

DATA MATIION

January

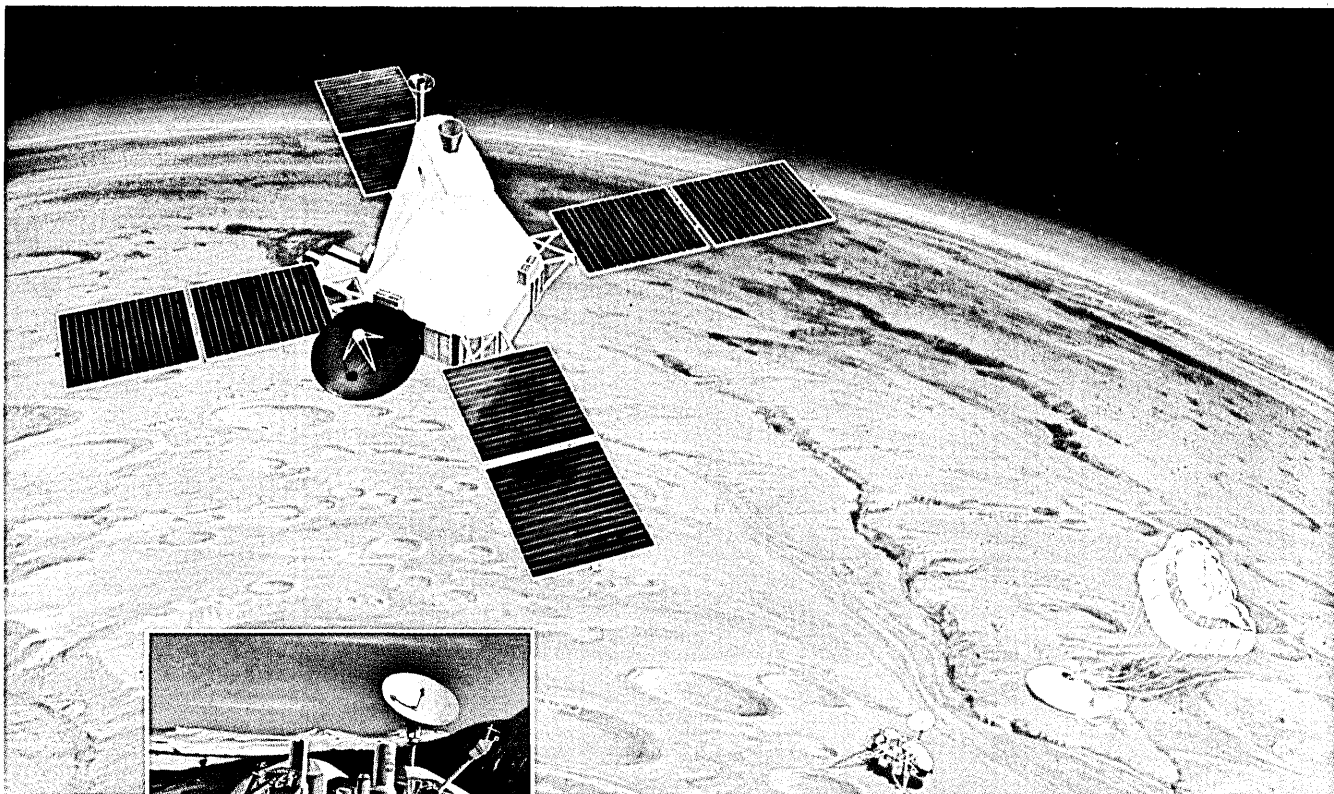
INTERACTIVE

TERMINALS

DISPLAY

Also: Salary Survey (page 73), and the outlook for the industry in '76...

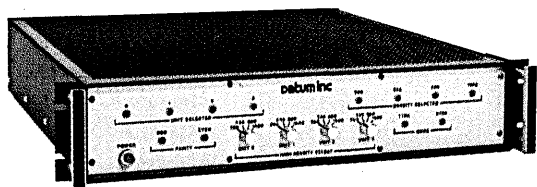
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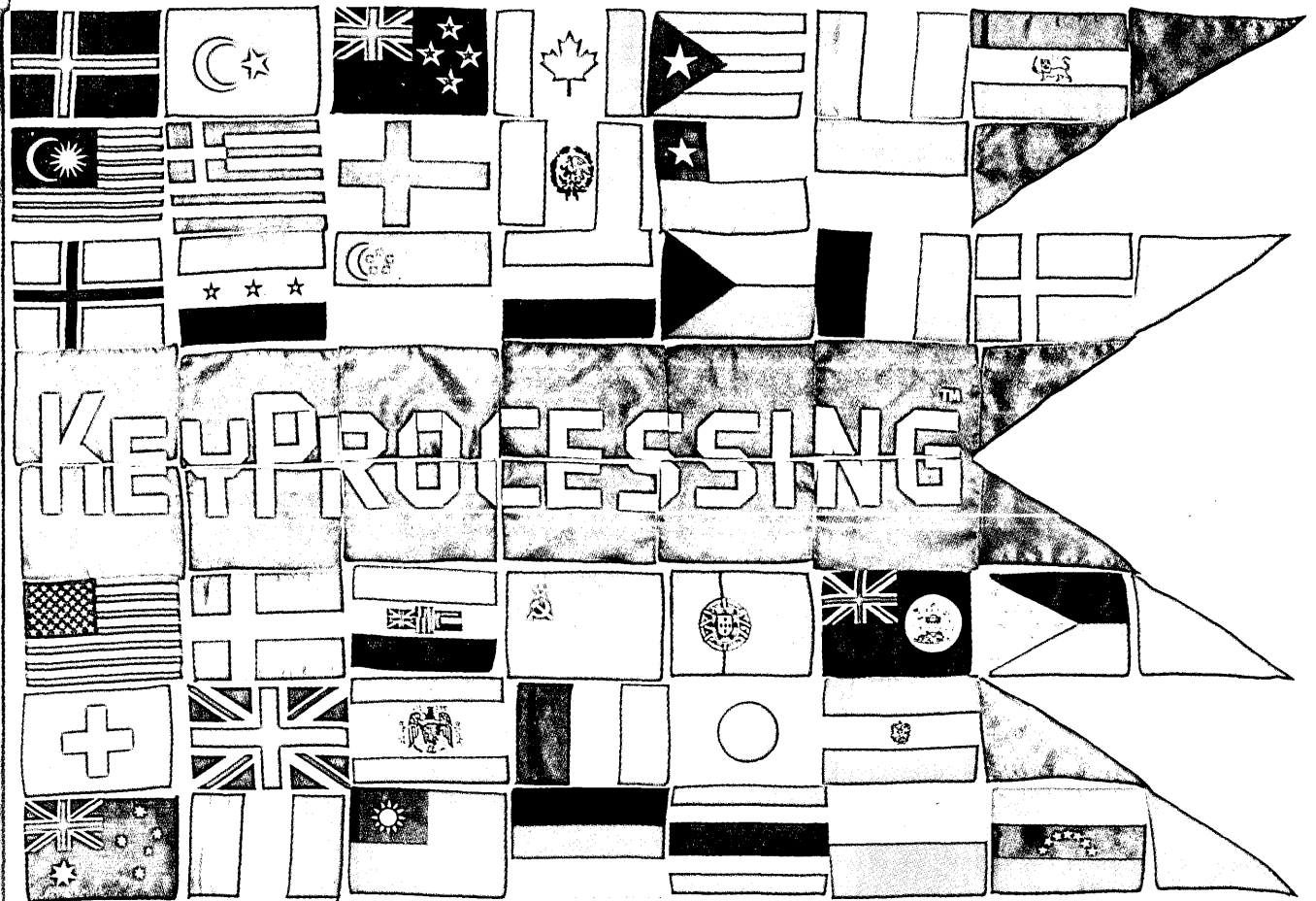


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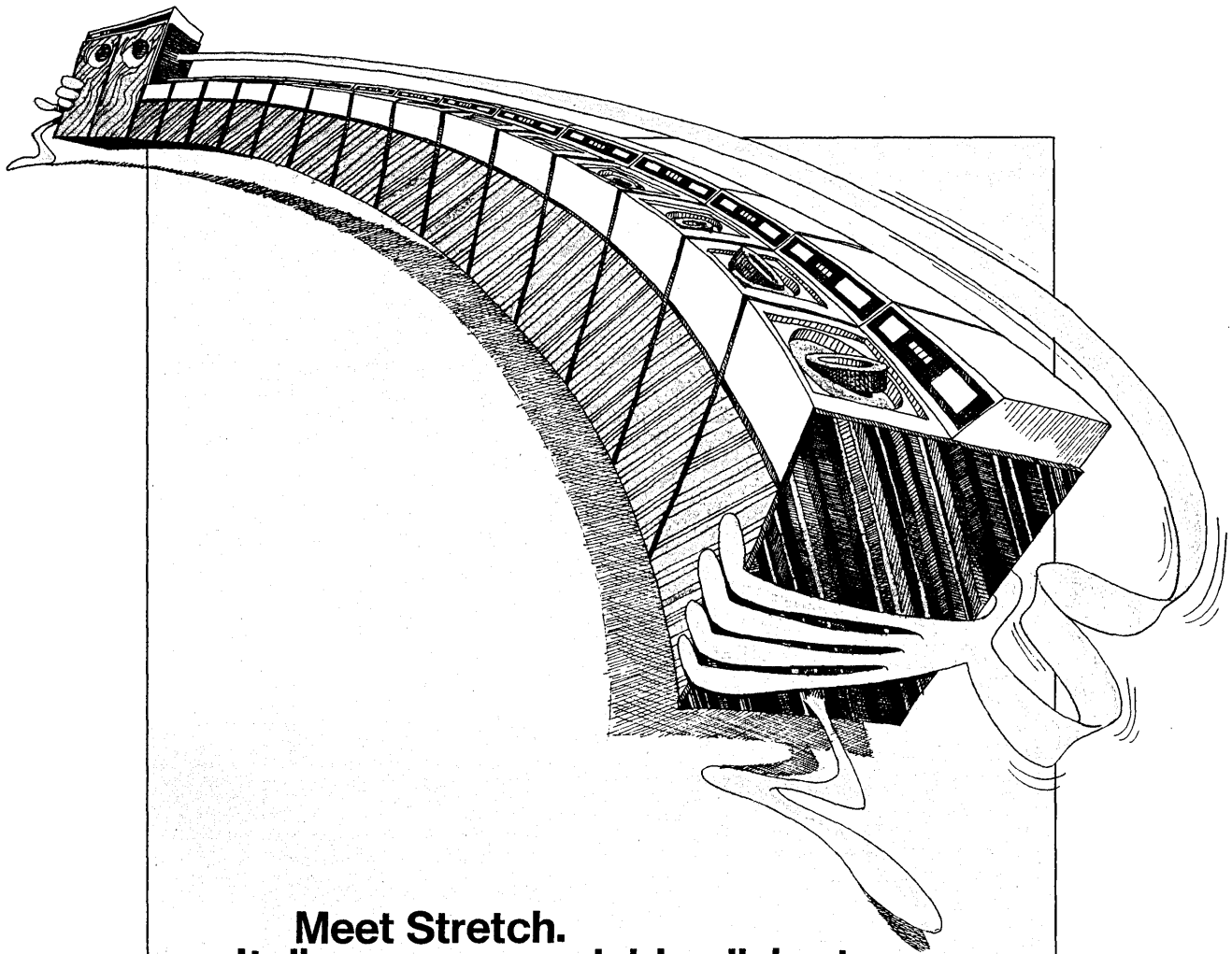
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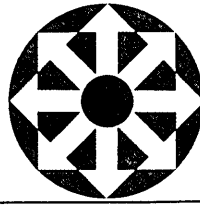
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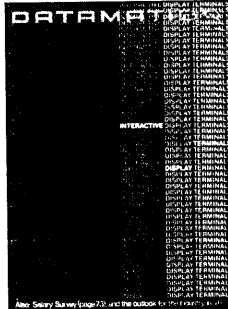
This issue 122,000 copies

JANUARY 1976

FEATURES

Display Terminal Survey

By 1980, an estimated \$15 billion worth of terminals will be installed, of which just about one-third will be general purpose display terminals. Although the formula for the devices has been nearly set — dot matrix characters appearing on crt screens backed with an increasing amount of built-in intelligence — over 50 vendors make variations. The mix of variations is so broad, especially in terms of intelligence, that it is no longer possible to clearly determine its limits. If one aspect of "future shock" is being faced with too many choices, the future is already here.



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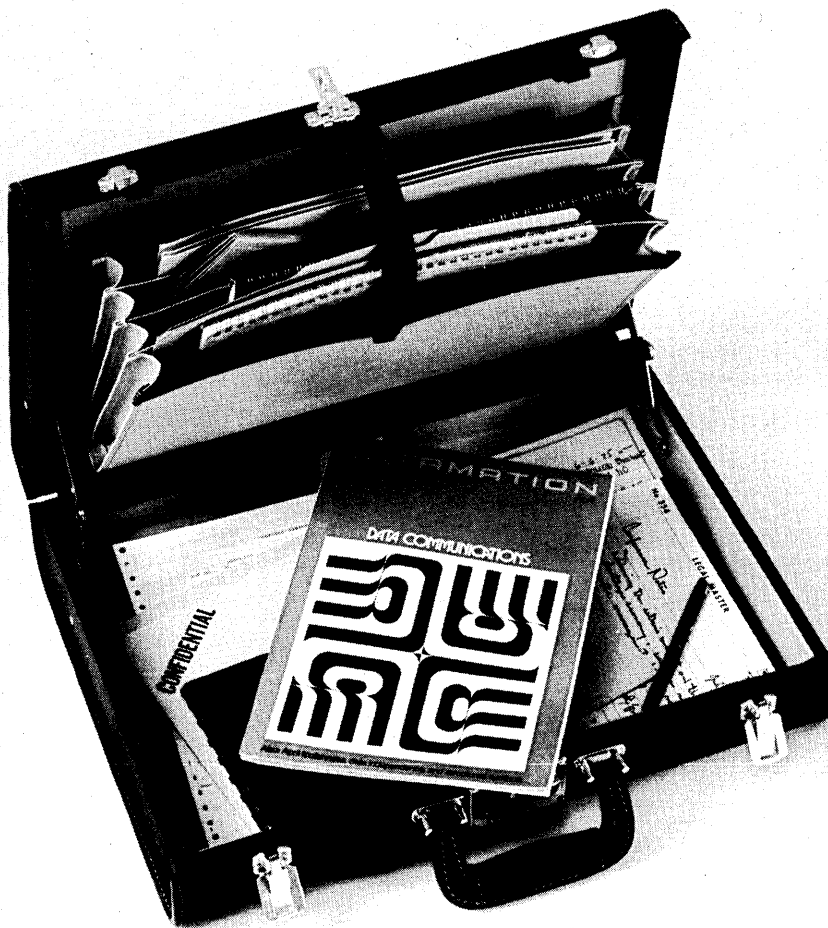
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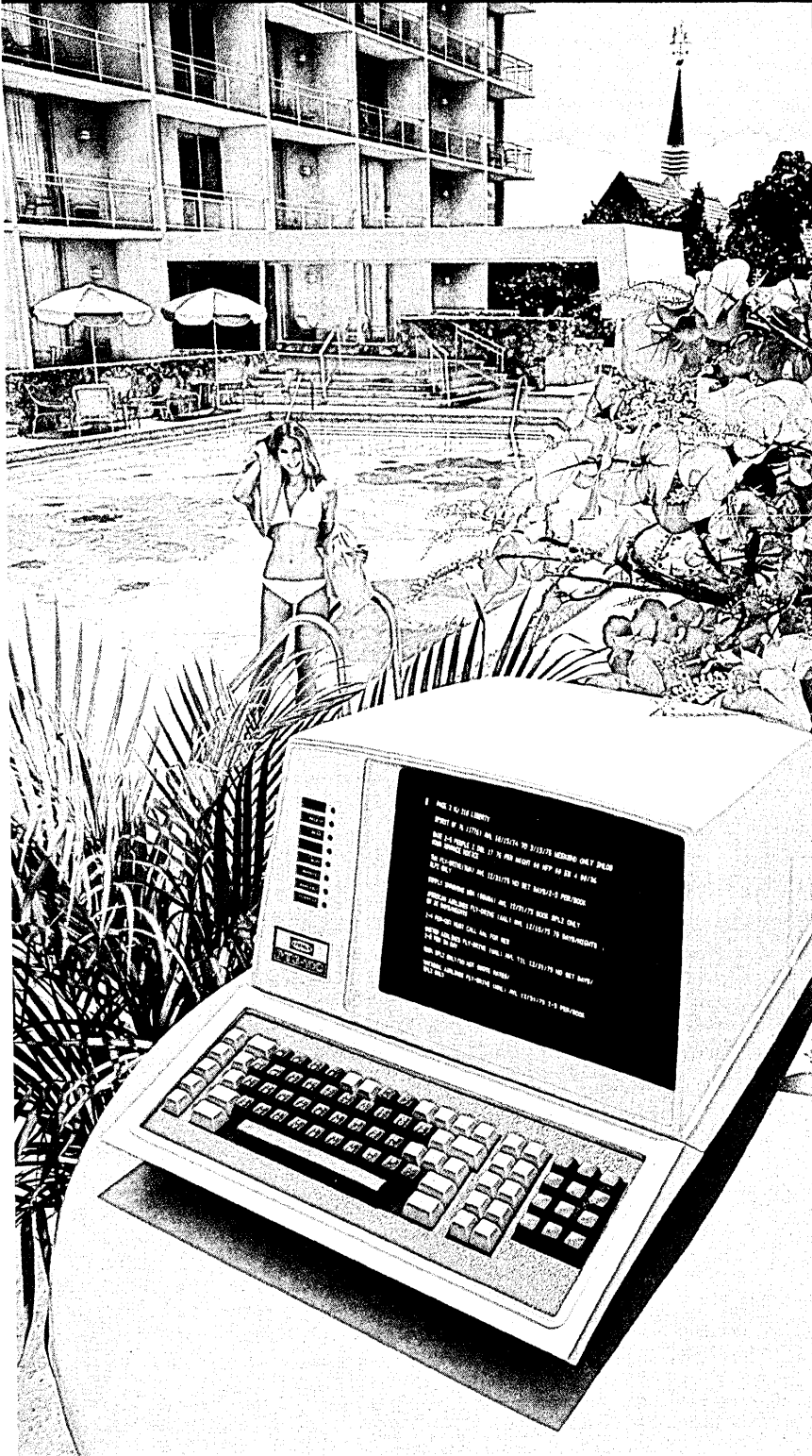
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letters

The user's needs

Your editorial on the communication gap between dp managers and their users in the November DATAMATION (p. 45) is singularly apt in the light of the Reynolds and Van Kinsbergen article ("Tracking Reliability and Availability," p. 106) in the same issue. In the one you point out that a common user complaint is the over-use of jargon; in the other we see the (inadvertent, one hopes) use of jargon to conceal the true state of the system. Trapped by the jargon of their trade, Reynolds and Van Kinsbergen report a system "availability" of about 92%; their users in fact have experienced a system "availability" of only about 63%. Reynolds and Van Kinsbergen speak confidently of a mean time between IPLs (Initial Program Load) of nearly nine hours; their users will have observed that the mean service time which one can expect before an interruption is in fact less than six hours.

With the users' experience differing so radically from the party line, there is no mystery why they form "an unhappy, if not disgusted" community. . . .

Reynolds and Van Kinsbergen consider a system to be "available" if it is up (i.e. not down); a user considers it available only if he can use it (i.e. if it is not down, not plowing through an IPL, and not rerunning an interrupted job). Furthermore, Reynolds and Van Kinsbergen don't consider a system "unavailable" if its unavailability is known in advance (i.e. is "scheduled"); such semantical hair-splitting is ignored (and rightly so) by the users: If I can't use it, it's not available.

Applying the users' viewpoint to just the raw figures (i.e. considering available time as a percentage of wall clock time) we calculate an availability of 83.5%; when we throw in the lost time as well, using the authors' gross estimates for the daily, scheduled IPL (30 minutes) and the unscheduled IPL's (two hours), the average user availability falls to 62.6%.

With respect to service interval, despite the fact that Reynolds and Van Kinsbergen have demonstrated their awareness of the importance of this concept (via their concern for the frequency distribution of failures) they fail to include it in their picture of the performance of the center. MTBI (Mean Time Between IPL's) is a suggestive number, *but it doesn't tell the user what he needs to know*. A user needs to know the likelihood that a

job, once submitted, will finish before the next interruption. Thus he finds the Mean Service Interval, MSI, (total usable time divided by total—scheduled or not—IPL's) a much more illuminating number. Even if one ignores the time lost to reruns, users at the Reynolds/Van Kinsbergen center will observe an MSI of about only 5.5 hours.

I suspect that one reason for the widespread use of "availability" and "MTBI" as defined by Reynolds and Van Kinsbergen is that these definitions are suggested by the manufacturer. (One should remember that the manufacturer has a vested interest in helping the dp manager to show that his center is efficiently utilized but saturated.) This dependence upon the manufacturer is also evident in the allegation that 36 failures were caused by "applications." But there is no way that an application program can cause a system to fail unless it exercises a weakness of that system, i.e. unless the system fails out from under it.

If dp managers want to achieve a greater measure of credibility among their users, they must adopt the users' viewpoint. They must shift their concern away from such traditional measures of computer center performance as "up-time" (which is what the Reynolds/Van Kinsbergen "availability" really is) and MTBI and cpu utilization, and begin to concentrate upon such user-oriented concepts as usable time, Mean Service Interval, throughput, and turnaround. No matter how good your numbers are, if I can't run my job when I want to, have it run to completion, and receive the results in a reasonable time, your center is no good.

D. F. STEVENS
Data Handling Division
CERN
Geneva, Switzerland

An issue of bigness

The November issue contained an article by W. David Gardner, "The Issue of Bigness" (p. 122), which is irresponsibly inaccurate in its references to Columbia Law School and to me. Mr. Gardner states that the March 1-2, 1974 Columbia Law School Conference on Industrial Concentration: "included IBM among its sponsors and has been described by one observer as heavily slanted in favor of big business."

But Mr. Gardner did not report that another of the Conference's 19 sponsors was the Computer Industry Association—the anti-IBM industry group—which described the Conference (*On Line*, March, 1974, p. 7) in the following way:

"Conference participation ex-

ceeded 70, including senior representatives from the Department of Justice, the Federal Trade Commission, the White House, several Circuit Court Judges and leading professors of law and economics from almost every major university in the U.S. . . . We commend Professor Goldschmid and Columbia University for their efforts to stimulate informed discussion of the question of whether the country will benefit or be harmed by the growing concentration of economic and political power in the hands of fewer and fewer corporate chief executives. We sincerely hope that there will be more conferences of this scope and caliber." (Emphasis in the original.)

Any observation that the Conference was "heavily slanted" could easily have been checked against numerous public comments. . . .

Also, Judge McWilliams, of the Tenth Circuit Court of Appeals, was not "deliberating on the Telex-IBM case" while attending the Conference. To my knowledge, the panel for the Telex case had not yet been selected, and oral argument on the case did not take place until May 14th, more than two months after the Conference.

As to my own views on the Telex case, I was one of the few commentators who predicted that District Judge Christensen would find for Telex, and on the merits of the case, I retain considerable sympathy for what he did.

I am surprised you would publish Mr. Gardner's shabby piece. . . .

HARVEY J. GOLDSCHMID
School of Law
Columbia University
New York, New York

. . . The article by David Gardner . . . contained inaccurate and misleading references to G. A. Saxton & Co., Inc.'s consulting relationship with Professor Goldschmid of Columbia Law School.

We do not use ". . . his reports and advice . . . to buttress (our) recommendations to purchase IBM stock." Rather, we utilize his analysis and his perspective as an expert to apprise our clients of developments in the various cases and to assess their import. The fact that Professor Goldschmid was one of the few responsible antitrust experts to conclude that Telex stood a good chance of winning the opening round at the District Court level seems inconsistent with the implications of your statement.

In my opinion, Mr. Gardner's column is a disservice both to Professor Goldschmid and to G. A. Saxton as well as misleading to your readers.

DAVID R. HATHAWAY
G. A. Saxton & Co., Inc.
New York, New York

letters

Mr. Gardner replies: Mr. Goldschmid and Mr. Hathaway make some reckless statements, but they don't offer much in the way of facts to make me change what I wrote. Since writing my article, I have had an opportunity to read the proceedings of Mr. Goldschmid's conference, which, incidentally, was closed to the press, and I concur with my previous source who said the conference was slanted in favor of big business. For those readers who want to read the proceedings and make up their own minds on the issue, they are contained in "Industrial Concentration: The New Learning," edited by Harvey J. Goldschmid, H. Michael Mann, J. Fred Weston, Columbia Univ. Center for Law and Economic Studies, Little, Brown & Company, Boston.

