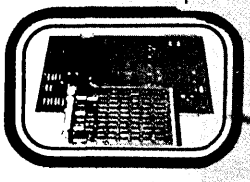


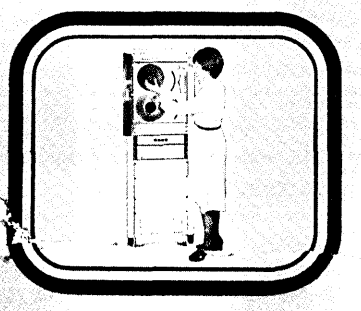


LINE PRINTER SYSTEM
300 to 1500 lpm
(64 characters)



MAGNETIC TAPE SYSTEMS
200 bpi NRZ through
1600 bpi PE
12.5 through 125 ips





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