For the record, the list of corporate sponsors of the conference is as follows: Alcoa Foundation, Amoco Foundation, Bethlehem Steel Corp., Deere & Co., Eastman Kodak Co., Exxon Corp., General Electric Foundation, General Motors Corp., IBM Corp., International Paper Co., Johnson & Johnson Co., Kraftco Corp., Mobil Oil Corp., PPG Industries Foundation, Union Carbide Corp. and Xerox Corp. Every one of those firms has at one time or other been the subject of antitrust charges and everyone of those firms must continually be concerned about antitrust charges because of the dominant positions they enjoy in their respective industries. In my view, these firms are a sort of "who's who" of big business in America and they got a conference program that was palatable to them. The only other sponsor with industry connection was the Computer Industry Assn., which informs me that it was not solicited as a sponsor for the conference but that it became a sponsor at the last minute when there was concern at the lopsided lineup of big business sponsoring the conference.

I erred when I stated that Judge McWilliams was "deliberating" on the IBM-Telex case when he attended the conference. However, Judge McWilliams did eventually deliberate on the case and it was common knowledge that the IBM-Telex case was in his circuit when he attended the conference.

Mr. Hathaway's description of Mr. Goldschmid's relationship with G. A. Saxton Co., contains nothing to convince me that my description that Mr. Goldschmid's advice is used by the Wall Street firm "to buttress recommendations to purchase IBM stock" is inaccurate.

"A standard it isn't"

In a letter to DATAMATION (Oct., p. 7) Eric Weiss stated that the proposed ANSI PL/I standard should be disapproved because it is virtually incomprehensible. The replies have all disagreed, usually on the grounds that readability must be sacrificed to precision, and that only compiler implementers need to understand it anyway.

The proposed PL/I standard, BSR x3.53, defines a language which is dif-

ferent from any current implementation of PL/I. The proposal consists of 362 pages of formal description, not counting the table of contents (6 pages), index (18 pages), and 158 errata (6 pages). There are few examples; a major chapter, Input/Output, has none at all. The syntax is defined using a super-BNF called the Translator; the semantics are defined by a set of procedures, called the Interpreter, which specifies a correct interpretation of the output of the Translator.

This formalism is precise and thorough, but reading it is much like trying to understand someone else's program from an uncommented source listing. I estimate that it would require three to six months of full-time effort (costing \$10-20,000 at today's prices) for one to understand the document sufficiently to:

- perform a thorough technical review
- write a user's manual
- prepare a fixed-price bid to implement this language on a computer system which one already knows well
- estimate, for a company which uses some version of PL/I now, the application capability of the new language and the cost of converting existing programs.

Weiss is right. The proposed PL/I standard is virtually incomprehensible, and it should be rejected on that basis alone.

Unfortunately, there is at present no standard for defining a programming language precisely. Besides PL/I, there will soon appear proposed standards for a new ANSI FORTRAN, an ANSI BASIC, a common language for the Dept. of Defense, and several application languages. With each of these we will be asked to accept not only the language itself, but also whatever means was used to define that language. Until a standard for language definition is adopted, we should avoid radical departures from the most widely understood practice in combining readability with precision, which currently is carefully chosen English supplemented by simple variants of BNF.

As for BSR x3.53, it will probably never have any practical significance anyway, at least as a standard. If it should be approved, the effort required to comprehend it will always be an effective barrier to widespread understanding and communication, with the result that its only utility may be to provide a few weeks of subject matter in a computer science course, as is the case with the likewise obscurely defined ALGOL 68.

This is a shame. The PL/I proposal is certainly an outstanding technical

work, the result of long labor by very talented international groups. It may well be a major contribution to the technology of language definition.

But a standard it isn't.

PAUL D. GRIEM, JR.
Medway, Massachusetts

Civil war in the corporation

Your November editorial (p. 45) ended with a plea which asked in effect, "Isn't there anyone out there who can stop that corporate civil war raging between dp professionals and their user/manager clients?"

"Civil War in the Corporation," your title, seems to overstate the issue. . . . But, for the moment, let's assume that matters are that bleak. What can be done?

Go to the managers and users where they live! Where? In their world of *output*! They certainly have little appetite for binary arithmetic, data verification techniques, multiplex or operations and the scores of similar topics that fill almost every data processing journal. Talk to them about *output* . . . reports that communicate decision-making information. The reporting function may be less than 5% of the dp budget but it is the tip of the iceberg, the *only part that managers see or ever care to see*.

Why isn't more done about this vital area? Because the favorite career path seems to be operator-to-programmer-to-systems analyst-to-project leader-to-data processing manager. Who's got time to mess with reports? Get 'em out! Put 'em into production on a regular basis! Let's get on with another several hundred kilobuck system design job!

The subject of output can be a career unto itself. Computers generally use three media . . . paper, film, video. Within each of these lie a host of unresolved complexities, e.g., batch, on-line, time-sharing, RJE, OS, DOS, vs, which can materially affect the "message of the media." Bringing these tools together in a timely and economic fashion requires an evolving and highly empathic group of participants. The key individual might consider himself on an orchestral podium blending the "instruments" that are called terminals, micrographics, plotters, printouts to meet the rapidly changing and far-ranging needs of a dynamic management.

Will this tactic stop the "Civil War in the Corporation?" It has for us, where it's been given a chance. What do you offer in second place?

A. M. KNEITEL
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MOVE OVER 1403. THE 2550 IS HERE.

Make room for the Dataproducts 2550 horizontal-font printer.

Until recently, the IBM 1403 train printer has been the industry standard for quality printing at 1100 lines per minute (LPM).

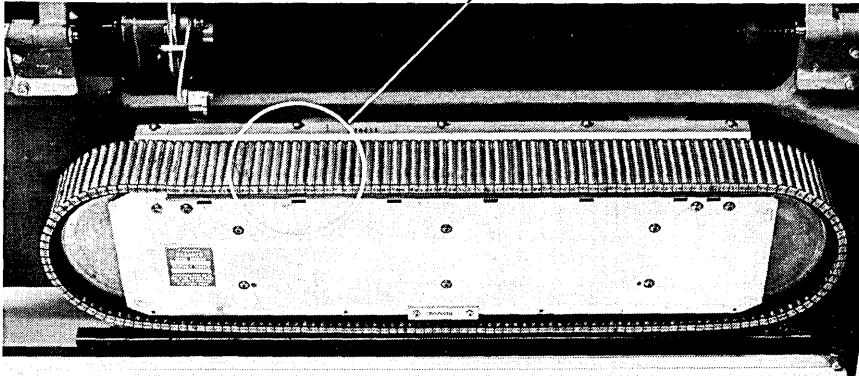
But now the 2550, with the Charaband® print drive, sets a new standard at 1500 LPM.

Or, 36% faster than the 1403.

Horizontal Font Printing

The Charaband is a horizontal-font carrier that offers all the advantages of train printers, and eliminates the disadvantages of sliding friction.

The 2550, combining the Charaband with our patented Mark IV hammer, offers a highly reliable friction-free print mechanism.



In short, consistent, straight-line, high quality printing.

Reliability Plus

The Charaband is driven on a roller bearing system to eliminate sliding friction and lubrication systems.

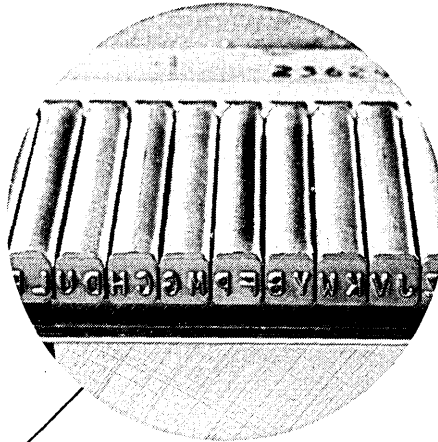
And, unlike train printers, very little wear occurs in the print mechanism.

Reliable operation— equals much less down time.

On-the-job Flexibility

The Charaband carries two complete fonts—one on each side. The fonts are reversible.

The 2550 also offers replaceable character-type modules that don't require a cartridge readjustment.



A 90° swing-open gate for easy access to Charaband, ribbon and paper.

And simplified controls built into your own "quietized" cabinet.

The 2550 Costs Less

It costs less than the 1403.

Yet, its exclusive Charaband design is a clear-cut improvement in line printer technology.

How do we do it?

Simply by specializing.

Dataproducts is the leading independent printer manufacturer in the world.

And by concentrating in one technology, we are able to make a better printer.

For less than the competition.

Our 2550 Charaband printer is 1500-LPM proof of that claim.

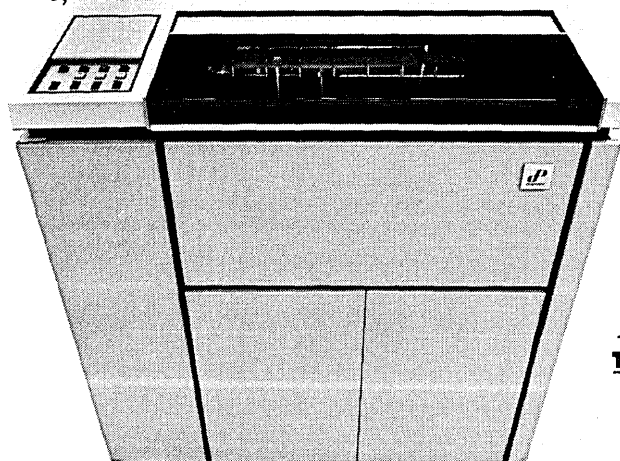
Interface Compatible

The 2550 can be interfaced with almost every major computer system that requires high-speed performance.

So we invite you to call or write for full information and specs.

Remember, Charaband horizontal-font, 1500-LPM speed, less down time and less money.

Little wonder the former industry standard has to move over.



Dataproducts
The Line Printer Company

6219 De Soto Avenue/Woodland Hills, Calif. 91364/Telephone (213) 887-8451/887-8147



At last, a system that makes credit verification as simple as it should be.

Ideally, credit card and check verification should be a simple "yes" or "no" proposition.

Unfortunately, at a lot of banks, supermarkets and other retail outlets, it's a complicated, time consuming process.

To solve the problem, Bell has designed the fast and simple to operate Transaction* telephone system.

The system includes the Transaction telephone terminal, the switched network, and 407 type data station interface. Plus, the data base computer.

The terminal itself is intended as the remote telephone in a digital inquiry-voice answer system. It has a single slot through which automatic dialing and bank or credit cards are passed. (If it's a check, the user keys in the account number.)

The Transaction telephone automatically

enters customer and user information by reading the magnetically encoded ABA Track II stripe found on the back of most major bank and credit cards. It also fully buffers all of the data input.

Sequential instruction lights guide the user through the simple data input procedure. While the data is being entered, the telephone dials the number of the data base needed for verification. All of the buffered information is then sped through the switched network and the 407 type data station. Customer information is withdrawn, and an audio or visual response is relayed to the user.

In addition, the terminal can be used as a regular telephone. And it's available in Touch-Tone® or rotary.

For the surprisingly low cost and complete details, contact your Bell Account Representative.

*Trademark of AT&T Co. ® Registered trademark of AT&T Co.



The Transaction Telephone System.

Another part of the Bell System's end-to-end data commitment.

people

A Campaign Pledge

"If I'm elected, I'll attack big government, big business and big labor," says Dan L. McGurk, who is running for Congress in California.

The election pledge from the former president of Xerox Data Systems and the founder of the



DAN L. MCGURK
He'd attack bigness

Computer Industry Association draws a quick question:

"Will you attack big business like Xerox?"

"Yes, like Xerox," answers Republican McGurk who hastens to add that all of his stockholdings in "big businesses" will be placed in a blind trust if he wins the 20th Congressional District seat. McGurk is running for the seat on the expectation that the current holder of the seat, Barry Goldwater Jr., will run for the U.S. Senate.

Actually, if there is a "big business" that McGurk might be most interested in, it would quite likely be IBM rather than Xerox. In the eyes of IBM, the organization McGurk once headed—the CIA—is Enemy Number One.

McGurk, however, is particularly interested in establishing tough and effective computer standards that would protect all computer users. "The users are the guys who get the short end because we don't have effective standards," says McGurk. "It's important that the federal government put in tougher standards and that the government move

faster in the area, too."

McGurk was asked why the federal government has been generally ineffective in protecting computer users and in stimulating the computer industry. He said that, while he didn't have all the answers to that question, he feels that the whole subject of computers is confusing to congressmen. McGurk noted that he would begin from a position of strength on computer-related issues, because he has a strong background on the subject from his years in the industry.

"I can understand computer-related problems," says McGurk. "And I would listen to people who want to talk about them."

Thus far, the computer industry has produced no politicians to speak of. The Watson brothers of IBM, the Wyly brothers of University Computing, and Ross Perot of Electronic Data Systems all possessed tremendous political clout with politicians, but none ever held elective office. Larry Spitters of Memorex finished a poor third in a California Republican primary two years ago.

McGurk's "biographical sketch" reads like he is central casting's idea of the main character in *The American Dream*. His youth was spent in the U.S., England, Argentina and Portugal and, when it came time to go to college, he went to West Point. At West Point, he was named a Rhodes Scholar and he took an advanced degree at Oxford University. After his military career, McGurk entered the computer industry on the marketing side, eventually ending up as senior vice president at

Scientific Data Systems in charge of all line operations. He was a major participant in the \$1 billion stock deal that Xerox offered SDS.

McGurk has participated in a wide variety of computer associations and in many civic organizations. He is senior warden of St. Nicholas Episcopal Church and lives in Hidden Hills, California, with his wife, Shirley, and their seven children.

All that sounds a little too pat, but McGurk does have his shortcomings. For one thing, he is a lousy driver. ("Yeh, I racked up a sports car once.") But he strongly denies the report that SDS management had him chauffeured to work in an English taxi because of any questionable driving abilities.

"The answer to that one is simple," says McGurk. "When we moved the SDS plant from Santa Monica to El Segundo, I couldn't sell my house and the kids wanted to stay where we were. But I was faced with an hour's drive to work, so one of the neighbor's kids who worked at SDS drove me to work. Actually, it was a good deal. I had a phone installed in the car and on the way to work in the morning, I called our eastern and midwestern sales managers—at inexpensive off-peak hour rates. And when I sold the car, I got exactly what I paid for it."

In the manner of campaign managers everywhere, Lee Sitzenberger, McGurk's campaign manager, says that McGurk would practice similar imaginative economies if elected to Congress. *

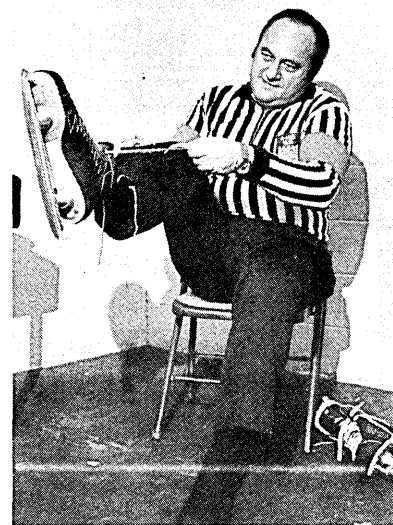
Down to Basics

When Al Cosentino likes something, he gives it everything he's got and that's a lot.

Among the things he likes are hockey, Italian food, and the business he's in as board chairman of Basic/Four Corp., producer of small business computer systems. Cosentino was Basic/Four's president from May 1973 until last month. Earlier he was vice president of the firm's parent, Management Assistance Inc. (MAI). Under his direction the Irvine, Calif., computer producing subsidiary has grown to a point where it accounts for \$30 million of its parent company's \$76 million in sales.

And Cosentino expects the growth rate to accelerate. He sees it as coming not only from the com-

(Continued on page 12)



AL COSENTINO
Means business on or off the ice

Basics

(Continued from page 11)

pany's primary market target, firms with \$500,000 to \$20 million in annual sales, but from large firms as well who are incorporating its small systems into larger systems. He said 44% of Basic/Four's sales in the last year were in this market.

Cosentino's impact on the Orange county area hasn't been restricted to business. The hockey aficionado has had a big part in building up youth hockey there. His two sons play and he referees every weekend. He has even encouraged girls to play and helped found a girls' league in Anaheim. The girls, he claims, are rougher than the boys.

The Basic/Four chairman took up hockey when he was in his mid-30s. "I didn't even know how to ice skate," he recalls. He taught himself

in the privacy of his own lake in Barrington, Ill.

At a much earlier age, he had to teach himself English. At the time he started school, he knew only Italian. Now he's not so sure of his Italian though it sounds good to an American ear.

He is sure though when it comes to Italian food. His father once owned an Italian restaurant in Jersey City. He shut it down, Cosentino remembers, because he wouldn't pay protection money. He'd like to follow in his father's footsteps. He's convinced there are no good Italian restaurants in Orange county and he'd like to start one or more.

Cosentino feels it was luck that led him into the computer business. He joined IBM in 1952 while still attending Brooklyn Polytechnic High School. "It was during the Korean war and they were having a

tough time finding engineers so they hired kids and trained them."

He remained with IBM in various field engineering and management jobs for 10 years. "I was very happy there and thought I'd stay there forever."

But the founders of MAI sought him out. They needed a service organization. Cosentino founded Sorbus, MAI's service arm. He still has warm feelings about IBM, even though the giant's System/3 competes with Basic/Four Systems. He feels the System/32 blessed the idea of the use of computers by small businesses. He's not at all concerned about the 5100.

Why did Cosentino leave IBM to join MAI? He liked the challenge the third party leasing firm offered, and, "They made me an offer I couldn't refuse." It was very basic. *

Likes Buying Firsts

Lots of people like to collect firsts. With Dr. Sidney Fernbach it's computers.

As head of the computation department of the Lawrence Livermore Laboratory since its formation in 1952, he was proud of the serial number one machines he has acquired. These include the first Control Data 3600, 6600, 7600 and Star. The lab got serial number three of the IBM Stretch computer but Fernbach points out that it was the first production model. The lab's first computer was a Univac 1, serial number five.

Often called the world's most experienced computer buyer, Dr. Fernbach, 56, now will have more time to devote to buying. He has been promoted to deputy associate director for scientific support for the Lawrence Laboratory. The office of scientific support has responsibility for defining computer hardware and software needs of the lab and of obtaining funding for such purposes from the federal Energy Research and Development Administration which funds the lab's \$200 million/year budget.

He should prove more of a chal-



DR. STANLEY FERNBACH
"... the biggest and the best"

lenge than ever to computer makers what with such statements as "I always want the biggest and best there is" and "I've never been satisfied with any computer already built" to his credit. The Lawrence lab has been doubling its computing power every year since its formation and Dr. Fernbach expects this to continue.

Dr. Fernbach received an A.B. from Temple Univ. in 1939; an A.M. from Temple in 1940; and a Ph.D. in Physics from the Univ. of

California, Berkeley in 1952. It didn't come easy. He says he almost flunked out of the first grade because he didn't know much English. His father was an immigrant upholsterer and only Yiddish was spoken at home. The family was hard hit by the depression. "I didn't even know if I'd be able to go to high school or not," he recalls.

A Philadelphia boy, he opted for the Navy during World War II. "I'd always wanted to be in the Navy." He thinks this had something to do with the fact that the Army-Navy game was always played in Philadelphia. He'd never been to one although he'd listen on the radio. "I was affected by all that military ceremony and stuff." The Navy sent him to Stillwater, Okla. ("the closest I ever came to water while I was in the Navy") where he spent a year learning Japanese. When he'd learned the language the war was over and he never used it.

After the war he accepted an assistant instructorship at Berkeley and worked for his Ph.D. This put him in the right place at the right time when the Lawrence lab was formed. *

In New Posts

EDWARD R. MARSHALL was named vice president, finance and administration for the North American computer operation of Honeywell . . . FRANK R. LAUTENBERG, president and chief operating officer of Automatic Data Processing, Inc., was named to the additional post of chief executive officer . . . DICK H.

BRANDON joined Advanced Computer Techniques Corp. to head the company's commercial sector . . . LEON WEISBURGH, founder and president of Anstat, Inc., was elected president for 1976 of the Association of Data Processing Service Organizations (ADAPSO). *

DP Dialogue

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



Technician Elizabeth Garcia wires the front panel of a chassis assembly produced by GTE Sylvania.

Structured Programming Eases Deadline Pressure at GTE Sylvania

A deadline had been set for completion of a complex management control system. If it couldn't be met, a major government contract would be lost.

That was the situation at the Western Division of GTE Sylvania's Electronic Systems Group in Mountain View, California. The division performs system development, manufacture and integration in the fields of reconnaissance, electronic defense and electro-optics for government and industry.

"In order to meet government re-

quirements, we had to design a total system that could relate cost elements, scheduling and actual performance to every phase of the project," explains Gene Giannotti, manager of computer services. "That's a great deal of work to accomplish in a year."

Fortunately, the company had already geared for quick, accurate program development with a structured approach to systems design and programming.

"We've found that all facets of the structured approach—top-down devel-

opment, modular design and structured walk-throughs—contribute to much more efficient overall project control," says Giannotti.

"The approach has enabled us to reduce debug time from about 50% of total programming time to practically zero," adds Pat Thompson, supervisor of application development.

The internal design of the Cost Schedule Control System (C/SCS) called for 50 different programs and modules to adequately define scores of
(Continued on next page)

GTE Sylvania...

(Continued from preceding page)

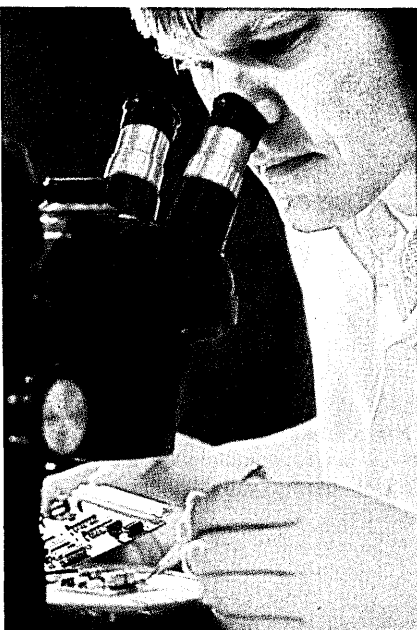
requirements from the engineering, manufacturing and financial departments. That's why one of the primary principles of structured design—that all programs be broken down into small, functionally defined modules—was especially critical. Top-down development—working from the highest level of logic to detailed segments—was also significant.

“Using the modular approach, many programmers can contribute to the same program simultaneously,” says Bill Inmon, chief programmer. “As a result, we saved a great deal of time.”

At GTE Sylvania, initial data entry was keypunched. Subsequent compiling and “fine tuning” were done on IBM 3277 Display Stations linked via IBM's Time Sharing Option to the division's System/370 Model 158 computer.

After each program was completed, it was submitted to a structured walk-through—basically a review session during which several programmers get together to analyze design logic, detect errors and develop test strategies.

“In addition to producing programs that are easier to maintain and modify, structured design and programming has proven invaluable to our engineers,” says Donald Kiser, vice president and general manager. “Structured programming is far more logical and accurate than traditional approaches. It has helped us improve programmer productivity and the quality of our end-product at the same time.”



Quality control technician Bob Evans inspects a circuit board produced by GTE Sylvania.



A customer makes a deposit directly to her savings account through an IBM 3604 teller terminal located in a Pick-n-Pay supermarket in Cleveland.

Meat, Potatoes and Cash— All in One Stop

If there is one place the average family visits at least once each week, it's the supermarket. And they don't always come with cash in hand. As a result, supermarkets may dispense large amounts of cash to their customers, often in return for personal or payroll checks. And the faster they can do that, the sooner shoppers can be on their way.

“The supermarket business is incredibly competitive. So we're always looking for new ways to provide additional services to bring people into our stores,” says Richard Bogomolny, president of Pick-n-Pay Supermarkets, Inc.

In a joint venture with The Broadview Savings and Loan Company, the Cleveland-based supermarket chain now offers a new service which it calls “The Money Service.” It enables Broadview's customers to make deposits or withdrawals from their savings accounts directly through IBM 3604 teller terminals—part of the IBM 3600 Finance Communication System—located in 55 Pick-n-Pay stores. Broadview plans to move to the more compact IBM 3606 Financial Services Terminal sometime in 1976.

“In addition to extending banking hours—we're open until 6 pm weekdays and all day Saturday—the terminals mean people can keep all their money in interest-bearing savings accounts until the moment they need cash,” says Bogomolny. “And it can all be done in one stop, right along with their regular

grocery shopping.”

The terminals, equipped with keyboards and display panels, are activated by magnetically encoded plastic “debit cards” issued by the savings and loan company. An operator simply inserts the card and then keys the cardholder's four-digit security code into the terminal, followed by the amount to be withdrawn or deposited. In a matter of seconds the transaction is completed. In the case of withdrawals, the customer can request cash up to a flexible limit determined by Pick-n-Pay—provided the account balance is large enough to cover the amount requested.

The terminals are online to an IBM 3601 Controller, a part of the 3600 system. The controller in turn communicates with Broadview's System/370 Model 145 virtual storage computer to ascertain account balances and to debit or credit accounts.

“Just two years ago, we had to enter all information manually, a process that used to take several minutes for each transaction. Now, with the online capability of the 3600 system, that time has been reduced to seconds,” comments Broadview's president, John Rupert.

“Because of the tremendous modular flexibility the system provides, we were able to install all 55 terminals in a matter of a few weeks. They will enable us to bring financial services to our customers at a fraction of the cost of opening new branches.”

APL Helps ABC Set a Fast Pace in the Ratings Race

At the ABC Television Network in New York City, the two questions most likely to be asked are "How did you like the show?" and "What's the rating?"

Ratings of TV shows are measures of their popularity, with a single rating point representing some 700,000 households which have viewed a given program. When a rating goes up or down, the Network's future advertising revenues may be affected. People at ABC involved with network planning therefore, keep an eagle eye on costs, revenues and ratings.

"We analyze network schedules and costs up to 78 weeks in advance," says Al Rubin, the TV network's vice president of business analysis and financial planning. "APL helps us meet our needs for analyzing financial changes related to new program schedules. Its speed and flexibility allows us to examine alternative schedules in hours instead of man-days. We can repeatedly adjust our data bases' input—costs, availabilities—in precisely the format desired, while avoiding elaborate computer reprogramming in accomplishing these tasks."

ABC uses an advanced version of APL called A Programming Language Shared Variables. Through the use of APLSV, a wide range of data bases

are accessible. APLSV runs on one of ABC's two Model 158s under Multiple Virtual Storage (MVS).

"Contrasted with standard data base management, APLSV is far speedier and more flexible," says Marvin S. Mord, vice president of research services for the Network. "We get data breakouts with APLSV that were not possible before.

"To us, the most helpful feature of APLSV is the simple one-statement expression that manipulates entire data sets," he adds. "By hitting just six keys, for example, we can get the average of a large set of program ratings.

"APLSV helps provide answers to vital questions—such as what would happen if we shifted a show to a new time slot against different competition? What would the effect be on overall network performance? That kind of capability means a lot to us, because we always seem to be racing the clock in this business."

As Mark Cohen, vice president for finance and planning for the ABC Tele-

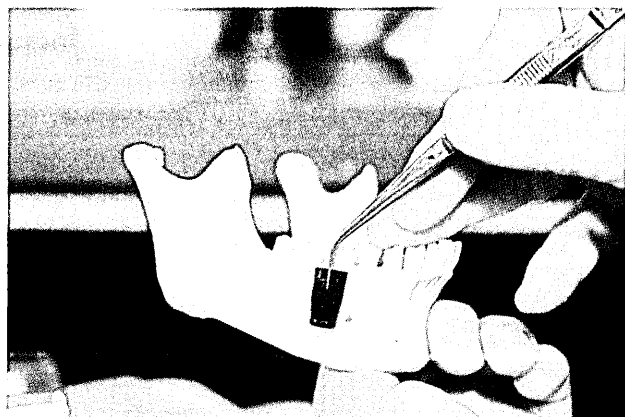


The ABC building in New York City, headquarters for one of the "big three" in television

vision Division, puts it: "APLSV gives us the ability to rapidly review and analyze Nielsen rating data. It's a particularly effective way of getting the information we need in the form we want."

Scientists Perfect Dental Implantation Technique

Until recently, replacing a lost tooth almost always required bridgework—anchoring the false tooth to the healthy ones surrounding it. Now, using a new technique, dentists at the University of Southern California are implanting artificial teeth directly into the jawbone.



A vitreous carbon rod, whose use in dentistry was developed with the aid of computer analysis, is implanted in the jawbone to serve as the foundation for a dental crown.

Their successful procedure uses vitreous carbon, a material new to dentistry, whose characteristics were tested on the university's IBM computer.

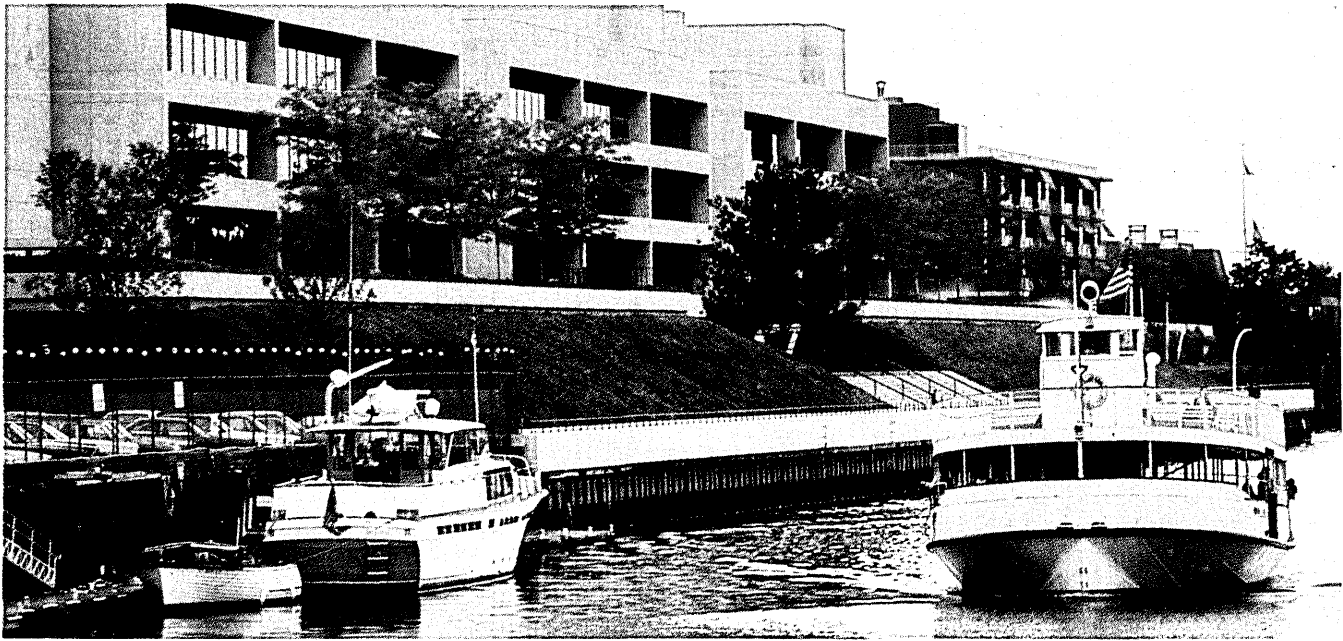
"The jaw is subject to constantly changing stresses that are created as a person chews," says Dr. Ronald Voss, director of the clinical implantation program at USC. "We had to be sure that artificial teeth made of vitreous carbon would approximate the behavior of normal teeth very closely. If there is insufficient stress, the jawbone will start to deteriorate. On the other hand, if the stress is too great, either the bone or the implant itself will break down."

Using an IBM System/370, Dr. Dale

Grenoble, associate professor of dentistry, and biomechanics engineer Albert Knoell, developed a mathematical model of the carbon implants to determine their maximum stress patterns. "This computer analysis focused on one part of the problem by helping us verify the structural integrity of the implant design without incurring the time and expense of building actual models," says Knoell.

The implant operation, which normally takes about half an hour, involves drilling a hole into the jawbone and inserting a grooved vitreous carbon rod. After a healing process of several months, a stainless steel post is anchored to the rod and a dental crown is attached.

So far, implants have been performed successfully on more than 300 patients. "Our oldest implants have been in place just over four years," says Dr. Voss. "We believe that in certain situations, implants can be more aesthetic and functionally efficient than any other dental replacements."



The new, expanded headquarters of General Reinsurance in Greenwich, Connecticut, symbolizes the rapid growth of the company.

DL/1 Speeds Growth at General Reinsurance

An online data base management system organized with Data Language/1 has resulted in faster communications as well as improved customer service for the General Reinsurance Corporation of Greenwich, Connecticut.

As the largest reinsurance company in the U.S., General Reinsurance assumes risks originally undertaken by other insurers in categories like property, casualty, fidelity, surety, aviation, marine and automobile insurance. It also covers specific individual risks for a fixed time period—for example, the hands of a pianist before a major performance. These are known as facultative agreements.

"It used to take a month or longer for new premium and claim information to be totally processed," recalls Frank Fahy, assistant vice president of business systems planning. "That included mailing time from the branch offices, coding and entering into the central data base. By the time corporate reports were consolidated and production reports were forwarded to account executives, some of the information was already outdated. Today, total processing takes just a few days."

"In addition to improved turnaround time, DL/1 enabled us to cope with a 39% growth in transaction volume in our facultative business last year without any additional staff," adds Tony Kandiew, assistant vice president of electronic data processing.

Beginning in July, 1974, General

Reinsurance made the transition from a System/360 Model 30 with a conventional base largely on tape to a System/370 Model 158 running under DOS/VS and the online DL/1 data base system. Under the current system, data can be entered in realtime from any one of 30 display terminals located in the regional and local offices, and then be communicated back to the Model 158 in Greenwich through a Customer Information Control System Virtual Storage (CICS/VS) interface.

Under DL/1, all related data files are organized hierarchically with the most significant and frequently accessed data on the highest level. Normally, every new application program requires the formation of a totally new sequential data file. With DL/1, however, data is structured into a common format that allows many batch or on-line programs to access the same data. Data security is preserved by a segment sensitivity feature that locks users out of data files that are not required by their applications.

"We decided on the DL/1 data base approach because it offered the flexibility and data security we wanted without using too much memory," says Kandiew. "If we ever need to expand to an even larger data base, such as the Information Management System (IMS), we feel confident the conversion would be quite easy because IMS uses the same data entry format as DL/1."

"We eliminated a great deal of redundant data using DL/1," says Kandiew. "Before, the same premium information may have been repeated in 100 different files. Today, it appears only twice: in the premium file and in the balance file."

"Our data base management system forces us to define logical data relationships before creating a new file. By improving documentation, it has significantly reduced the time we spend on file maintenance and costly reprogramming."

Fred Schmitt, assistant vice president of information services, points out, "With more accurate and current status reports available using DL/1, our branch information services staff can supply our clients with a more comprehensive service package much earlier now. We feel DL/1 has helped us to achieve a much tighter control of our business."

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

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Data Processing Division

DATAMATION

DID YOU THINK HEWLETT-PACKARD WOULD STOP AT A GREAT BUSINESS CALCULATOR?



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The Hewlett-Packard 3000CX—the small computer designed from the ground up to be terminal-oriented. It lets you put the full power of the computer where you need it. Where the people are. Not just a tantalizing two or three terminals, but enough to bring information and answers to the many places they're needed. To close a sale. To check an order. To solve an inventory problem.

Every terminal speaks five languages, including the two most important for business—COBOL and RPG. And while our terminals are helping your people get today's work done today, concurrent batch processing is giving your company a headstart on tomorrow.

The 3000CX manages your company's data base with IMAGE. IMAGE takes data out of the straitjacket of traditional file management systems. Reduces data redundancy. Simplifies application programming. Makes your operating information significantly easier to get at. The HP 3000CX is a very businesslike computer.

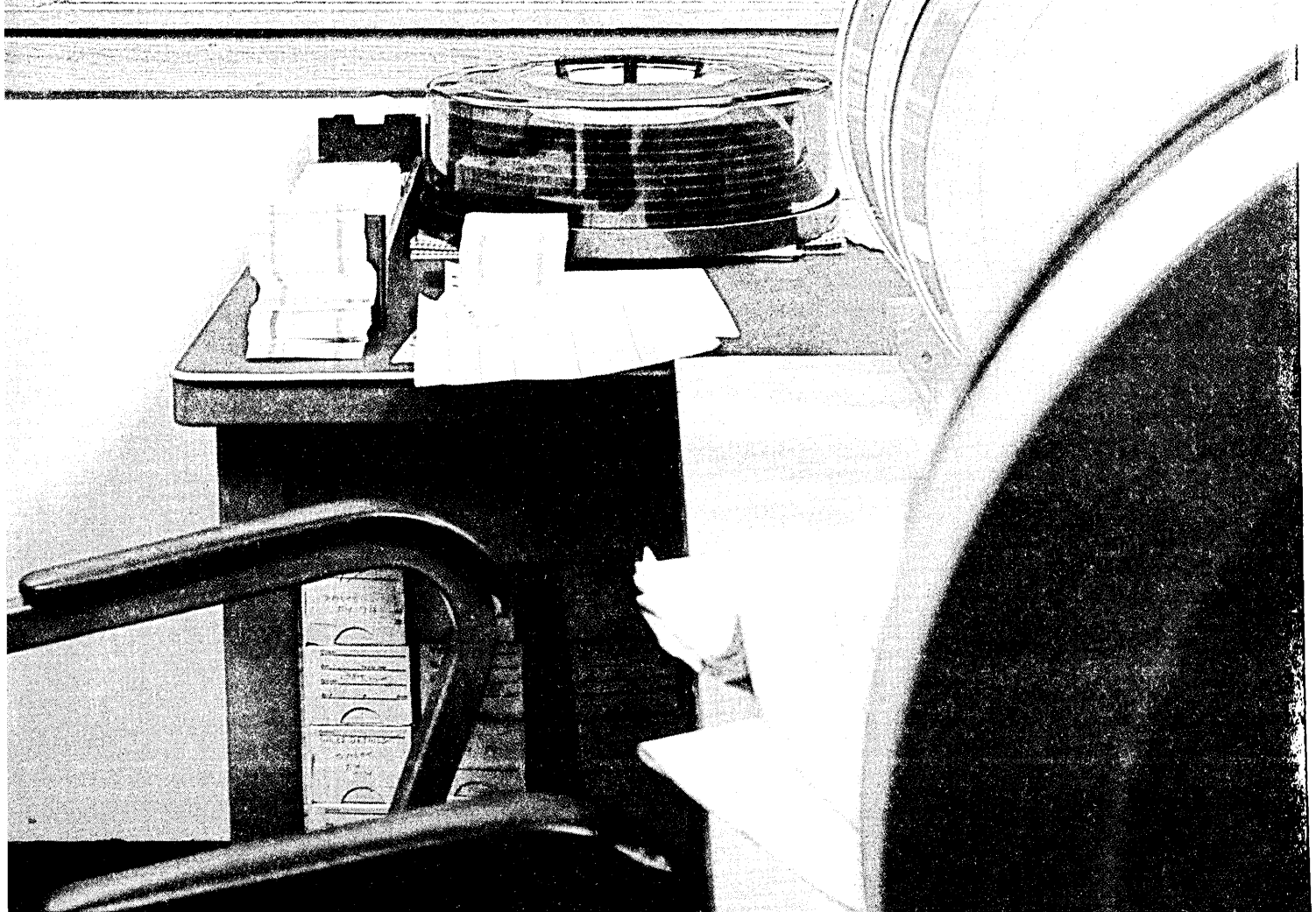
There's much more you should know about the 3000CX System before you decide on any computer. A call to your local Hewlett-Packard office, or a letter, will put that information in your hands. Promptly.

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How come most big computers never seem big enough.

Most big computer systems are batch-type processors. So no matter how big they are, they can still do only one job at a time.

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Almost any large-scale system but ours. The DECsystem-10.

Because the DECsystem-10 is a different kind of large-scale computer. It can do interactive, batch, remote batch, on-line EDP, real-time and transaction processing, and can be used for networks and hierarchical systems too. Which means lots of people in lots of locations can

use it in lots of different ways. All at the same time.

Because the DECsystem-10 is a truly flexible big computer.

It can handle from 640K to 20 million characters of memory. It can accommodate up to 512 jobs at the same time. Each individual user can program with up to 1,280K characters of directly addressable memory. It offers COBOL, FORTRAN, ALGOL, APL, BASIC, and MACRO, complete with de-bugging aids. (There's even a new low-cost APL terminal.) It offers you both virtual and cache memory and an advanced Business Instruction Set. It has complete systems software — MCS, DBMS, a file manage-

ment system, and our famous TOPS-10 operating system — all supported by us, instead of you.

Best of all, the DECsystem-10 costs about half what other big systems do. And it's backed by Digital's experience with over 50,000 computer installations worldwide.

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calendar

FEBRUARY

4th Annual Midwest Digital Equipment Exhibit, **Feb. 10-11**, Minneapolis. More than 800 users and manufacturers are expected to attend this display of computer interactive terminals, data communications equipment, peripherals, data acquisition and digital test instruments. Contact: Clarence K. Peterson, Deerland Distributors, Inc., Minneapolis, Minn., (612) 331-6433.

IEEE International Solid State Circuits Conference, **Feb. 18-20**, Philadelphia. Speakers from the U.S., Japan, Italy, Belgium, France, Israel, Holland, England, Germany, and Canada will present more than 80 topical reports on circuit advancements. Keynote addresses will focus on the impact of the microprocessor within the IC industry in the U.S., and the emerging role of IC's in Europe and the Far East. There will be 17 day and 10 evening sessions, including panel discussions. All registrants receive a copy of the annual conference report. Fees: \$40, members; \$50, nonmembers, advance. Add \$10 for on-site registration. Contact: Lewis Winner, 152 W. 42nd St., New York, N.Y. 10036, (212) 279-3125.

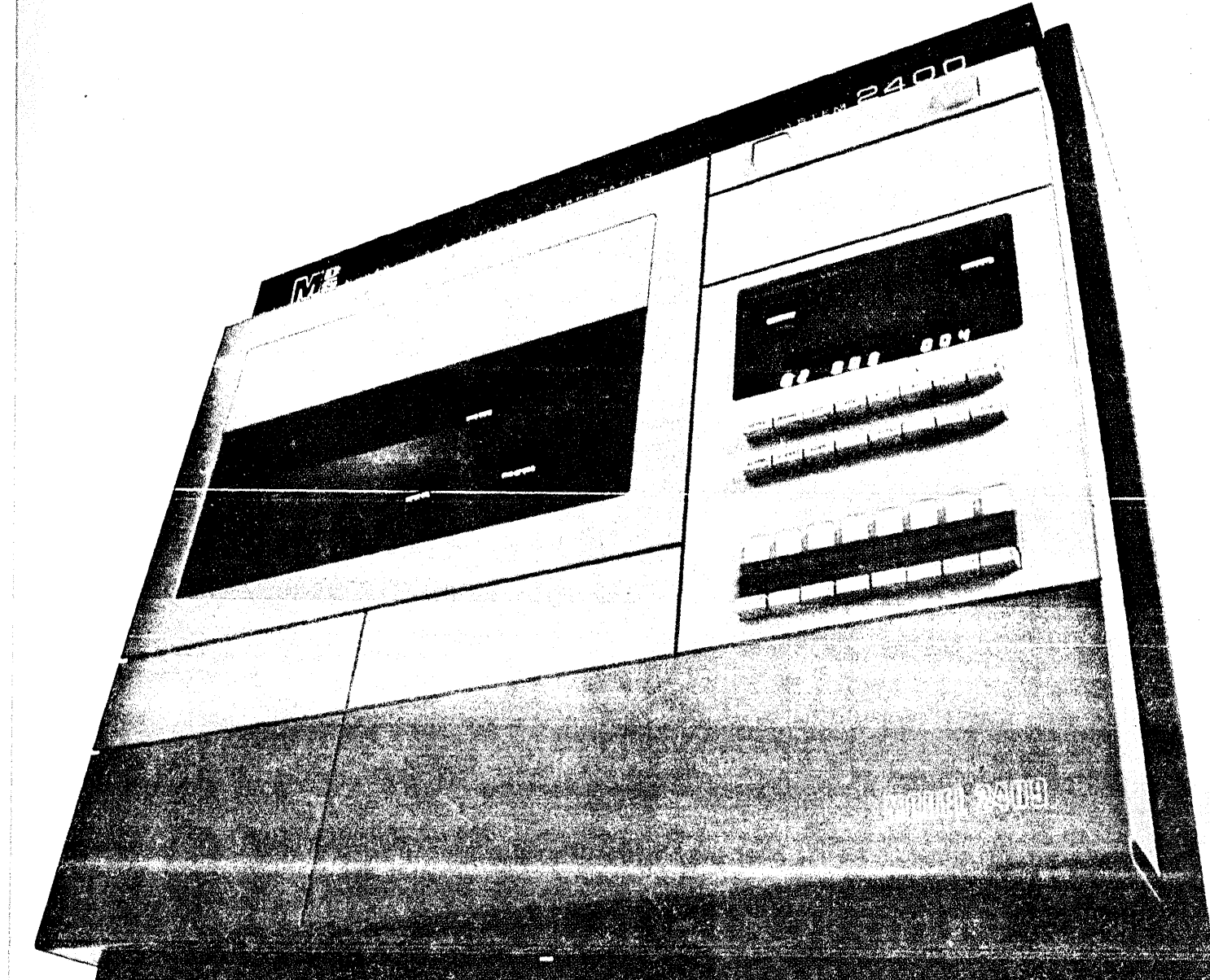
Federal ACP Procurement: Hardware, Software and Services, **Feb. 18-20**, Washington, D.C. Representatives from industry and government will meet to plan improvement in federal procurement practices. Fees: \$265, industry members; \$295, nonmembers; \$195, teams; \$175, government members; \$195, nonmembers; \$95, teams. Contact: Dept. FDSP 1976, AIE Seminars, P.O. Box 25116, Los Angeles, Calif. 90025, (213) 826-7572.

COMPCON Spring '76, **Feb. 24-26**, San Francisco. Major industry figures are among the speakers at the 12th international conference sponsored by the IEEE Computer Society. Fees: \$50, members; \$65, nonmembers; \$10, student members. Add \$10 after Feb. 13. Contact: Jon E. Petersen, COMPCON 76 Spring, IBM, R62/123, 5600 Cottle Rd., San Jose, Calif. 95193.

MARCH

PL/1 Winter Symposium, **March 1-5**, Keystone, Colo. Users of this language, from programmers to managers in industry and government, will participate in this tutorial on "Data Base and High Level Language Interfaces." Some of the topics include relational data structures, network data structures, papers on user systems, and security/privacy implications. Fee: \$150. Contact: Roger J. Jones, Cibar, Inc., St. 120, 2850 W. Serendipity Circle, Colorado Springs, Colo. 80917, (303) 574-4050.

INTERFACE '76, **March 29-31**, Miami Beach. The original data communications conference and exposition, presented in association with DATAMATION magazine, will feature product workshops, for information on the latest data communications equipment and services; methods workshops, for planning and managing a datacom network, and applications sessions which will spotlight systems for specific industry and application areas. More than 200 exhibitors will display products, equipment, and services. Fees: \$95, three days; \$50, one day; team discounts available. Contact: INTERFACE '76, 160 Speen St., Framingham, Mass. 01701; toll-free (800) 255-4620; in Massachusetts, (617) 879-4502 (collect). *



Give your main frame the power you're paying for.

MDS System 2400 lets your central computer perform. Mainframe systems are designed primarily for rapid internal processing. Their efficiency is seriously degraded by dependence on peripheral functions involving data preparation. It is now possible to execute most peripheral functions without mainframe involvement. With the power and flexibility of the MDS System 2400, backed by one of the most experienced support teams in the industry.

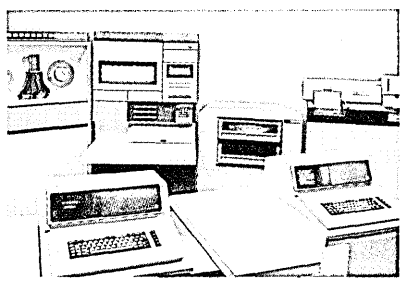
The 2400 is a mini-computer-based data handling system specializing in I/O service to large computer users. It performs functions off line which would normally consume up to 80% of costly mainframe time. And it can handle several operations

- concurrently:
- Intelligent data entry
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Let your main frame do what it was intended for. Find out

how from the people who pioneered peripheral processing. And *why* over 3500 companies (including 48% of the FORTUNE 500) have already selected Mohawk equipment to boost their total operational productivity.

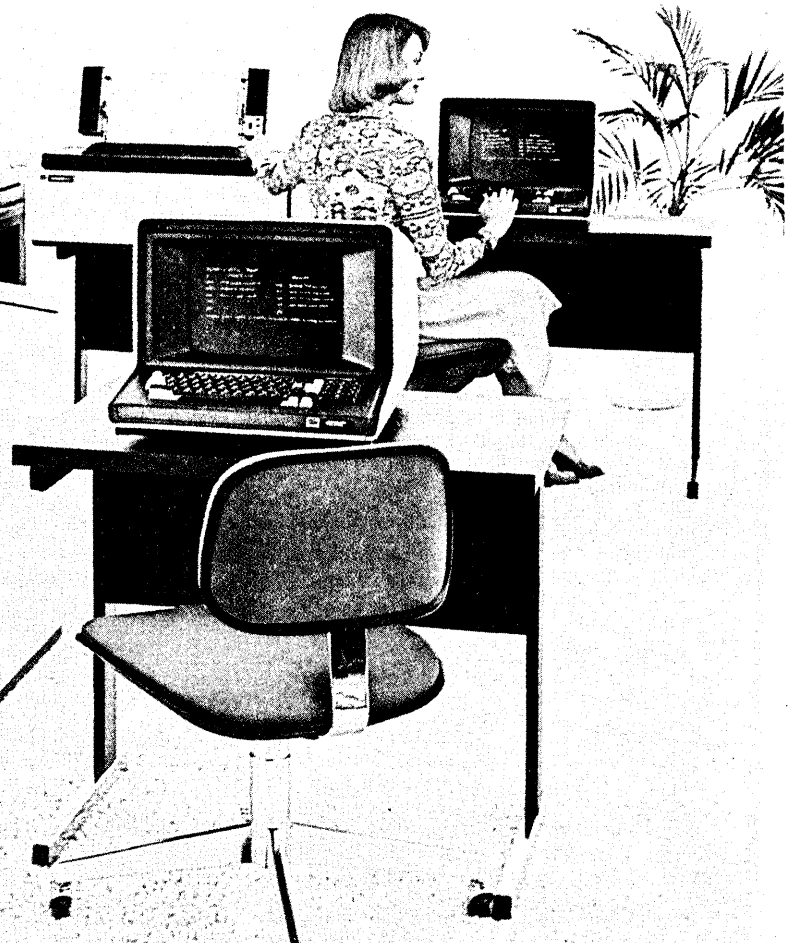
Ask your local MDS representative how System 2400 can help maintain the bottom line with your existing computer. Call or write Mohawk Data Sciences Corporation, Executive Headquarters, 1599 Littleton Road, Parsippany, NJ 07054, phone (201) 540-9080



Mohawk Data Sciences

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It's 340 in Poughkeepsie, 350 in Des Moines and 440 in Los Angeles.



Now there's a family of distributed data entry and processing systems that you can tailor to the requirements of your remote sites.

If you've considered the advantages of distributed data entry and processing, you've probably discovered a sad truth:

A system that's fine for Poughkeepsie might be a washout in Des Moines.

Different sites have different needs. From remote data entry, to communications, to remote inquiry and response, to on-site report and forms generation.

And to overwhelm a small branch with high-powered equipment is just as bad as under-equipping a large one.

To match each of your branches with exactly the right equipment, in both hardware and software, there's only one terminal manufacturer to turn to. Us.

We're as flexible as you are.

Using our Sycor Models 340, 350 and 440, and their wide range of peripheral equipment, you can pinpoint capability to site requirements and price.

Our Model 350, for instance, might be just the ticket for your two-man operation in Des Moines. While a larger branch in Los Angeles might require the concurrent background processing capabilities of the Sycor 440.

And, while each of the three terminal systems has its own unique capabilities, they all work together in a remote processing network.

Each, for example, can be programmed with our high-level, easy-to-use TAL language. And,

they not only talk to your CPU, but to each other.

And that means flexibility.

Should the requirements of one location change, our systems can change with them. You can switch terminal models without changing programs, or even retraining operators.

The Model 340.

For smaller office situations that call for data entry, you'll find our Model 340 the low-cost intelligent answer.

No matter which of its hundreds of applications you use it for—like order entry, payroll and accounts payable—you're assured of virtually error-free data every time. Because operator errors are pointed out immediately for on-the-spot correction.

And, its 8k bytes of programmable memory and capabilities like customized field validation, conditional data entry and arithmetic operations, mean the Model 340 goes even further in providing for needs you might not even have anticipated when you first got it.

The Model 350.

If you need the advantages of random accessibility, look into the Model 350. The 500,000 "fill-in-the-blanks" characters on its exclusive dual flexible disks let you store customer, product/price and salesman files right at the source.

And, with its 16k bytes of programmable memory, the Model 350 not only retrieves data, but maintains and updates files—and even

generates reports.

Just key in a customer number and you get all the pertinent data: name, address and billing information. That means reduced key-strokes, improved accuracy and big savings.

The Sycor 440 System.

When you need more than just data entry, look into our new Sycor 440. With a disk storage capacity of up to 10 million characters and the use of up to eight separate terminals, you can do data entry and inquiry/response concurrent with background processing.

Our 440 system lets you share and access files locally, reducing communication line costs and investments in central CPU resources.

Each display is controlled by the on-site processor and is capable of performing independently. At the same time that you're performing data entry you can make use of our special programs to produce a wide variety of management reports like sales analysis, inventory and billing.

It's a system as flexible as your needs.

Give us a call.

We invite you to take a closer look at our family of distributed data entry and processing systems—the lowest cost answer to your branch office needs.

Call your Sycor representative for details.

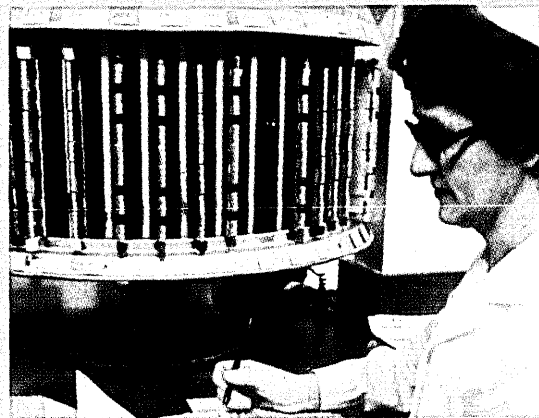
SYCOR

...applying intelligence to remote processing.

CORPORATE OFFICES: Ann Arbor, Michigan 48104 (313) 971-0900. DISTRICT SALES OFFICES: Atlanta (404) 455-3070 • Boston (617) 890-7290 • Chicago (312) 297-5200 • Cleveland (216) 741-4840 • Columbus (614) 888-8657 • Dallas (214) 521-6710 • Denver (303) 458-0794 • Detroit (313) 355-5770 • Greensboro, N.C. (919) 274-2964 • Hartford (203) 529-1100 • Houston (713) 785-2953 • Indianapolis (317) 788-1577 • Kansas City, Mo. (816) 842-7799 • Los Angeles (213) 640-0120 • Miami (305) 592-1533 • Milwaukee (414) 257-3780 • Minneapolis (612) 854-2309 • Newark (201) 773-7400 • New York (212) 371-9050 • Philadelphia (609) 665-1170 • Pittsburgh (412) 922-3350 • Portland, Ore. (503) 227-5672 • San Francisco (415) 349-6626 • St. Louis (314) 878-0900 • Washington (703) 527-0200. CANADA: Sycor International Ltd.; Ontario and Quebec.

For The Twin Cities — A Hospital Data System That Delivers:

INCOTERM®



The Hospital Services Division of McDonnell Douglas Automation Company serves the data processing needs of America's health care industry. In fact, McAUTO works for more hospitals than any other company of its kind.

In a growing number of hospitals, McAUTO is turning to the power, speed and flexibility of INCOTERM Intelligent Terminal systems to dramatically reduce the costs of hospital data collection and management.

Name the job. Admissions. Accounting. Histories. Financial management. Personnel. Drug dispensing. Diet planning. Nursing.

In McAUTO's Hospital Financial Control System, for example, INCOTERM provides fast access to patient accounting files under exacting control routines and helps to automate all of the hospital's accounting functions. File maintenance. Census changes. Patient billing and collection. Filing and cancelling of insurance claims. Health care price data. Payroll. Accounts payable. Property accounting.

Or take nursing. INCOTERM equipment is used to maintain basic patient census data — to indicate discharged patients, transfers, admissions. This, in turn, is used as the basis for action at some other point in the INCOTERM data network — such as the nursery.

Of course, INCOTERM delivers in a lot of other environments as well. Banks. Insurance companies. Railroads. Airlines. Government data systems. That's why McAUTO chose us in the first place.

INCOTERM: More Power To Your Terminal.

INCOTERM®
CORPORATION

6 Strathmore Road
Natick, Massachusetts 01760
(617) 655-6100

Sales and customer service offices in major cities throughout the United States and abroad.

source data

SOURCE DATA provides information on books, courses, references, reports, periodicals, and vendor publications.



Computer Data Management and Data Base Technology
by Harry Katzan, Jr.
Van Nostrand Reinhold Co., 1975
347 pp. \$15.95

Computer Data-Base Organization
by James Martin
Prentice-Hall, Inc., 1975
558 pp. \$26.50

Here are two fine volumes covering a broad range of topics dealing with data management. Both are suitable as texts, with some introductory material included in each, and sufficient coverage of advanced and reference information so that professionals may wish to consider either or both books for their personal libraries. There is some overlap in coverage, but there is also considerable divergence in emphasis between the books.

Katzan's book is somewhat shorter than Martin's, and less comprehensive in treating detailed points. The first 90 pages are introductory covering basic hardware and software concepts; however a course in data management would presumably require sufficient prerequisites to make this material superfluous. For example, there are five pages of data communications concepts which are insufficient to treat the subject, and none of this material is referred to again in the book.

The rest of the book is divided into data management concepts and data base technology. Discussion of file structures and access methods are intertwined with a description of the data management functions provided by IBM's vs operating system, including such topics as the DD control card, control blocks and tables, and vsAM. Data base technology includes a description of the CODASYL system (based on the 1971 DBTG report), the Guide/Share statement of requirements for a data base system, the Relational Model, Honeywell's Integrated Data Store, and IBM's IMS.

The Martin book is best described as very much techniques oriented. It is divided into two main parts covering the logical and physical aspects of data management. Introductory material covers the need for and objectives of data base systems. Next, logical data

structures are introduced, covering tree and plex structures. The term "plex" is used instead of "network," since the latter term has tended to become misused. The CODASYL, IMS (DL/I), and Relational systems are then described.

Comparing the two books, Katzan treats the CODASYL material a bit better, but Martin handles IMS and Relational approaches in more detail. The Martin book includes a chapter on normalization of relations which is done well and is essential to an understanding of the concept. Neither book treats IMS in other than an introductory fashion; and while Martin references IMS/vs and Katzan IMS Version 2, neither even mentions secondary indexing.

The remainder of the Martin book covers physical aspects, and concentrates on storage and accessing techniques. This part forms the bulk of the volume and is the best material in either book. It is a comprehensive compendium of storage structures, accessing techniques, pointer mechanisms, retrieval strategies, and performance algorithms. The writing is clear and the figures are particularly well done.

It should be noted that neither work really treats data base systems as such. The coverage of various systems are only included to exemplify methods of data description and data structure support. Little, if any, discussion is included of the operating characteristics of data base systems such as recovery, integrity, backup, concurrent access control, and implementation tools.

Nevertheless, either book can serve as the basis for gaining an understanding of access mechanisms and data structure support in data base systems, with the Martin book preferable for the more comprehensive treatment.

—Robert M. Curtice

Mr. Curtice is a consultant with Arthur D. Little, Inc., whose specialty is data base systems.

Achieving the Optimum Information System for the Laboratory
J. Lloyd Johnson Associates
1500 Skokie Building
Northbrook, Ill. 60062
1975, 472 pp. \$62.50 (\$60 prepaid)

This work, produced by the J. Lloyd Johnson consulting firm, contains most informative data for the hospital administrator, clinical laboratory pathologist, technologist, laboratory director, and others interested in computerization in the medical field. The chapters dealing with an ideal labora-

tory information system, a description of basic hardware, and software terms and concepts, are certainly worth studying. The chapter "Toward the Optimal System," deals with planning and management considerations in a laboratory, and can be especially helpful to laboratory and hospital administrators involved in the selection of computers in this area.

A candid discussion of basic issues and available systems in the field is one of the strongest points of the book. Critical comments in the latter chapters are quite impressive.

Unfortunately the major deficiency of the volume is the lack of competent editing. English language usage is poor and scholarship is inadequate. The main substance of the book, however, is well worth reading and studying.

—Marion J. Ball

Prof. Ball is director of the health sciences center computer systems and management group at Temple Univ., Philadelphia.

BOOK BRIEFS . . .

Innovation: The Management Connection
by Robert O. Burns
Lexington Books, 125 Spring St.,
Lexington, Mass. 02173 (1975)
157 pp. \$14

Packed into this volume are several unconventional concepts aimed at scientists and engineers who manage research and development programs. The author's contention is that humans exist perpetually in a state of change, and that managers must be adept at handling changes, especially those that come from new applications of technology. Chapter titles include "The Relationship of Science and Technology to the Goals of Our Society," "Cultural Conflicts," "Management Creativity," "Technological Creativity," and several covering specifics of research and development projects.

Managing Computers: Data Processing Case Histories
George Penney, ed.
Hayden Book Co., Inc., 1975
128 pp. \$6.95 (paperback)

An effective way of learning to deal with computer operations is, quite frequently, to find out what others have done in similar situations. With this in mind, Britain's National Computing Centre sponsored a study that resulted in this book. The case histories describe a variety of common data management situations, discussions of problems and crises that occurred, and how they were handled at various levels. Each case begins with a synopsis and a list of terms with which the reader should be familiar, and closes with suggested discussion topics and a statement of the lessons to be learned from the study.

source data

Systems Analysis and Design of Real-Time Management Information Systems

by Robert J. Thierauf
Prentice-Hall, 1975
607 pp. \$17.95

This seems to be a comprehensive text which presents actual procedures used in analyzing and designing systems for a manufacturing firm. Following an introductory section and feasibility discussion, the overall and detailed aspects of real-time MIS systems are described. A number of chapters deal with thorough systems analysis of MIS subsystems for corporate planning, marketing, research and development, engineering, manufacturing, inventory, purchasing, physical distribution, accounting, finance and personnel. There are a number of illustrations and examples to assist the presentation; the book closes with a look at the future of MIS.

reports & references

Remote Batch Terminals

Rated highest in overall performance in a survey of 294 users with a total of 1,525 installed batch terminals, was Harris Corp. equipment. Batch terminals from Data 100, Datapoint, and Computer Machinery Corp. also outscored IBM, the largest producer of this type of equipment. These survey results plus detailed specifications of 78 batch terminals from 37 vendors are found in *All About Remote Batch Terminals*, from the November supplement to *Datapro 70*. Ease of operation, hardware reliability, maintenance service, software and technical support, in addition to overall performance were the categories rated by the users. Price: \$10. DATAPRO RESEARCH CORP., 1805 Underwood Blvd., Delran, N.J. 08075.

Computer Performance Evaluation

How well does the software use the hardware in a given job mix? A number of software and hardware monitors are available to answer this question by direct measurement, or statistics accumulated by the operating systems can be evaluated by job accounting packages. The *Auerbach Guide to Computer Performance Evaluation* describes and evaluates such leading monitor and job accounting packages

as Boeing's SARA, Boole & Babbage's SMS, Comten's Alert, etc. The report includes a nontechnical tutorial on the subject, in-depth reports on 14 leading packages, and a directory of suppliers. Price: \$24.95. AUERBACH PUBLISHERS INC., 6560 No. Park Drive, Pennsauken, N.J. 08109.

Electronics in China

A 276-page report, *China's Electronics Industry and Market*, provides a useful background to doing business in China. Business practices, trading organizations, and legal considerations are presented. The report forecasts the market potential for 116 types of electronic components and 129 types of equipment, and China's capability in various phases of electronic product production, from telecommunications to microwave equipment to semiconductors, is discussed. China's 60 most important manufacturing facilities are listed with the types of equipment produced. Price: \$65. FRED GLYNN/MARKETING RESEARCH, 2200 Sacramento St., San Francisco, California 94115.

Computer Cartography

The market for computer graphics applied to mapmaking is the subject of a 300-page study, *Computer Cartography: Worldwide Technology and Markets*. Within a decade approximately 2,500 installations with computerized cartographic systems are forecast. Such a system consists of graphic input stations (digitizer, tablet, function keys or keyboard), output stations (flat bed, drum, light beam, COM, or electrostatic plotter), interactive crt work stations, secondary mass memories (disc, tape, or drum), mini-computers, and in some cases, communications interfaces to remote processors. Graphic types include topographic and land use maps; air and waterway charts; and socio-economic, business, agricultural, and natural resource graphs. Pre-publication price: \$325 (\$375 after February). INTERNATIONAL TECHNOLOGY MARKETING, 246 Plymouth Rd., Newton, Mass. 02161.

Datapro Catalog

A 22-page pocket catalog describes this vendor's monthly updated information services such as *Datapro 70*, the new *Directory of Software*, and reports on minicomputers, office systems, banking automation, and point of sale. Newsletters and 27 selected best-selling reports are detailed. A 60-day trial subscription for \$10 permits use of references on computer systems, minicomputers, software, and other items. DATAPRO RESEARCH CORP., Delran, N.J. FOR COPY CIRCLE 201 ON READER CARD

System/32 Market

Potential sales of the System/32 as a remote computer in dispersed applications should eventually outpace sales of the machine as a small business computer. So predicts *The IBM System/32 Market*, a 119-page report which forecasts sales in units and dollars to 1981. Sales for 1975 are estimated at 4,000 units for a total of \$160 million, with an additional \$7.5 million spent on software. System characteristics, available software, pricing, and system design are discussed. The System/3 is compared also, and the potential user market is evaluated. Price: \$475. FROST & SULLIVAN, INC., 106 Fulton St., New York, N.Y. 10038.

Datamation Subject Index

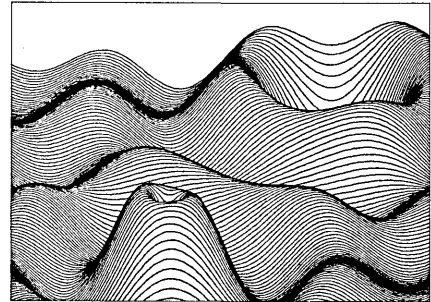
The subject index for DATAMATION, Vol. 21, Nos. 1-12, (1975) is available. References to feature articles, News in Perspective, Editor's Readout, conference reports, the Forum, Look Ahead, People, and book reviews are included. DATAMATION, Los Angeles, Calif.

FOR COPY CIRCLE 212 ON READER CARD

vendor literature

Hard Copy Output

Through "tripling," this vendor's printer/plotter provides three outputs, becoming a line printer, pen plotter, and crt hard copy device in one. A brochure describes with output sam-



ples how the system prints and plots simultaneously under machine control without changing hardware. When the crt requests hard copy, the system prints the desired copies, then returns to computer directed work. Cost-effectiveness, specifications, and switching protocol are among the items discussed. VERSATEC, Santa Clara, Calif. FOR COPY CIRCLE 205 ON READER CARD

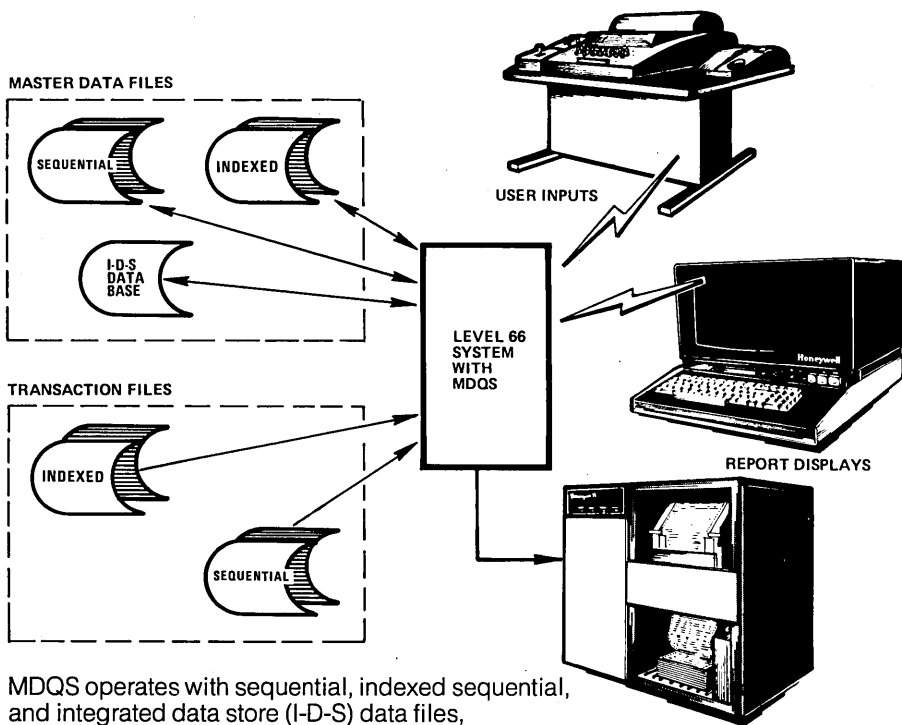
Disc cleaners

Disc cleaning wands, foam swabs, and lint-free cloths are offered as free samples from among items such as disc

Q: How do you answer questions that weren't anticipated?

A: Easily.
With Honeywell's MDOs.





MDQS operates with sequential, indexed sequential, and integrated data store (I-D-S) data files, following instructions fed into the central computer system from remote or onsite keyboard terminals.

Q: What is MDQS?

A: Honeywell's MDQS (Management Data Query System) is an advanced software system designed to generate information from your files in the form you need, when and where you need it. It was developed to meet those information requirements which, while requiring a timely response, are often unanticipated and nonrecurring.

Here's how MDQS responds to those challenges:

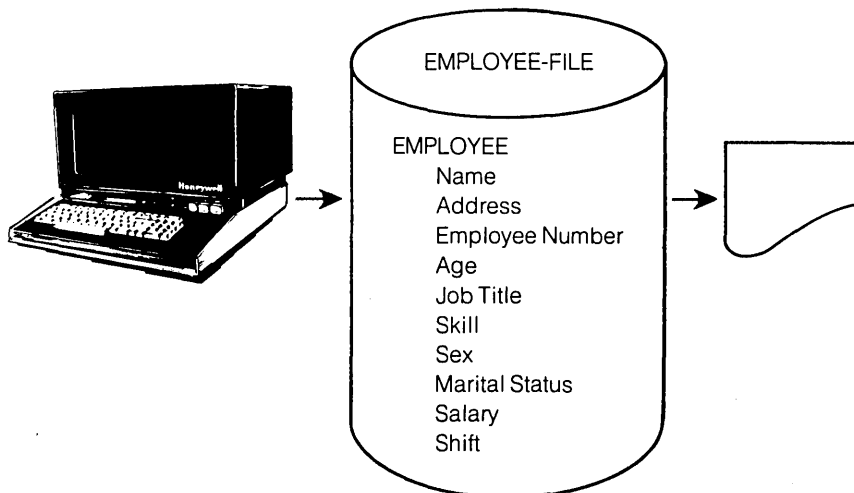
- It eliminates the need for special program development, saving you the time and costs such development would require.
- It can be used by every level of personnel, from beginner to experienced computer user, from departmental employee to top executive. It allows management to use the computer and its resources for "what if" situations. And it allows operating departments to get working information immediately.

- The actual file interrogation and display of data can take place on a terminal in your office.
- It lets you create, update, manipulate, retrieve, or display the contents of a computer file, a series of files, or a data base. In precisely the format you specify.

MDQS handles all standard file types efficiently. And it has features that let you respond to complex, unpredictable situations.

MDQS is available now, as one of the capabilities of Honeywell's Series 60 Level 66 information systems and our General Comprehensive Operating Supervisor (GCOS). It's working today. It's also available to any user of Honeywell's nationwide DATANET-WORK service, so you can test MDQS on your files, in your office!

CAR-POOLING EXAMPLE:



Q: What can MDQS do for me?

A: MDQS offers you a number of significant capabilities:

- Processing of existing GCOS user files. These may be sequential or indexed sequential data files, or integrated (I-D-S) data bases.
- Access to as many as 15 files, to fill a user request through just one information query.
- A language so simple that a report can be prepared with as few as two elementary commands: RETRIEVE and PRINT.

- An easy method to express selection criteria.
- Elective data destination—display on CRT terminals, printing on a hard-copy terminal or at the central site printer, or storage on a file.
- A precise report generation feature allowing you to produce one or more single or multilevel reports with page layout and data element editing control. Report and page headings can be generated automatically along with footing and control break lines, including subtotals and totals.

- Sorting with multiple keys for queries needing ordered report displays.
- File security, with extended protection to the data element level during the retrieval/update process.

Q: How can MDQS be used?

A: MDQS can be used in many ways.

A company can use MDQS to provide a corporate financial reporting system with reports customized to individual needs. It can use MDQS to prepare for labor negotiations by determining costs of various wage and employee benefit proposals. Hospitals can use MDQS to search patient medical history records before prescribing drug treatment.

The recent gasoline shortage created a need for information of the type MDQS is uniquely suited to provide. Industries and local governments across the nation began encouraging employees to form car pools. Many companies compiled lists to help their employees locate co-workers who lived near them and worked the same hours. This type of search and listing is not only easy for MDQS, but the privacy of information such as salaries is protected against unauthorized access by the system's security provisions.



For example: A listing to locate all employees working the first shift and living on Washington Avenue is needed. The report should be ordered in street number sequence. To do this, the terminal operator need only type:

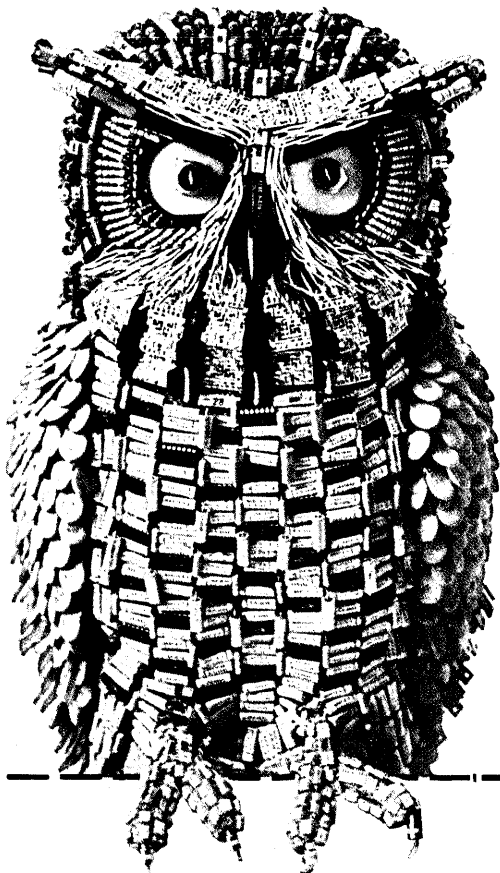
RETRIEVE EMPLOYEE FROM
EMPLOYEE-FILE

WHERE ADDRESS CONTAINS
"WASHINGTON AVE" AND
SHIFT=1

SORT EMPLOYEE ON ADDRESS
PRINT ON PRINTER NAME
ADDRESS

The list will read:

NAME	ADDRESS
J.E. Smith	10 Washington Avenue
A.B. Jones	135 Washington Avenue
P.C. Brown	354 Washington Avenue
S.T. Thomas	624 Washington Avenue



Q: Is MDQS more than a data query and reporting capability?

A: MDQS is also a powerful procedural language.

- The system provides comprehensive arithmetic capabilities.
- Data file creation includes all the necessary data preparation functions such as validation and transformation.
- Master files or data bases can be updated from multiple transaction files.
- Data files can be easily restructured.
- The system provides the power and flexibility to write entire application systems. As an interactive computer development tool, it permits fast application programming. In fact, procedures can be developed and in production within minutes, instead of days!
- Tutorial assistance is included for novice terminal operators.
- Complete or partial procedures can be initiated by a single keyword entry

from any terminal. Partial procedures can be completed at time of execution through user-supplied search conditions.

Q: Can you summarize the benefits?

- A:** Yes. MDQS:
- **RESPONDS QUICKLY** to a wide range of information requests.
 - **INCREASES PRODUCTIVITY** of personnel using the system.
 - **COMPLEMENTS**— rather than replaces— existing applications.
 - **DECREASES COSTS** of system development and information processing.
 - **SOLVES** a variety of **SIMPLE** or **COMPLEX** information processing tasks.
 - **OFFERS EASY ACCESS** through simple commands.
 - **IS FLEXIBLE** to allow processing of unplanned requests.

The Other Computer Company: **Honeywell**

Q: How can I get more information?

A: Call your local Honeywell sales office, or mail this coupon.

AT63

Honeywell Information Systems
200 Smith Street (MS 440)
Waltham, Massachusetts 02154

Name _____ Title _____

Firm _____ Address _____

City _____ State _____ Zip _____ Phone _____

CIRCLE 31 ON READER CARD

Printed in U.S.A.

source data

pack inspection kits and cartridge cleaners. A 16-page illustrated catalog presents this vendor's full line of kits and cleaners for keeping computers and peripherals in good working order. THE TEXWIPE CO., Hillsdale, N. J. FOR SAMPLE CIRCLE 204 ON READER CARD

Multi-tasking OS

A 20-page brochure describes "The Optimizer," a 32-bit multi-tasking operating system, which optimizes the use of software on this vendor's 32-bit minicomputers. Numerous diagrams and specifications concerning tasks, memory, and files illustrate its use in single, parallel, and multi-tasking computing environments. INTERDATA, INC., Oceanport, N. J. FOR COPY CIRCLE 206 ON READER CARD

Data Communications

A four-page brochure, "Entrex Data/Comm," describes a parameterized communications option that can be used in a source data capture and pre-processing atmosphere. A generalized binary synchronous communications (BSC) package allowing interface with

Microprocessor Guide

A well illustrated, 32-page *Microprocessor User's Guide* presents much basic information on microprocessors in the form of papers originally presented at Wescon conferences. The first paper discusses how to select microprocessors for dedicated control uses; the second is on how to design with microprocessors. Also included are detailed specifications on several of this vendor's products, such as the MPS-883 (8-bit microprocessor system) and the M821 System Analyzer.

"virtually any terminal or mainframe supporting BSC protocol" is also discussed. ENTREX, Burlington, Mass. FOR COPY CIRCLE 207 ON READER CARD

Pocket Calculators

A 32-page illustrated brochure, *Pocket Calculator Buyer's Guide*, describes with specifications this vendor's full line of preprogrammed and programmable pocket calculators for both scientific and business applications. Information is also included on calculator accessories, support literature, prerecorded programs, and the HP-65 users' library of calculator programs. HEWLETT-PACKARD CO., Palo Alto, Calif. FOR COPY CIRCLE 203 ON READER CARD

Data Channel Service

Data channel service for intercity business data transmission is described in an illustrated brochure. A dedicated line for full-time data transmission with alternate voice capability as an option is offered. The data channels are usable for two-point data applications or in a complex multi-point network. SOUTHERN PACIFIC COMMUNICATIONS CO., Burlingame, Calif. FOR COPY CIRCLE 210 ON READER CARD

Available also is the 22-page *PROM User's Guide* which gives a brief introduction to PROM technology, including MOS and bipolar PROM's. Information on selecting and using PROM's—a cross reference guide to other vendors' products is given—and on equipment to support PROM users is presented. The booklet also, of course, discusses Pro-Log's line of PROM programming hardware and programmer options. PRO-LOG CORP., Monterey, Calif. FOR COPY CIRCLE 202 ON READER CARD

COURSES

General Management Skills

General Management Skills is a self-paced program of about 100 study hours of intensive education in the duties of a top-level administrator. It is comprised of five courses, each in a looseleaf binder containing text, programmed instruction, a practice case, and an examination case. *What Managers Do, Training and Developing Today's Workforce, Communication for Results, Human Behavior in the Organization, and The Management of Technological Change* are the titles of the five courses. Each course alone is priced at \$55 (\$50 for AMA members), and the complete program is \$220 (\$200 for AMA members). AMERICAN MANAGEMENT ASSN. EXTENSION INST., 135 W. 50th St., New York, N. Y. 10020.

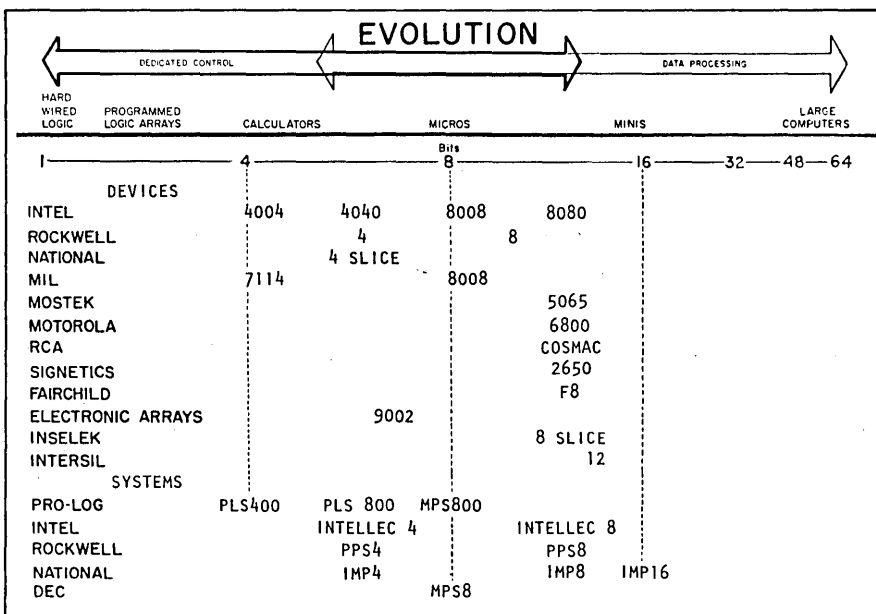
Microcomputer Profile

A one day technology update on microcomputers, with hands-on demonstrations and survey materials, will be offered during March in seven cities: Los Angeles (on the 1st), Chicago (3rd), Ottawa (5th), Boston (8th), Washington, D. C. (9th), Dallas (11th), and San Diego (the 15th). Fee, including course materials and lunch: \$165. TECHNOLOGY SERVICE CORP., 2811 Wilshire Blvd., Santa Monica, Calif. 90403.

periodicals

Byte

A monthly magazine, *Byte, the Small Systems Journal*, edited by Carl Helmers, has recently begun publishing "to provide the computer experimenter with a combination of information aimed at the practical problems of home brew computer situations." Articles on hardware design, theory of computers, and software design, as well as profiles of specific hardware and software items, are typical of the material published. One recent letter to the editor refers to *Byte* as a magazine "exclusively devoted to the 'do it yourself' computer enthusiast," and there are a number of ads for parts and services required by the computer experimenter. Subscription: \$12/yr. GREEN PUBLISHING INC., Peterborough, N. H. 03458. *



Envoy.

The Paperless Portable vs. Portable Paper.

The Paperless Portable is a sleek 26 pound CRT terminal. It looks and acts like an engineer's fondest day dream, but it's as real as the tip of your nose.

Until now, man has been content with 'portable paper.' He put a noisy 100 pound teleprinter on wheels and carried a box of paper around and called it portable.

Or he used a portable thermal printer. It too demanded reams of paper, and it still weighed almost 40 pounds. At the end of your arm, portable was a euphemism for heavy.

The Paperless Portable is Envoy. It comes in two models, the 620 and the 680. Both have built in acoustic couplers, full cursor controls and display 24 lines with 80 characters per line. The 680 also has formatting, graphics, an edit sub-mode for programmers and video output display

capability for group presentations.

Unlike the two mechanical contraptions described above, Envoy is reliable. Its solid state electronics can't get out of alignment. And the only noise you'll hear is the faint hum of progress.

Now, as the name implies, the Envoy is paperless. If paper is essential to your operation, you'll have to make do with teleprinters.

But if you're using paper just because you're used to it; or because you like the 'security' of paper, you owe it to yourself to consider Envoy.

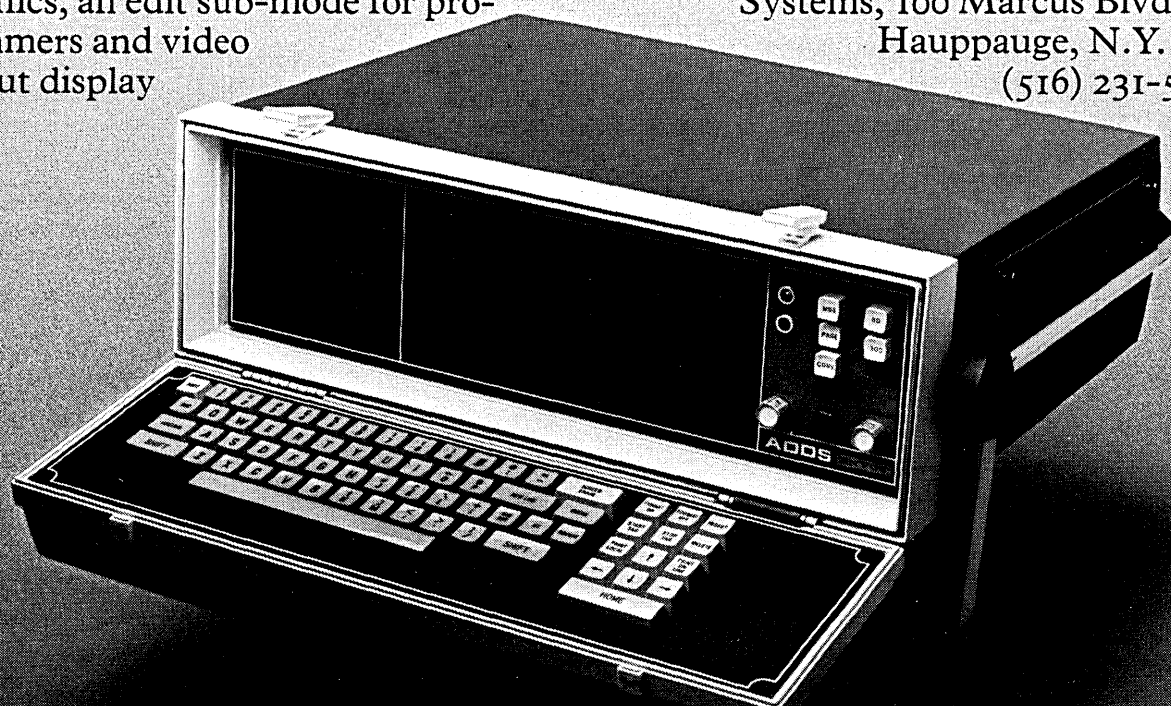
The Paperless Portable.

It's better than heavy.

And at \$2250 for the 620 and \$2995 for the 680, it's better than paper.

ADDS Applied Digital Data Systems, 100 Marcus Blvd., Hauppauge, N.Y.

(516) 231-5400.





THE NEXT LOGICAL STEP

DISTRIBUTED DATA PROCESSING
WITH A LARGE DATA BASE
AND A COMPREHENSIVE
DATABASE MANAGEMENT
SOFTWARE SYSTEM

It's part of Singer's responsibility to understand and anticipate your changing needs. So we know that increasingly, most company operations demand that each of their locations have the ability to capture, validate, and pre-process data at the source.

If your company is considering the solution to this problem, you probably need the SINGER* Series 1500 Intelligent Terminal System. One member of this series is the **SINGER Model 1503 Intelligent Terminal**. Only about the size of a desk, it contains up to 20 million bytes of disc-based data storage, which can be distributed to up to 16 remote terminals.

Share and access data files

This means you can now access large amounts of data at the source, without having to depend on the central computer. Comprehensive, ready-to-use software makes it a versatile computer that can provide you with big computer benefits.

Because now each remote terminal has immediate access to shared files *locally*, to aid in data entry and validation. The file data concerning your

operation is always current, providing fast, accurate data to help you manage your business.

Communicate

Unattended two-way communications up to 9600 baud is available, of course. Also, the ability to choose any format convenient to you for your report printouts.

The terminal interacts visually with the operator, so it's simple to learn and easy to use with a minimum of training.

But there's more. Much more. We'd like to tell you about it. And hear all about your data processing applications and data entry requirements. To arrange that, simply drop us a line or pick up the phone—**IT'S THE NEXT LOGICAL STEP FOR YOU.**

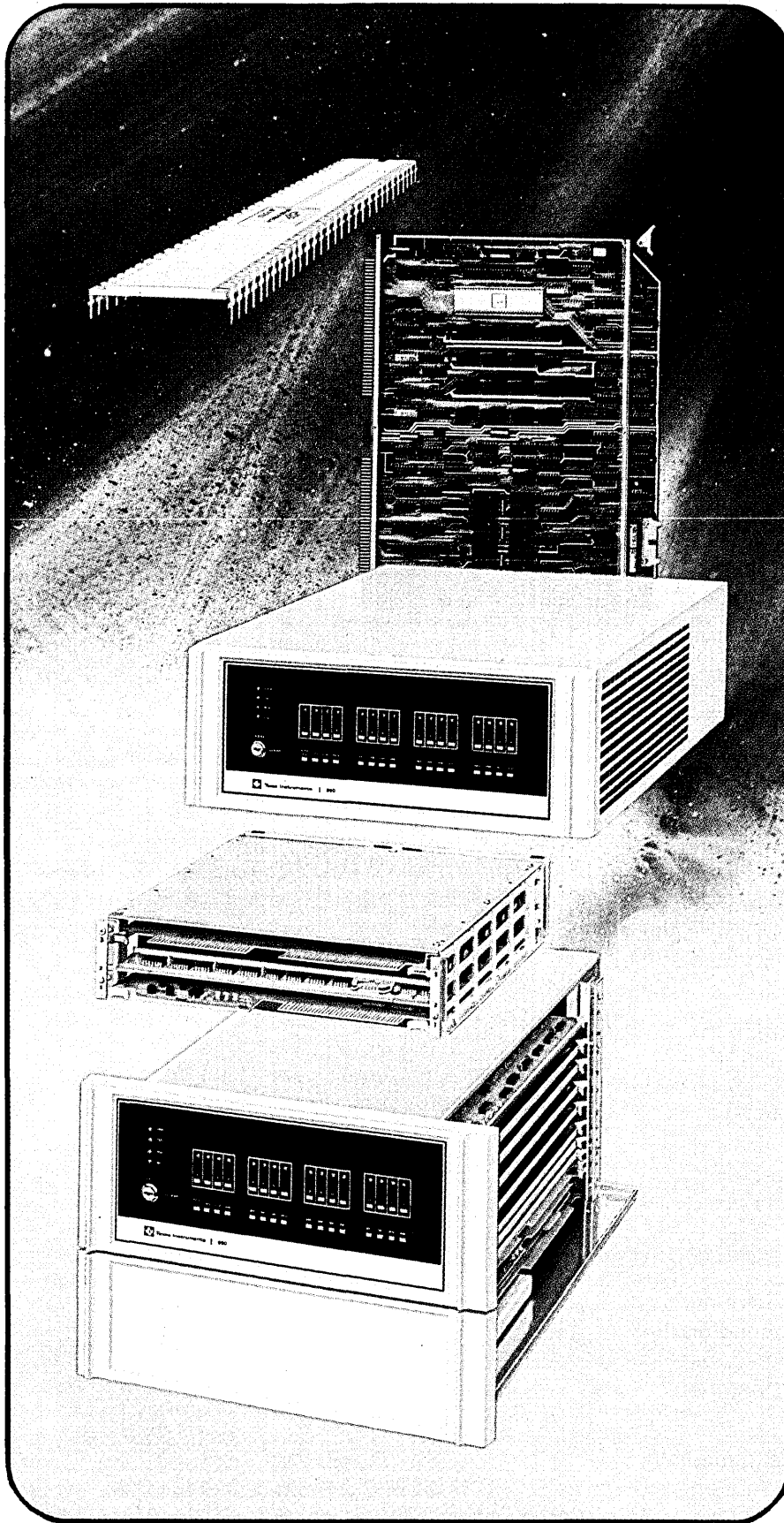
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SINGER

BUSINESS MACHINES

Cosby Manor Road Utica, N.Y. 13502 315/797-5750

TI's 990 computer family...



The TI concept of what a computer family should be goes beyond producing the most reliable and cost-effective hardware around. To us, that's basic. The extra dimension is usability, and this means software and support.

The TI 990 computer family has all the ingredients. We make every member of the family ourselves, and we make them all software-compatible from bottom to top. We also make them the most economical on the market and back them with total TI support, both before and after the sale.

Complete software libraries, as well as memory-resident and disc-based operating systems, support real-time and multi-tasking operations. We offer FORTRAN, COBOL and BASIC languages . . . program development packages with utilities . . . stand-alone software development systems. And we offer cross-support on timesharing networks so you can begin early development of your own applications programs.

The TMS 9900 Microprocessor . . . The Technology Leader

The advanced capabilities of the 990 family result from a TI milestone in MOS technology . . . the TMS 9900 single-chip, 16-bit microprocessor. It's at the heart of the 990 family, with a unique design that allows for data manipulation that's been hard to achieve with earlier devices. With its high-speed interrupt capability and versatile set of instructions, the TMS 9900 delivers the kind of computing power you'd expect from a 16-bit TTL computer. And it's the best microprocessor going for terminals, machine monitoring and control, and many other applications.

Because the TMS 9900 provides the instruction set for the new 990/4 microcomputer and 990/10 minicomputer, software developed for the low-end computers will be compatible with the higher

support, software and hardware

performance models . . . and with a minimum of interface and software adaptation.

Versatile Operating Systems

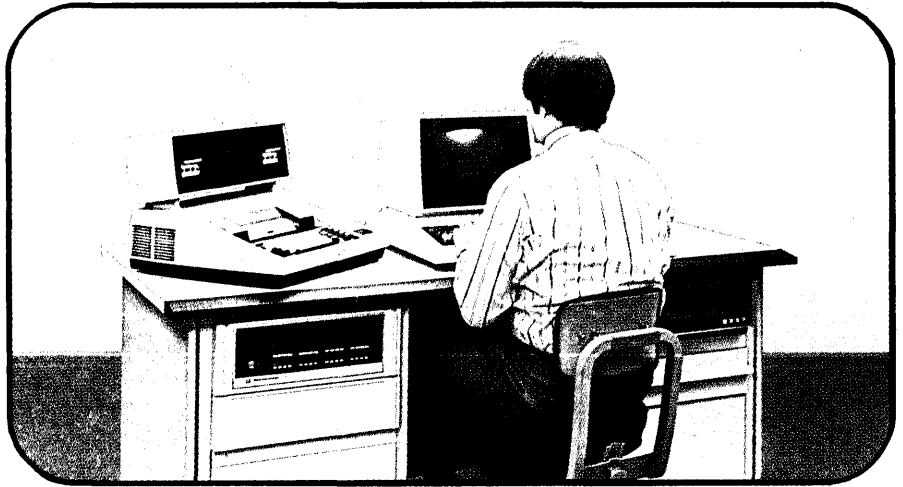
Coming up with the right kind of software means designing operating systems with as much versatility as you'll find in the hardware. The TX990 Executive Operating System uses the 990/4 microcomputer for low-cost multi-task control with a minimum of peripheral support. Users can select only the function they need for efficient memory usage, leaving more memory available for application software.

For larger 990/10 systems requiring mass storage and rapid access to programs and data files, the DX10 disc operating system gives you all you need and eliminates most of the time-consuming work previously associated with system generations. It includes a utility for constructing and testing software, and controls our "Librarian" software package for source and object program files.

Flexible Packaged Systems

TI offers two packaged program development systems and a prototyping system for the user who needs his own stand-alone system for software and firmware development of application programs.

These packaged systems provide a flexible method of implementing early project development. These include the low-priced 990/4 Program Development System and the powerful 990/10 Program Development System. The 990/10 system combines the power of



the 990/10 minicomputer with the disc-based DX10 operating system and an extensive set of software development tools. The standard package includes the 990/10 minicomputer with 64K bytes of error-correcting memory, ROM loader and diagnostics, 3.1-million byte removable disc kit with accompanying peripherals, and a complete software development package. And, at \$24,500, this system costs at least 20% less than comparable equipment from other manufacturers.

For developing firmware modules, there is a \$5950 prototyping system which includes a 990/4 computer with 16K bytes of memory and programmer front panel, and a "Silent 700*" twin-cassette ASR data terminal. Also, an optional PROM programming kit is available for developing read-only memory.

And, we provide a wide variety of

program development utilities for the 990 family. There is communications software that supports either synchronous or asynchronous data transmission, and can operate with the TX990 or the DX10.

Support from the start

In addition to software, the TI 990 family has another kind of support that's basic to every TI computer product. Complete training and applications assistance, plus a nationwide service network backed by TI-CARE†, our remote diagnostic, service dispatching and real-time field service management information system.

For complete details on the new 990 family, call your nearest TI office or write Texas Instruments Incorporated, P.O. Box 1444, M/S 784, Houston, Texas 77001.

Or phone Computer Equipment Marketing at (512) 258-5121.



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TEXAS INSTRUMENTS
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†Service Mark of Texas Instruments

We deliver economy in more ways than one. We're Singer-M&M Computer Industries. The high-speed Intelligent Remote Batch Terminal People with the most economical terminal systems in the world.

A WORLD OF ECONOMY IN RELIABILITY Hardware and software with years of proven field performance implement Singer-M&M's terminals. And, all hardware undergoes extensive life testing prior to shipment. The result? Infant mortality is eliminated. Therefore, you have less down time and lower operating costs. That means greater reliability *and* economy!

A WORLD OF ECONOMY IN CAPABILITY Singer-M&M terminals are among the fastest in the market. You get up to 30% faster data throughput! All M&M terminals communicate at speeds up to 50 K B/P.S. And, the high-speed capabilities are built right in, with an economy-boosting combination of flexible software, fast processor cycle time and large communication buffers.

A WORLD OF ECONOMY IN SERVICE The Singer-M&M service group provides national and international service coverage with 1700 representatives in the U.S. and more than 2000 in other key areas throughout Europe and the Far East. And, Singer-M&M people have the expertise coupled with more than 25 years of computer-related experience to assure service that's rapid, efficient — and economical!

A WORLD OF ECONOMY IN COST M&M provides the lowest cost terminal in the market. But, that's not all! Providing higher performance than terminals emulated is an integral part of M&M equipment. As an independent, we have to offer you more for less. And, we do! More service. More reliability. And, more performance. It all adds up to lower operating costs for you!

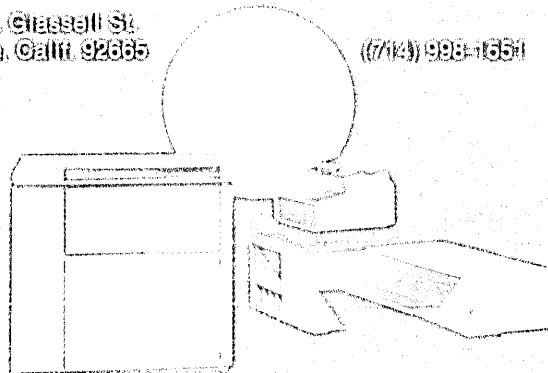
Singer-M&M Computer Industries. A world of economy that can make a big difference in your world.

SINGER

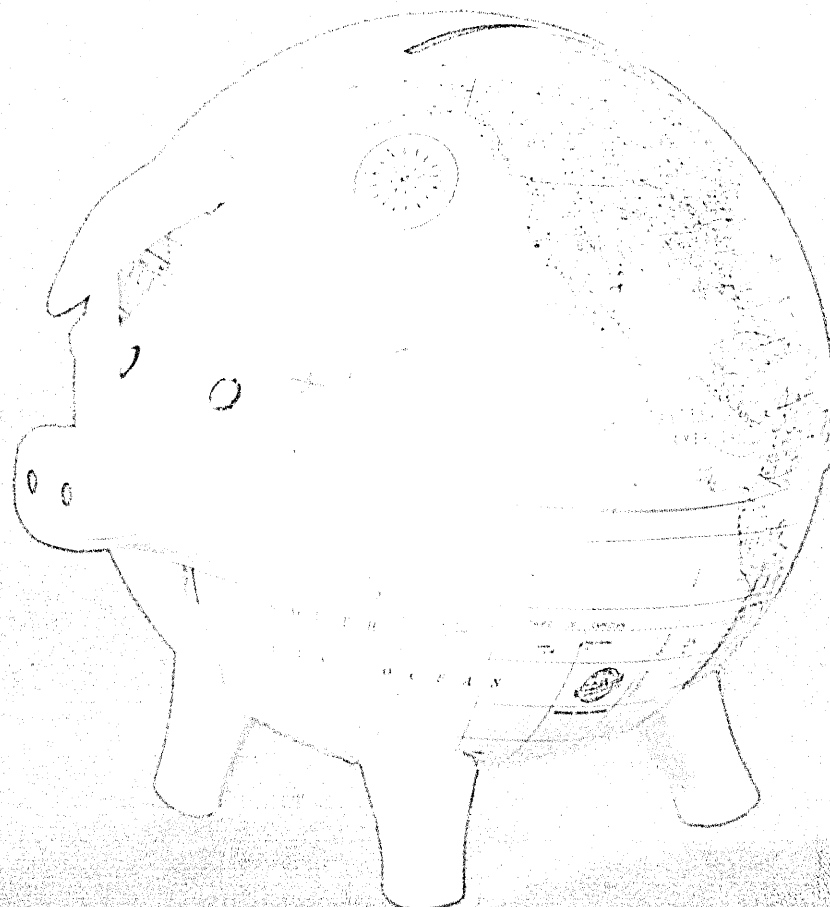
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A World of Economy



CIRCLE 98 ON READER CARD

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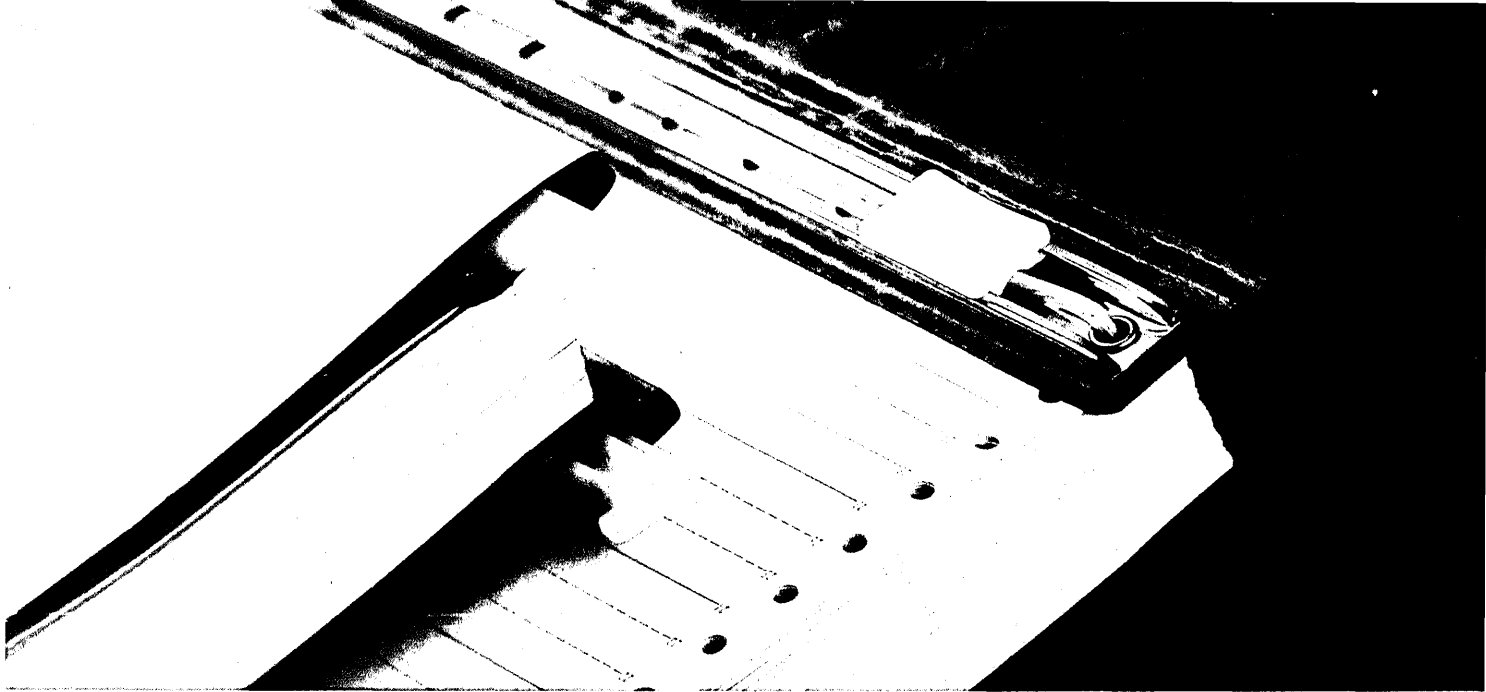
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Easy does it.

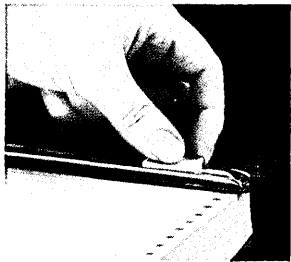
National's new Easy-Slider® and Easy-Hanger® Binders make it easier than ever to house, hang and handle computer printouts.

If you think printouts should be a source of information and *not* a source of irritation, you're going to like what National's done for data binders.

Take the new Easy-Slider Binder. Remember how hard it used to be to load and unload printouts? Stubborn slides. Broken fingernails. Sharp edges. Cuts and nicks.

Not anymore! Now all you do is press down lightly on the smooth-gliding, Easy-Slider fastener to open or close cable posts for quick and easy top or bottom loading.

A knurled thumb depression prevents slipping, enables you to slide the fastener easily and effortlessly. The smooth, tapered ends on the polished steel channel assure safe, sure handling. Easy-Slider.



As easy on *you* as it is on printouts.

Same with the new Easy-Hanger Binder. A total of *four* sliding hooks — two on top, two on the bottom — hold print-

outs evenly and securely with no stress or strain.

Happily, you can also retract the Easy-Hanger hooks when binder is removed from storage rack to make it easy to transport and use.

Why not make it easy on yourself and everyone else with these two new National printout binders. Find out more about them now along with the complete line of National



Data Processing storage and retrieval equipment in our new, illustrated brochure. Mail the coupon for your free copy plus a handy, free Printout **NATIONAL** Reference Ruler.



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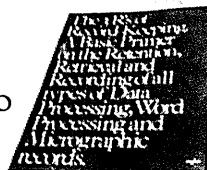
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Company _____

Address _____

City _____

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THE BEST, AND GETTING BETTER:

A proven system with more than two years of hard field use at many organizations, DATASHARE has demonstrated its ability to disperse computer power to field offices for many tasks, sharply improving employee productivity while reducing operating costs. But at Datapoint we haven't rested on our laurels. Our DATASHARE is constantly being improved. Consider these facts.

A FULLY PROGRAMMABLE, MULTI-USER SYSTEM

DATASHARE is a fully programmable, multi-user system using a powerful processor and a line of peripherals to match your needs. Using the Datapoint 5500 processor with 48K user memory, 16 users can simultaneously access the system and accomplish data entry, data processing, file management or report generation. Programming can be quickly accomplished in DATASHARE language. Each user can run a separate program and access single or multiple public or restricted files. There's no spinning wheels trying to make a limited system fit specialized needs—DATASHARE's inherent flexibility and powerful software lets the user at each remote site readily accomplish the task at hand.

WITH VIRTUAL MEMORY

Optimum productivity from any computer system requires an

2, etc. There's no need for tedious time consuming file conversion routines to use DATASHARE files in other applications or with other non-DATASHARE Programs.

EASY FILE BACK-UP

Many competitive systems are oblivious of the real business need for keeping duplicate files, offering only relatively primitive capability for file duplication or back-up. DATASHARE's Operating System allows a convenient means to duplicate entire disk files and utilities for cassette-disk, tape-disk or disk-disk duplication procedures, allowing crucial back-up files to be easily made.

CONCURRENT COMMUNICATIONS/PROCESSING

Datapoint processors have long been noted for their powerful communications packages, whereby program and data files can quickly be transferred between processor sites. Similarly DATASHARE now offers the ability to transmit and receive data files while the field system users continue using DATASHARE for standard applications. Files may now be sent to a central home office or other computer site without any interruption to normal ongoing usage.

Likewise, as with any computer system, there's a need to create new programs, to debug, to run utilities or other batch operations. With DATASHARE's concurrent processing

can cross the country with a DATASHARE network. And you can have one or more DATASHARE ports used as a dial-up facility sequentially accessed by an unlimited number of field users. To make field office usage even simpler, all DATASHARE hardware and software is operator-oriented with a minimum of controls. The 3600 user-terminal, for example, has a straightforward typewriter style keyboard and easy to read non-glare display.

PROGRAM FLEXIBILITY

Thousands of DATASHARE installations in field locations have demonstrated the flexibility and cost effectiveness that a proven system can provide. But there's another important advantage to DATASHARE usage—program interchange. Programs written for your DATASHARE can also be used in the popular Diskette 1100 Intelligent Terminals. With this capability, programs need not be restricted only to DATASHARE sites but can be used for those applications whenever a single-user stand-alone system such as a Diskette 1100 is utilized. Also, programs written for the Diskette 1100 will run in the multi-user DATASHARE system.

ADAPTABILITY—DATASHARE'S MIDDLE NAME

Another nice thing about DATASHARE is its ready adaptability

Don't settle for second best. Set your sights on

Operating System that allows user programs to exceed the main memory size. Most large mainframe systems today use virtual memory techniques, and so does DATASHARE. Up to 512 K characters (bytes) of space may be shared among the maximum 16 DATASHARE users such that each user is assured a 32K program space.

DYNAMIC FILE MANAGEMENT

Any business processing system worth its salt needs a file structure that users can work *with* easily, not have to work *around* arduously. The files generated on the DATASHARE system are totally dynamic—which means that users can easily create new files without regard to file length or use of complex file tables. Also, files can be combined, added to or deleted without complex techniques or system considerations. And DATASHARE files are compatible with other Datapoint programs such as DATAFORM, DATABUS, BASIC, RPG

capability the system manager can do all these, can run RPG 2, BASIC or DOS Utilities from the central processor console while the system's terminal users still enjoy full access. With this capability, new system development, or "odd jobs" don't have to wait for off-hours.

REMOTE OR LOCAL USER TERMINALS

DATASHARE user terminals can be placed up to 2,000 feet away from a central 2200 or 5500 processor using simple twisted pair connections. But if there's a need to go further, the terminals can be hooked to modems or acoustic couplers and standard dial-up telephone lines using conventional hardware. In fact you

to your company's needs and requirements. In some organizations, it may serve as an independent computer utility, providing computer power for a multitude of applications to its work stations. In others, the user terminals may serve strictly for data entry, editing and pre-processing of field data so that a large central computer can function most efficiently. For some users, the powerful independent processing at dispersed work stations is the attraction. For others, it's the ability to structure very tightly a computerized approach for previously manually handled chores. Or it can be a combination of all of the above. Adaptability—DATASHARE's middle name and another good reason why it's the best yet.

So don't settle for second best. Go with the most advanced, most proven dispersed processing network on the market—DATASHARE. For more information, contact the Datapoint sales office nearest you, or write or call Datapoint Corporation, attention: Marketing Communications, 9725 Datapoint Drive, San Antonio, Texas 78284 (512) 690-7151.

DATAPPOINT CORPORATION



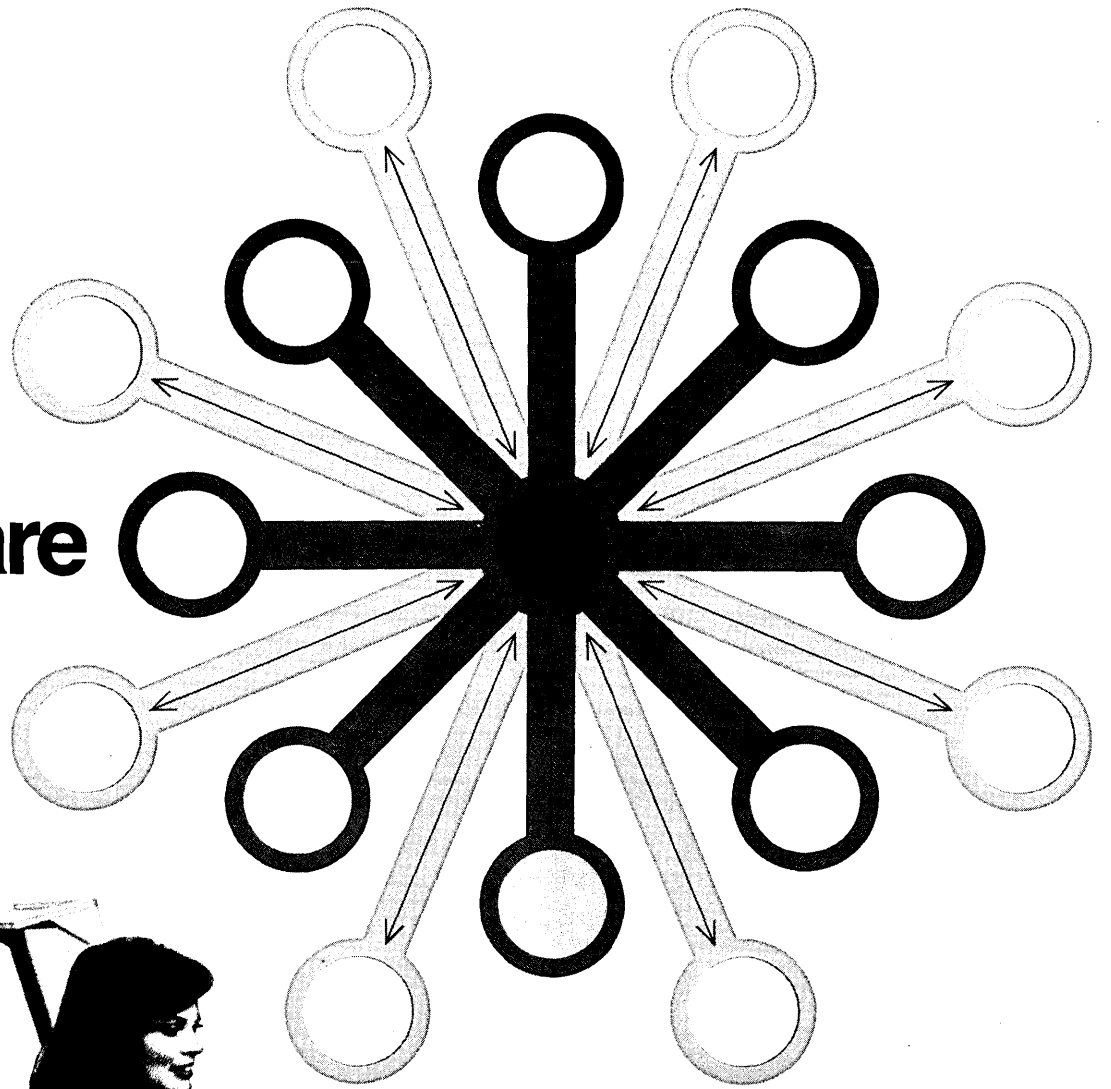
The leader in dispersed data processing

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CIRCLE 17 ON READER CARD

Datashare



"With our Video 100 you don't need a ton of paper to debug a program."

Debugging a program with hard copy can be tough. You can't get to the bottom of the problem 'til you get to the bottom of the heap.

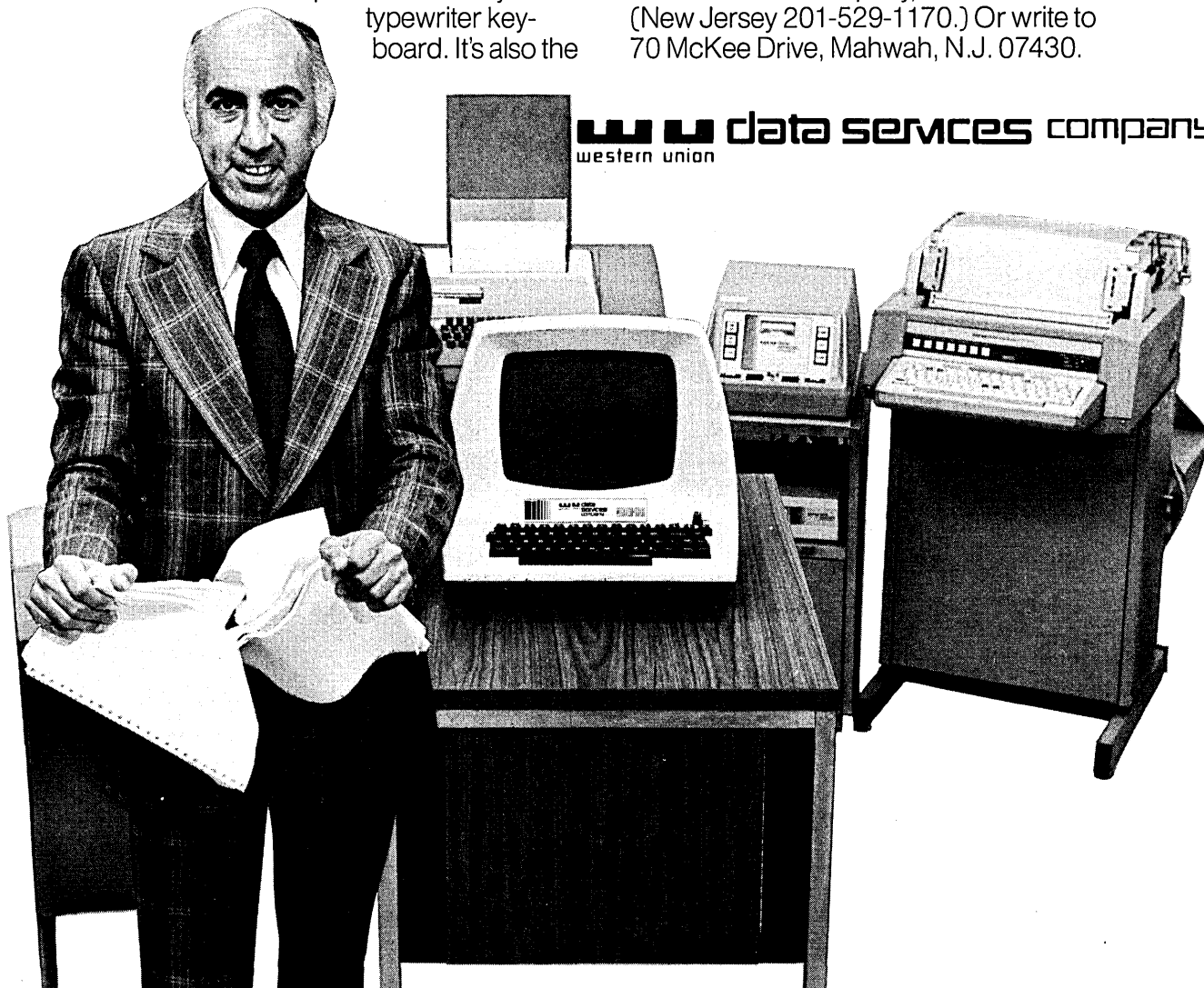
That's why we've come up with the Video 100 terminal. Fast visual display of data makes it the perfect problem solving supplement to your teleprinters. And it gives you the advantages of a video terminal at teleprinter prices: just \$65 a month.

The Video 100 is perfect for in-house timesharing and remote inquiry applications. It's fast and quiet with an easy-to-use typewriter keyboard. It's also the

only display terminal anywhere that comes with Termicare—our nationwide diagnostic, maintenance and support service. One toll-free call gets immediate assistance.

Let the most experienced data terminal company in the timesharing field help you select the right terminal for your needs. The Video 100 for debugging; our teleprinters for hard copy print-outs.

For more information, call me today. Z. V. Zakarian, President, Western Union Data Services Company, at 800-631-7050. (New Jersey 201-529-1170.) Or write to 70 McKee Drive, Mahwah, N.J. 07430.



western union data services company

Tektronix Graphics now has a mind of its own.

The 4051 BASIC Graphic Computing System: Off-line computing and editing: On-line processing in any language.

Introducing an intelligent solution to your time-sharing budget crunch. The 4051 can pay for itself in one year's time-sharing savings or less. Its built-in 8K of workspace (expandable to 32K), mag tape storage, and complete editing capability can take you off-line and take a huge bite out of connect-time charges. Out of CPU time. Out of storage costs.

The system that makes time stand still. The 4051 includes the off-line pre-processing power you've always wanted . . . whenever you want it. It offers cost-saving editing capacity. Terminal capability. The super-efficiency of Graphics.

You program locally in BASIC. Enhanced with many extras, and designed so you can get your teeth into Graphics instantly. Commands like MATRIX DRAW, WINDOW, VIEWPORT, ROTATE, and much more.

Ready to grow . . . with support for the novice to the programming pro. Plus time-saving applications software. Plus a full complement of 4051 peripherals standing by.

Just \$280./mo. Lease price.* Only Tektronix' advanced technology can save you so much time for such a small cost. Your local Sales Engineer can set up a demonstration right on your desk. Why waste time? Talk to him now, or write:

Tektronix, Inc.
Information Display Group
P.O. Box 500
Beaverton, Oregon 97077



TEKTRONIX®

CIRCLE 54 ON READER CARD



*U.S. Domestic price only

Case History: Kellwood Company maximizes uptime....

Problem:

Kellwood's computers, communications and security operations clogged by power interruptions.

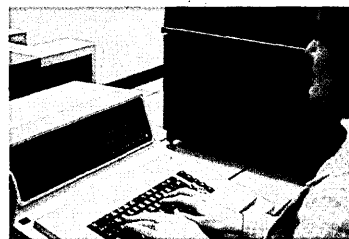
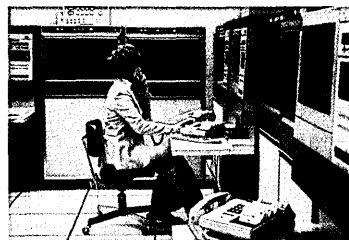
Action Taken:

A 75 KW redundant Uninterruptible Power Supply (UPS) built by International Power Machines was installed.



International Power Machines Corporation

3328 Executive Blvd.
P.O. Box 724
Mesquite, Texas 75149
214/288-7501
Telex: 73-0992



Result:

Kellwood Company of St. Louis has eliminated the costly power spikes or drops . . . now, their computer, security systems and communications systems are guaranteed their full operating potential. IN ONE YEAR THE UPS HAS PAID FOR ITSELF!

The integrity of Kellwood's IBM System/370, Model 158 computer is especially important because it controls so much of the company's business operations. Besides being linked to 30 terminals in plants throughout the US, it controls inventory, handles billing of over \$1 million per day and the payroll of 18,000 employees. Kellwood is a major manufacturer of apparel, recreation and home fashion merchandise.

"Our facility was plagued by power interruptions," says Dick Puhl of Kellwood, "I wanted a maintenance free UPS with the most up-to-date technology. IPM equipment has helped solve our power problems."

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by George Seeley
Supervisor of
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Fiber Glass Division
PPG Industries

"We had tried to develop our Order Entry System in Cobol, but user requirements changed so rapidly we were unable to provide quick response. MARK IV gave us overnight turnaround. We were able to meet schedule requirements that would have been impossible with Cobol or PL/1.

"In developing our product costing data base with MARK IV, we designed and programmed as we went along. In conjunction with IMS and DL/I — and MARK IV is a natural teammate with DL/I — we completed our work in a fraction of the time it would have taken with Cobol. And we didn't have to teach our people any new languages.

"Now we have a product-cost data base that gives us the complete picture from raw materials and labor to inventory and material requirements. And we're implementing another MARK IV module for work scheduling. When it's finished, we'll have a tailor-made system that meets our information needs from start to finish.

"Our system has been running for about a year. And with extreme reliability."

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DP Salary Survey

by Daniel P. Schlosky, Assistant Editor

The averages (for more than 84,000 employees across the nation, in 10 industry groups and in five different sizes of computer shops) are up from a year ago, but inflation is still biting away.

"It takes all the running you can do to keep in the same place." Lewis Carroll's *Alice in Wonderland* remark (*Through the Looking Glass* actually) was particularly apt when this decade's unique combination of fleet-footed inflation and persistent recession bewildered our nation's economists. Now several years deeper into the same situation, a good many of us are no longer in the same place but are rather rapidly falling behind.

However, some economic indicators, such as a significant rise in the gross national product in 1975's third quarter, seem to signal an upturn in the economy. If we are pulling out of the recession, and a steep inflation rate is still with us, how do our paychecks reflect real buying power at this time? And are data processing professionals keeping their heads above the current economic waters?

The dp professional feels the economic pinch no less than do others in the economic mainstream. In fact there is good reason to consider dp personnel no longer a breed apart, speaking in economic as well as other terms, as was thought to be the case not too long ago. Dp professionals are just as vulnerable to economic forces, perhaps even more so since most of them have neither unions to bargain for raises and benefits, nor associations or guilds to establish rates for services. Each employee is on his own as far as bargaining for improved compensation or for seeking better opportunities go.

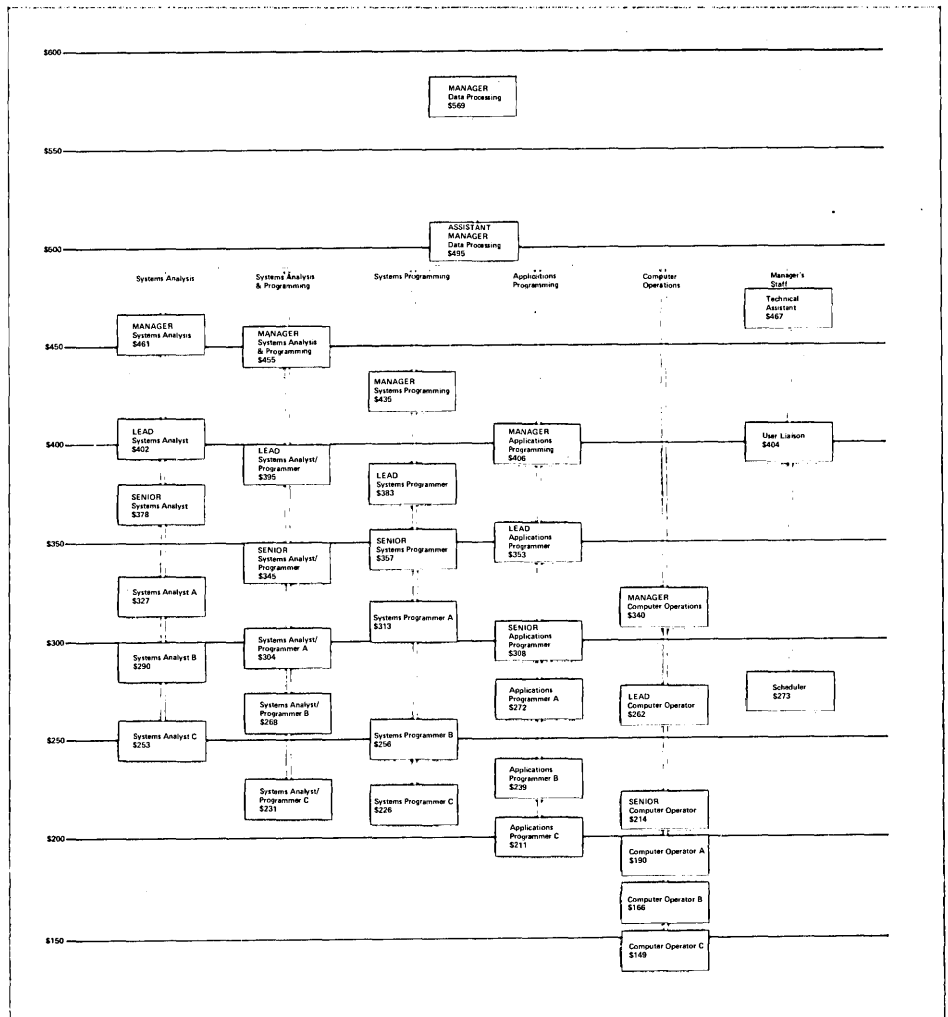
Options are available, especially at lower rungs of the occupation ladder. A dp professional can often switch to another company or another city, although doing this so often in the past has given him the onus of a gypsy. He can possibly switch to another, perhaps

better paying specialty, such as from applications programming to systems programming or systems analysis. Or he could remain where he is and concentrate on that promotion. The nationwide survey of dp salaries presented in this article will hopefully aid him in thinking about his alternatives.

Of immediate interest would be the "grape cluster" chart below which depicts the relative standings of 35 of the positions covered in this salary survey. This hierarchy is based on the midpoints of the salary ranges for the positions listed. In addition to the two top dp management positions and the

manager's staff, five job "families" are grouped for more visually direct comparison than the salary charts on the following pages. (To determine where your own position falls in this chart, be sure to read the job descriptions in this survey; the same job title does not necessarily mean the same work responsibilities.)

This chart may be of use to the dp professional contemplating a switch to another related field. A Senior Computer Operator for example may consider a switch to Applications Programmer "C"; an Applications Programmer "B" may think of crossing



The data used in this survey was supplied by A. S. Hansen, inc., publisher of the "Weber Salary Survey on Data Processing Positions in the United States." The survey includes an actual count of 84,067 employees in 79 dp positions in 1,062 companies. (Not all positions are reported in this article.) The 96 page annual report includes detailed information on positions in 67 cities and more detailed breakdowns of industry salary ranges by city. Further information on the report is available from A. S. Hansen, inc., at 117 Green Bay Road, Lake Bluff, Illinois 60044.

SALARY SURVEY

over to Systems Programmer "C" (or "B" if he can get the job). The chart also shows the job (and salary) goals within the job "family."

Managers and salary administrators in addition to employees may also find the information in the nationwide salary survey gathered here to be useful. While the employee can use it to compare his salary to that of others in this position and to think about possible career paths, managers and administrators will examine whether their firms are competitive as well as equitable in salary offerings.

The manager

The dp manager, of all dp professionals, is faring best in today's economic environment. His average annual salary this past June was \$29,588, compared to \$19,760 of June 1970. His increased compensation reflects an increased complexity in his job, since the typical dp installation, according to the study from which this article's data derives, has gotten bigger, more centralized, and more sophisticated.

The top dp manager's position has also increased in status, often carrying corporate officership and participation in bonus and stock option plans. In fact approximately 40% of top dp management are eligible for 15 to 20% bonuses.

Salaries for dp personnel in general, if year-end estimates of the Consumer Price Index prevail, may be experiencing a slow turnaround (see Table 1). This turnaround, however, would be due less to salary raises for most dp professionals than to a slowing rise in inflation. While continuing to lose ground to inflationary forces, most groups are losing less than they did a year ago, some are holding steady, and two (Systems Analysis and Applications Programming) seem to be reversing the trend and climbing back up. Managers in particular are doing the best of any dp group, continuing to gain in compensation in real terms, and seeming to keep well above the

reach of the inflationary bite.

Job skill levels

Before turning directly to the charts, the reader is cautioned to examine the job definitions to make certain that a "Systems Programmer B" or a "Lead Application Programmer" does what he thinks he does. Job titles at different firms may be the same, but the actual work responsibilities may vary considerably. It is a good idea to read the job descriptions carefully before proceeding to the data in the charts.

The data gathered here was collected from a rather large data base.¹ In addition to average salaries, we have included other information which in our estimation would be most immediately useful or important to the reader, such as the effects of installation size and geography on salaries.

The charts break down the job "families" by skill level, from manager to trainee. In addition, the *Nationwide Averages* chart presents five salaries for each position. "Low" is the numerical average for the lowest rates reported in the survey (barring some stray values that would abnormally distort the figures). The "First Quartile" (1st Q) is the cut off rate for the lowest 25% of salaries reported for the position; 75% of all workers in this position level make a higher salary than this figure. "Average" is the numerical average of all rates. "Third Quartile" (3rd Q) and "High" are the analogous counterparts of the first two lowest categories.

Effects of installation size

The five categories in the *Salaries by Installation Size* chart are based on monthly hardware rental. The categories are shown with some representative examples of model numbers of machines that normally rent in the range indicated:

1. to \$25,000 (e.g., IBM System/3s, NCR Century Series, HIS 2015)
2. to \$50,000 (e.g., CDC 3600, Burroughs B5500, DEC 1080)
3. to \$75,000 (e.g., IBM 370/155, HIS 68/60, CDC Cyber 174)
4. to \$150,000 (e.g., Burroughs B7700, IBM 370/168, Univac 1100/40)

5. over \$150,000 (e.g., IBM 370/195, CDC 7600 or Star)

At the managerial level, the size of the installation normally affects the size of the paycheck. The larger installation often means increased sophistication and variety of applications, as well as larger groups to manage; and the manager is compensated accordingly. For other professional groups, the size of the installation in general also affects the size of salaries, though less so at some lower levels.

Note that the figures in the chart are the first to third quartile range, which includes the middle 50% of the salaries, the thought being that this would be more meaningful than the entire range.

Effects of industry

In past surveys some broad distinctions were evident in how one industry (e.g. transportation, manufacturing, utilities) paid its dp personnel compared to another. Ten industry groups were normally ranked in the order of high paying to low paying. It is impossible to do so this year because no neat classifications can be drawn from the data. One dp category, such as applications programmers, may be paid very well in, say wholesale trade, while another may be compensated very poorly in that same industry group. What this situation may reveal is a process of leveling off of salary scales paid to dp workers across industry lines.

Effects of geography

Our cities vary widely in costs of living, desirability, and such considerations as tension and areas of outright danger. Pay scales, one might expect, would reflect such differences. In some cases they do; New York City for instance pays higher salaries in every job category than does Portland, a city singled out in a recent study as the most desirable large city to live in. But on the other hand Buffalo, where the cost of living according to recent Consumer Price Index figures exceeds the national average, has lower salaries in

JOB FAMILY	1970-71		1971-72		1972-73	
	Salary Increase	"Real" Salary Gain/Loss	Salary Increase	"Real" Salary Gain/Loss	Salary Increase	"Real" Salary Gain/Loss
Management	9.2%	+5.8%	6.5%	+3.1%	8.1%	-.7%
Systems Analysis	6.9%	+3.5%	4.8%	+1.4%	4.4%	-4.4%
Systems Analysis/Programming	2.9%	-.5%	6.4%	+3.0%	3.6%	-5.2%
Systems Programming	not surveyed		not surveyed		4.4%	-4.4%
Applications Programming	2.8%	-.6%	5.9%	+2.5%	5.2%	-3.6%
Computer Operations	3.9%	+ .5%	4.6%	+1.2%	6.0%	-2.9%
Data Entry	6.8%	+3.4%	5.7%	+2.3%	3.1%	-5.7%

Table 1. Increases in the consumer price index according to the Bureau of Labor Statistics were 3.4% in 1971 over 1970, 3.4% again in 72, 8.8% in 73, 12.2% in 74, and down to an estimated 6.8% in 1975. This makes for a compound total of 39.4% higher living expenses in 1975 compared to 1970. Changes in

"real" salaries (also compounded) of most dp personnel fall below this percentage, although the systems analyst is staying above—and the dp manager well above—this percentage. Of other groups, Applications Programming is narrowing the "real" loss gap that started in '73 and '74, while the others

every category than Seattle, where the index for the same period fell below the national average.

It would seem then that *Average Salaries by City* figures bear little correlation to the Consumer Price Index or to the Urban Family Budget Index for various cities as published by the Bureau of Labor Statistics. Anomalies abound. The Systems Analysis Manager and the Applications Programming Manager in Columbus make about \$40 per week more than their counterparts in Cleveland. Yet the Manager of Combined Systems Analysis and Applications Programming in Cleveland, as well as the Tab Supervisor and Data Control Supervisor, all take home an average of \$60 or more per week than do the same personnel in Columbus! A Data Control Supervisor in Indianapolis is among the lowest paid for the category while the Data Entry Supervisor in the same city is among the highest paid. And these three cities are all within a couple of hundred miles of each other.

Although the pattern—if there is one—is highly complex, the charts of average salary figures for 17 cities which are included can still be a useful tool for gauging ballpark figures. These charts can be supplemented by figures supplied by the Bureau of Labor Statistics for your area. The bureau follows some key dp positions for certain cities and this information is available on request.

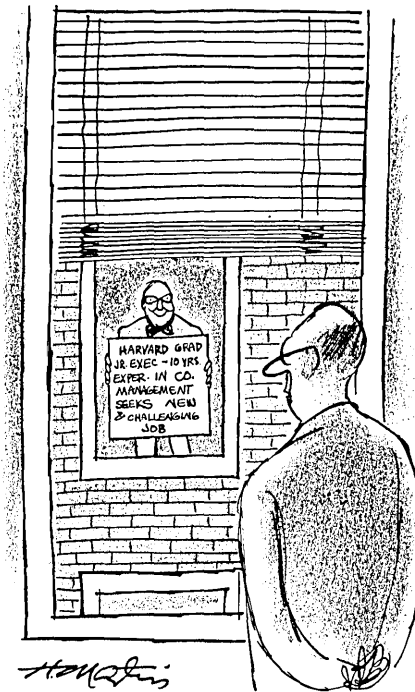
The job classifications

The job titles and descriptions listed here correspond to those on the questionnaire used for the survey. Large computer departments should be able to find a good fit for most of their employees. In smaller departments there may be employees handling several of the positions defined, and these employees should be classified on the basis of how they spend most of their time on the job. If this is not possible, then classifying them by the highest position that represents a significant portion of their job time should suffice.

Data Control and Data Entry are positions newly listed or renamed this year. The first category is described

below. Data Entry incorporates key-punch, key-to-disc, key-to-tape, and crt devices. Most firms still use only keypunch as their sole data entry device, but a majority of those firms where more than one device type is used employ operators interchangeably on them. A few firms report a premium paid to key-to-disc operators of between 10 to 15% over keypunch operator salaries, but at most firms there is no differentiation in pay scales between operators on one type device compared to those on another.

There are as yet no entries for Data Base Administrator, Chief Programmer, or Software Coordinator, and



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some judgment is necessary for fixing these positions on the chart. The positions descriptions listed may not be totally comprehensive, but the 1,062 companies participating in the survey were able to work with them.

Types of shops

Two types of shops are represented. The first, and by far most common, has the managers of systems programming, applications programming, etc. reporting to the dp manager. In the

second, accounting for about 20% of the installations, the managers of systems analysis and applications programming report to someone other than the dp manager.

One interesting change is apparent from this year's charts as compared to last year's. The systems analyst at a user site is compensated less than the applications programmer, while the opposite remains true at the central site. One speculation for this situation would be that at the user site, the work is less varied for the systems analyst than at the central site. Another speculation could be simply that users don't yet know how to evaluate systems people.

Final word

The economic situation at this writing is still far from bullish. Caution is recommended in using the salary data presented here. Jobs are not all that easy to obtain.

THE JOB DESCRIPTIONS

DP Manager & his staff

Manager of Data Processing

Plans, organizes, and controls the overall activities of the data processing department, including systems analysis, programming, and computer operation. Consults with, advises, and coordinates between his groups and other departments. Reports to corporate management on data processing plans, projects, performance, and related matters.

Assistant Manager of Data Processing

Assists the manager in planning, organizing, and controlling the sections of the department. Usually has line responsibility but in certain instances may have only staff responsibility. Participates in research and procedural studies. Develops analyses of existing and newly developed equipment and techniques. Consults with and advises other departments with regard to feasibility studies, systems and procedures, and records control.

Technical Assistant to the Manager

Provides technical assistance for planning and directing the installation, modification, and operation of dp systems. Analyzes proposed and existing dp applications in terms of machine capabilities, costs, and man and machine hours. Usually has only departmental staff responsibility. Plans and recommends machine modifications or additional equipment. Directs the

1973-74		1974-75		1970-75	1970-75
Salary Increase	"Real" Salary Gain/Loss	Salary Increase	"Real" Salary Gain/Loss	Compound Change	Compound Gain/Loss
10.2%	-2.0%	10.3%	+3.5%	+52.8%	+13.4%
8.7%	-3.5%	11.3%	+4.5%	+41.5%	+2.1%
8.8%	-3.4%	7.2%	+ .4%	+32.3%	-7.1%
10.8%	-1.4%	3.8%	-3.0%		
4.8%	-7.4%	11.0%	+4.2%	+33.2%	-6.2%
7.2%	-5.0%	6.3%	- .5%	+31.3%	-8.1%
6.5%	-5.7%	7.6%	+ .8%	+33.4%	-6.0%

are either maintaining a steady state or slipping slightly compared to last year. The numbers in general look somewhat better than they did last year; this is due more to a slowing inflation rate than to bigger raises for most dp personnel.

SALARY SURVEY

compilation of records and reports concerning production, machine malfunctions, and maintenance.

User Liaison (Coordinator of Data Processing)

Coordinates activities of the dp operation with the company's other departments. Usually has only departmental staff responsibility. Assists in establishing systems analysis, programming, and computer operations priorities. Recommends standard policies and procedures.

Work Process Scheduler

Schedules operating time of the overall dp activities. Responsible for keeping idle time to a minimum. Schedules preventive maintenance.



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Systems Analysis

Manager of Systems Analysis

Responsible for feasibility studies for new applications, and for systems design. Assigns and directs personnel. Consults with and advises other departments on systems and procedures. Reports to the Manager of Data Processing.

Lead Systems Analyst

Assists in planning, organizing, and controlling the activities of the section. Assists in scheduling the work of the section and assigning personnel to projects. May act as systems projects manager. May coordinate the activities of the section with other sections and departments.

Senior Systems Analyst

Confers with officials, scientists, and engineers to define business or scientific/engineering dp problems.

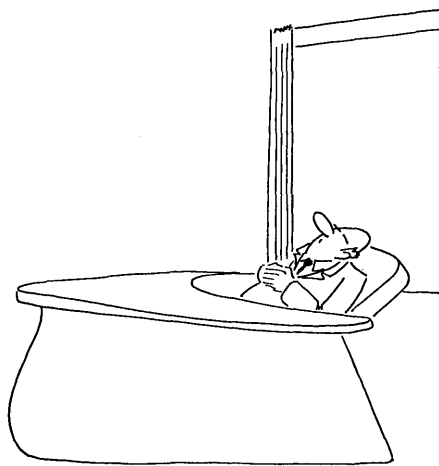
Formulates statements of those problems and devises dp solutions. Prepares block diagrams illustrating the solutions and may assist in or supervise the preparation of flowcharts from those diagrams.

Systems Analyst A

Defines the applications problem, determines system specifications, recommends equipment changes, and designs dp procedures. Devises data verification methods. Prepares block diagrams and record layouts from which programming prepares flowcharts. May assist in or supervise the preparation of flowcharts.

Systems Analyst B

Assists in devising computer system specifications and record layouts. Prepares systems flowcharts to describe



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existing and proposed operations. Prepares comprehensive block diagrams in accordance with instructions from higher classifications. May assist in the preparation of flowcharts. Analyzes existing office procedures as assigned.

Systems Analyst C

Carries out analyses of a less complex nature. Prepares functional process charts to describe existing and proposed operations. Designs detailed record and form layouts. Details block diagrams to reflect specific computer procedures. May assist in the preparation of flowcharts.

Systems Analysis & Programming

Manager of Systems Analysis and Programming

Responsible for feasibility studies, systems design and programming. Assigns personnel to projects and directs their

activities. Coordinates section activities with other sections and departments. Reports to Data Processing Manager or to Corporate Management.

Lead Systems Analyst/Programmer

Assists in planning, organizing and controlling the activities of the section. Assists in scheduling and assigning personnel. May act as systems/programming project manager. May coordinate the activities of the section with other sections and departments.

Senior Systems Analyst/Programmer

Confers with managers, scientists, and engineers to define business or scientific/engineering dp problems. Formulates statements of those problems and devises dp solutions. Prepares block diagrams illustrating the solutions and may assist in or supervise the preparation of flowcharts from those diagrams. Analyzes existing system and program logic and makes revisions.

Systems Analyst/Programmer A

Confers with dp personnel to determine the problem and type of data to be processed. Defines the applications problem, determines system specifications, recommends equipment changes, designs dp procedures and block diagrams. May prepare flowcharts and codes. Devises data verification methods and standard systems procedures.

Systems Analyst/Programmer B

Assists in devising system and program specifications and record layouts. Prepares flowcharts and logic diagrams for existing and proposed operations. Codes. Prepares comprehensive block diagrams in accordance with instructions from higher classifications. May assist in the preparation of flowcharts. Analyzes existing office procedures as assigned.

Systems Analyst/Programmer C Trainee

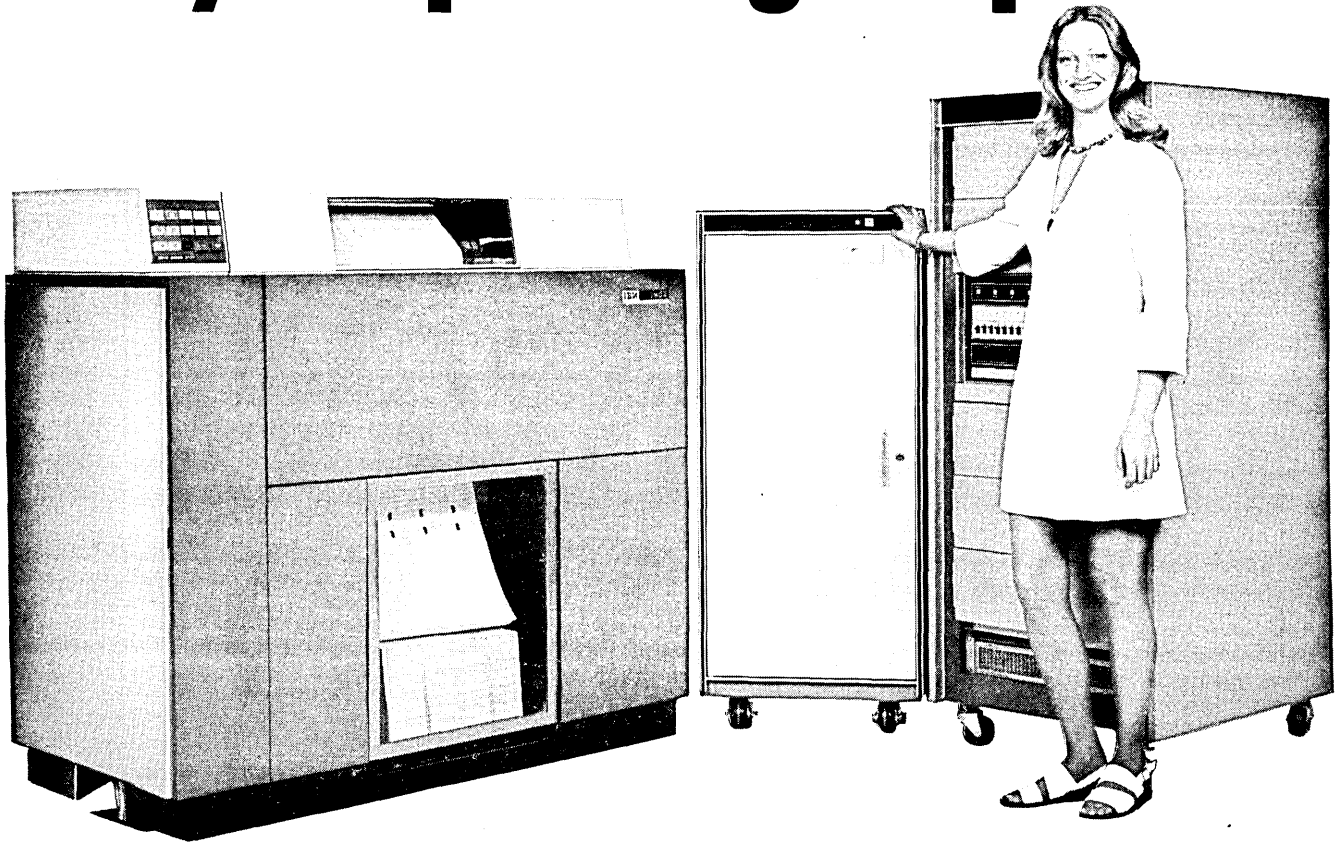
Carries out analyses and programming of a less complex nature as assigned and instructed. Usually works only on one activity under very close direction with the work being closely checked. Prepares functional process charts to describe existing and proposed operations. Designs detailed record and form layouts. Details block diagrams to reflect specific procedures. May assist in the preparation of flowcharts.

Systems Programming

Manager of Systems Programming

Plans and directs all activities of the Systems Programming Section. Pro-

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SALARY SURVEY

SURVEY OF WEEKLY DATA

Job Title	Nationwide Averages						Salaries by Installation Size Determined by Monthly Hardware Rental					
	Conventional Organization Reporting Through DP Manager	Number In Survey	Low	1st Q.	Avg.	3rd Q.	High	to \$25,000	to \$50,000	to \$75,000	to \$150,000	over \$150,000
Department Management (with all functions reporting)												
Manager	929	253	463	569	662	1,135	370-679	380-651	463-645	449-699	384-764	
Assistant Manager	231	220	403	495	576	988	322-591	331-566	403-561	390-608	334-665	
Technical Assistant (Planning)	230	207	380	467	543	931	303-557	311-534	379-529	368-573	314-626	
User Liaison	232	179	329	404	470	806	263-482	270-462	328-458	319-496	272-542	
Scheduler	87	121	222	273	318	545	177-326	182-312	222-309	215-335	184-367	
DP "Operations" Management (without Systems Analysis, Systems Programming, or Applications Programming)												
Manager	435	207	357	424	484	832	279-459	294-506	346-542	336-522	380-596	
Assistant Manager	169	170	293	348	397	682	229-376	241-415	284-444	275-428	311-489	
Technical Assistant (Planning)	111	157	272	323	368	632	212-348	223-384	263-411	255-396	289-453	
User Liaison	215	138	239	284	324	557	187-307	197-339	232-363	225-350	254-399	
Scheduler	364	114	196	233	266	457	153-252	161-278	190-298	184-287	209-328	
Systems Analysis												
Manager	347	249	400	461	514	756	316-492	374-505	375-550	378-552	413-567	
Lead Analyst	766	216	348	402	448	658	275-428	325-440	326-478	328-481	359-494	
Senior Analyst	1,711	204	328	378	422	620	259-403	306-414	307-451	310-453	338-465	
Analyst A	1,889	176	284	327	365	536	224-349	265-359	266-390	268-392	293-403	
Analyst B	1,239	156	252	290	324	476	199-309	235-318	236-346	238-348	260-357	
Analyst C	184	136	220	253	283	415	173-270	205-278	206-302	207-303	227-312	
Combined Systems Analysis & Applications Programming												
Manager	876	225	397	455	506	814	289-493	291-501	349-561	381-514	359-581	
Lead Analyst/Programmer	1,636	195	345	395	440	709	251-429	253-436	303-487	331-446	312-505	
Senior Analyst/Programmer	2,863	171	302	345	384	619	219-375	221-381	265-426	289-390	273-441	
Analyst/Programmer A	4,090	150	266	304	338	546	193-330	195-336	233-375	255-344	240-389	
Analyst/Programmer B	2,904	132	234	268	298	480	170-291	171-295	206-330	224-303	211-342	
Analyst/Programmer C	1,322	114	202	231	257	415	147-251	148-255	177-285	194-261	183-296	
Systems Programming												
Manager	341	258	384	435	480	740	249-503	326-469	379-509	352-494	356-558	
Lead Programmer	370	227	338	383	423	651	219-442	287-413	333-448	309-435	314-491	
Senior Programmer	838	211	315	357	394	606	204-412	267-385	310-418	288-405	292-457	
Programmer A	927	185	276	313	346	532	179-361	235-338	272-367	253-356	257-402	
Programmer B	739	152	226	256	283	436	146-296	192-277	223-300	207-291	210-329	
Programmer C	473	134	199	226	249	384	129-261	169-244	196-264	183-257	185-290	
Applications Programming												
Manager	310	218	356	406	445	746	295-432	322-442	314-457	331-441	340-512	
Lead Programmer	649	190	310	353	387	648	256-376	281-385	273-397	288-383	295-446	
Senior Programmer	2,029	166	271	308	338	566	224-328	245-336	238-347	252-335	258-389	
Programmer A	2,993	146	239	272	298	499	197-289	216-296	210-306	222-295	227-343	
Programmer B	2,405	128	210	239	262	439	174-254	190-260	185-269	195-259	200-302	
Programmer C	1,536	113	185	211	231	387	153-224	167-229	163-237	172-229	176-266	
Computer Operations												
Manager	1,001	177	294	340	377	641	247-360	265-366	261-397	267-380	263-436	
Lead Computer Operator	1,953	136	226	262	290	493	190-277	204-281	200-305	206-292	202-335	
Senior Computer Operator	3,322	111	185	214	237	404	155-226	167-230	164-250	168-239	165-274	
Computer Operator A	4,408	99	164	190	211	358	138-201	148-204	146-222	150-212	147-244	
Computer Operator B	2,969	86	144	166	185	314	121-176	130-179	127-194	130-186	129-213	
Computer Operator C	1,570	77	129	149	166	281	109-158	116-160	114-174	117-167	115-191	
Tape Librarian	1,030	92	136	160	182	311	97-185	123-193	115-215	129-201	104-207	
Tab Operations												
Supervisor	117	154	217	251	281	444	180-288	192-290	201-280	192-279	219-303	
Lead Tab Operator	171	128	180	208	233	368	149-239	160-240	167-233	159-231	182-251	
Tab Operator A	543	106	149	173	194	306	124-199	133-200	139-193	133-192	151-209	
Tab Operator B	347	93	132	153	171	271	109-175	117-176	122-171	117-170	133-185	
Tab Operator C	202	83	117	135	151	239	97-155	103-156	108-151	104-150	118-163	
Data Control												
Supervisor	345	143	205	250	282	458	172-335	183-279	199-333	181-285	198-336	
Data Control Group Leader	358	111	160	195	220	357	134-262	143-218	155-260	141-223	154-262	
Data Control Clerk A	1,102	98	142	172	194	316	119-231	126-192	137-230	124-197	136-231	
Data Control Clerk B	924	87	125	152	171	279	105-204	112-170	121-203	110-174	120-205	
Data Control Clerk C	297	77	111	135	152	247	92-181	99-150	107-180	97-154	106-181	
Data Entry												
Supervisor	961	120	172	201	223	390	155-220	163-219	155-231	161-233	152-254	
Lead Data Entry Operator	1,309	106	152	177	196	344	137-193	143-193	136-203	141-205	134-224	
Data Entry Operator A	7,131	94	134	157	174	304	121-171	127-171	121-180	125-181	119-198	
Data Entry Operator B	7,070	84	120	141	156	273	108-154	114-153	108-162	112-163	106-178	
Data Entry Operator C	2,044	74	107	124	138	242	96-136	101-135	96-143	99-144	94-157	
Trainee	677	71	101	118	131	230	91-130	96-129	91-136	94-137	89-150	
Organization Reporting Through Separate Managers												
Systems Analysis												
Manager	135	188	352	411	460	686	305-514	301-548	348-524	394-536	238-566	
Lead Analyst	311	164	306	357	400	597	265-447	262-477	302-456	342-466	207-492	
Senior Analyst	755	143	267	312	349	521	231-391	228-417	264-399	299-407	181-430	
Analyst A	731	126	235	275	308	459	204-344	201-367	233-351	263-358	160-379	
Analyst B	286	111	207	242	271	404	179-303	179-323	205-309	232-316	140-333	
Analyst C	63	97	182	213	239	356	158-267	156-285	181-272	205-278	124-294	
Applications Programming												
Manager	83	208	374	426	475	651	276-503	354-464	340-515	316-530	283-509	
Lead Programmer	122	171	306	350	390	534	226-412	291-380	279-422	259-434	232-418	
Senior Programmer	749	150	269	307	342	469	198-362	255-334	245-371	227-381	204-366	
Programmer A	989	123	220	251	280	384	162-296	209-273	200-304	186-312	167-300	
Programmer B	613	108	194	221	247	338	143-261	184-241	177-268	164-275	147-264	
Programmer C	398	95	171	196	218	299	126-231	163-213	156-237	145-243	130-234	

PROCESSING SALARIES

Average Salaries by City

Atlanta	Balti- more	Boston	Chicago Area	Cleve- land	Colum- bus	Houston	L.A. Area	Miami Area	Mil- waukee	Minneap. Area	New York	Phila- delphia	San Fran. Area	Seattle	Tampa Area	Tulsa
529	528	673	608	552	531	565	677	664	469	459	695	646	615	664	475	626
460	460	585	529	480	462	492	589	578	408	399	605	562	535	577	413	545
434	433	552	499	452	435	464	555	544	385	376	570	530	504	544	390	514
376	375	477	431	392	377	401	481	471	333	326	494	458	437	471	337	444
254	253	322	292	265	254	271	325	318	225	220	333	310	295	318	228	300
428	429	433	452	434	425	404	490	419	367	439	488	434	430	442	446	514
351	352	355	370	356	349	331	402	343	301	360	400	356	353	362	365	422
325	326	329	343	330	323	306	372	318	278	333	371	330	327	335	338	391
286	287	290	303	291	285	270	328	280	245	293	327	291	288	295	298	344
235	236	238	248	238	233	222	269	230	201	241	268	238	236	242	245	282
431	378	437	478	388	425	394	497	429	379	405	542	385	461	509	386	442
375	329	380	416	337	370	342	433	373	330	352	471	335	400	443	336	385
353	310	358	392	318	348	323	408	351	311	332	444	316	378	417	317	363
306	268	310	339	275	301	279	353	304	269	288	385	273	327	361	274	314
271	238	275	301	244	267	248	313	270	238	255	341	242	290	321	243	278
236	207	240	263	213	233	216	273	235	208	222	298	211	253	280	212	243
439	453	440	452	443	380	407	423	437	461	418	529	430	471	505	427	464
382	394	383	393	385	331	354	368	381	401	364	460	374	410	439	371	404
333	344	335	343	336	289	310	322	332	350	317	402	327	358	384	324	353
294	304	295	303	296	255	273	283	293	308	280	354	288	315	338	286	311
259	267	259	266	261	224	240	249	258	271	246	312	253	278	297	251	274
224	231	224	230	225	194	208	215	223	235	213	269	219	240	257	217	236
420	422	401	442	435	414	456	483	439	426	409	510	461	472	472	393	472
370	371	353	389	382	364	401	424	386	375	360	449	406	416	415	346	415
344	346	329	362	356	339	373	396	359	349	335	418	378	387	387	322	387
303	304	289	313	298	298	328	347	316	306	294	367	332	340	340	283	340
248	249	236	260	256	244	268	285	258	251	241	301	272	278	278	232	278
218	219	208	230	225	215	236	251	228	221	212	265	240	245	245	204	245
400	360	354	424	363	401	408	473	359	354	375	436	369	443	456	381	381
348	313	308	368	315	349	355	411	312	308	326	379	321	385	397	331	332
304	273	269	322	275	305	310	359	273	269	285	332	281	337	347	289	290
268	241	237	283	242	268	273	316	240	237	251	292	247	296	306	255	255
236	212	208	250	214	236	240	278	211	209	221	257	217	261	269	224	225
208	187	184	220	188	208	212	245	187	184	194	226	192	230	237	198	198
310	311	353	358	331	339	317	367	325	327	318	386	316	382	395	318	359
239	239	271	276	255	261	244	282	251	252	245	297	243	294	304	244	277
195	196	222	226	208	214	199	231	205	206	200	243	199	240	248	200	226
173	174	197	200	185	190	177	205	182	183	178	216	176	213	221	178	201
152	152	172	175	162	166	155	179	159	160	155	189	155	187	193	155	175
136	136	155	157	145	149	139	161	143	144	139	170	138	168	173	139	158
162	161	170	172	130	127	138	180	178	161	140	169	153	176	158		155
	219	234	282	246	182	271	245	253	218	232	271	246	296			222
	182	194	234	204	151	225	203	210	180	192	225	204	245			185
	151	161	195	169	125	187	169	175	150	160	187	170	204			153
	133	142	172	150	111	165	149	154	133	141	165	150	180			135
	118	126	152	132	98	146	132	136	117	125	146	133	159			120
239	229		263	274	217	267	259	234	236	219	279	233	270	230	243	216
186	178		205	214	169	208	202	183	184	171	218	181	210	179	189	169
165	158		182	189	150	184	179	161	162	151	192	160	186	159	167	149
146	139		160	167	132	162	158	143	144	133	170	142	164	140	148	132
129	123		142	148	117	143	139	126	127	118	150	125	146	124	131	117
217	182	204	221	207	185	198	222	209	187	186	221	192	224	227	192	231
191	160	179	195	182	162	174	194	183	165	163	195	169	197	199	169	204
169	142	159	172	162	144	154	172	163	146	144	172	150	174	177	150	180
152	127	143	155	145	129	139	155	146	131	130	155	134	156	159	134	162
134	112	126	137	128	114	123	137	129	116	115	137	119	138	140	119	143
128	107	120	130	122	109	117	130	123	110	109	130	113	132	134	113	136
		409	418	416	399	430	451	379	460	425	455	446	438		429	425
		356	363	362	347	374	392	330	400	370	396	388	381		373	370
		311	318	316	303	327	343	288	349	323	346	339	333		326	323
		274	280	279	267	288	302	254	308	284	305	299	293		287	284
		241	246	245	235	253	266	223	271	250	268	263	258		253	250
		212	217	216	207	223	234	196	239	221	236	232	228		223	221
374			415	449	396	442	496	402	396	423	459	364	466		378	461
306			340	368	324	362	406	329	324	346	377	298	382		310	378
269			299	323	285	318	357	289	285	304	331	262	336		272	331
220			245	264	233	261	292	237	233	249	271	214	275		223	272
194			216	233	205	230	258	209	206	219	239	189	242		196	239
171			191	206	182	203	228	184	181	194	211	167	214		173	211

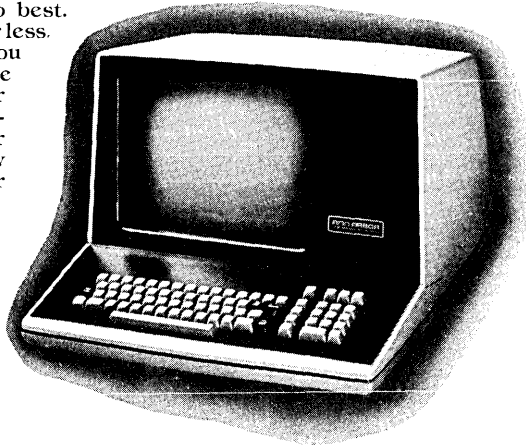
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SALARY SURVEY

jects software and hardware requirements in conjunction with other managers within the department and with corporate management. Develops standards for all systems software and works to design and implement systems required. Directs the interfacing of systems software with the hardware configuration and the applications systems. Provides technical guidance relating to the operating system to all members of the dp staff. Reports to either the Manager of Data Processing or to the Manager of Systems Analysis or to the Manager of Programming.

Lead Systems Programmer

Assists in scheduling systems programming projects and in assigning personnel to those projects. May act as a project manager for major systems applications and as the manager of the department in his absence. Usually assumes the responsibility for coordinating the activities of systems programming with the other dp sections.

Senior Systems Programmer

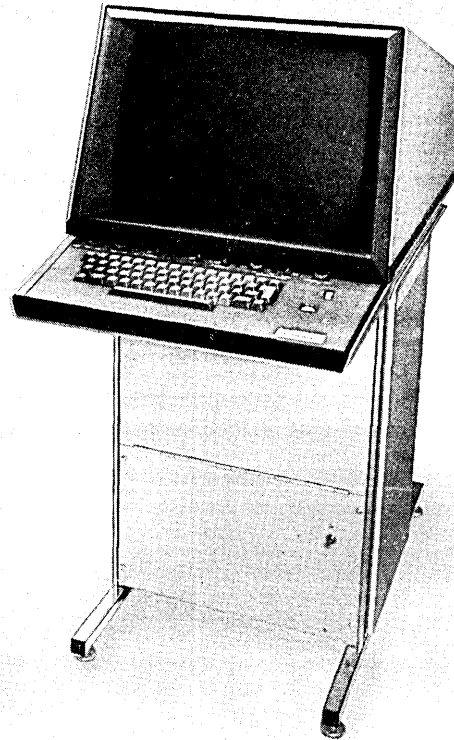
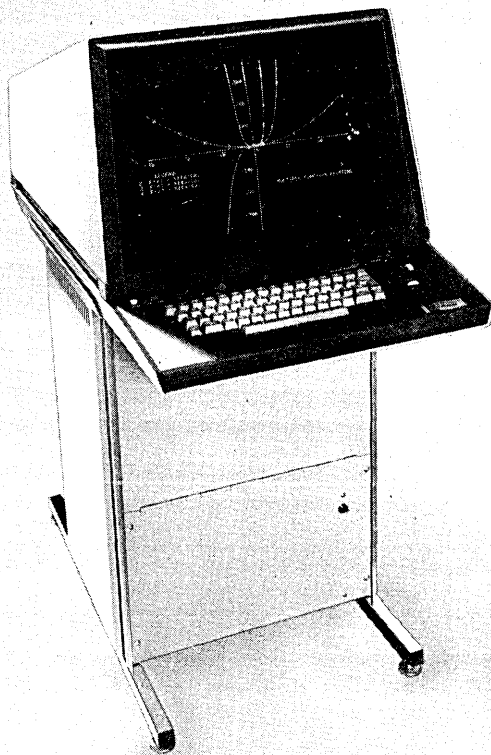
Develops specifications for extremely complex systems programming applications. May define the logic, perform the coding, testing, and debugging or may provide technical direction to lower classifications performing these operations. Usually is responsible for applications dealing with the overall operating system or with complex subsystems such as sophisticated file management routines, large telecommunications networks, or advanced mathematical/scientific software packages.

Systems Programmer A

Works from specifications to develop or modify programs to improve the efficiency of the operating system. Develops logic, codes, tests and debugs software defined by higher level categories. Modifies, tests and debugs vendor-supplied utilities, application packages and engineering releases. Assists in developing and modifying relatively complex software, such as routines supporting multiprogramming, telecommunications and file management.

Systems Programmer B

Assists in defining and programming moderately complex software such as utilities, job control language, macros and subroutines. May assist the coding of benchmarks, job accounting and control modules developed internally by the firm. May assist with relatively complex software such as compilers, link editors, and assemblers.



Now you see it, Now you don't.

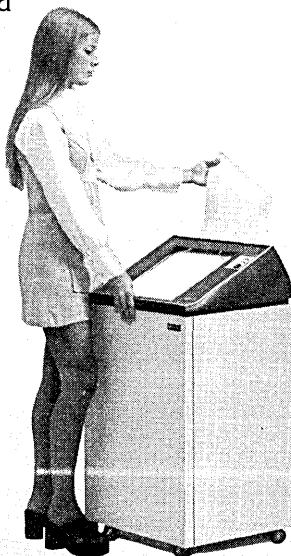
A CRT image is like puppy love. Nice while it lasts, but over before you can enjoy it.

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**Applications
Programming**

Systems Programmer C

Assists in coding and maintaining utilities, job control language, and I/O programs, as well as other systems software of moderate complexity. May assist in maintaining the program libraries and technical manuals and in installing new vendor-supplied engineering releases. Assignments are generally under the technical direction of a higher level systems programmer. Usually possesses some background in applications programming and has a working knowledge of at least one assembler language.

Manager of Applications Programming

Plans, organizes, and controls the preparation of application programs. Assigns, outlines and coordinates the work of the programming staff. Establishes standards for block diagramming, flowcharting, and coding. May write and debug complex programs. Collaborates with systems analysts and other technical personnel in scheduling equipment analyses, feasibility studies, and applications systems planning. Reports to the Manager of Data Processing.

JOB FAMILIES

The jobs have been grouped into a number of "families." The families range from "Manager" or "Supervisor" to "Trainee." There are two important things to know about the families. First, the levels in each category were *derived*, not arbitrarily set. A histogram was constructed for all people in "programming" by plotting "number of

people" vs. "salary." If there were five "bumps" or clusters in the histogram, five levels of programmer were defined. These levels were worked back onto the questionnaire. Over a period of years, the listed classifications have evolved.

Second, the classifications have these general qualifying characteristics:

Manager (or Supervisor)	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	Usually considered the assistant manager, or supervisor in families where an "assistant manager" title does not appear. Instead may be a line supervisor with full technical knowledge but added duties of assigning, instructing, and checking other section members.
Senior	Usually competent to work at the highest technical level of all phases of the activity. Works on his own most of the time. May give some direction to lower classifications.
A	Works under general supervision. Usually can work on his own in most phases of the activity. Requires only some general direction for the other phases.
B	Works under direct supervision. Usually fairly competent to work on several phases of the activities with only general directions, but needs some instruction and guidance for the other phases.
C	Works under immediate supervision, generally on only one activity. The work is carefully checked.
Trainee	Usually a probationary employee who has no previous experience.

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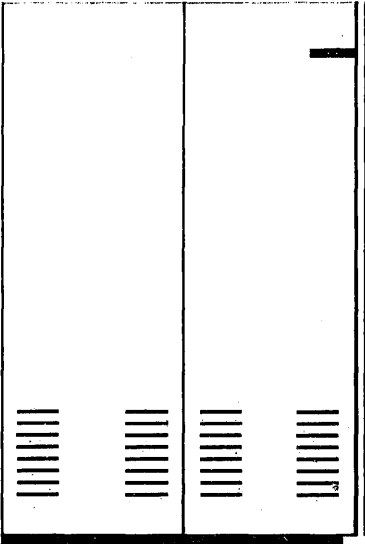
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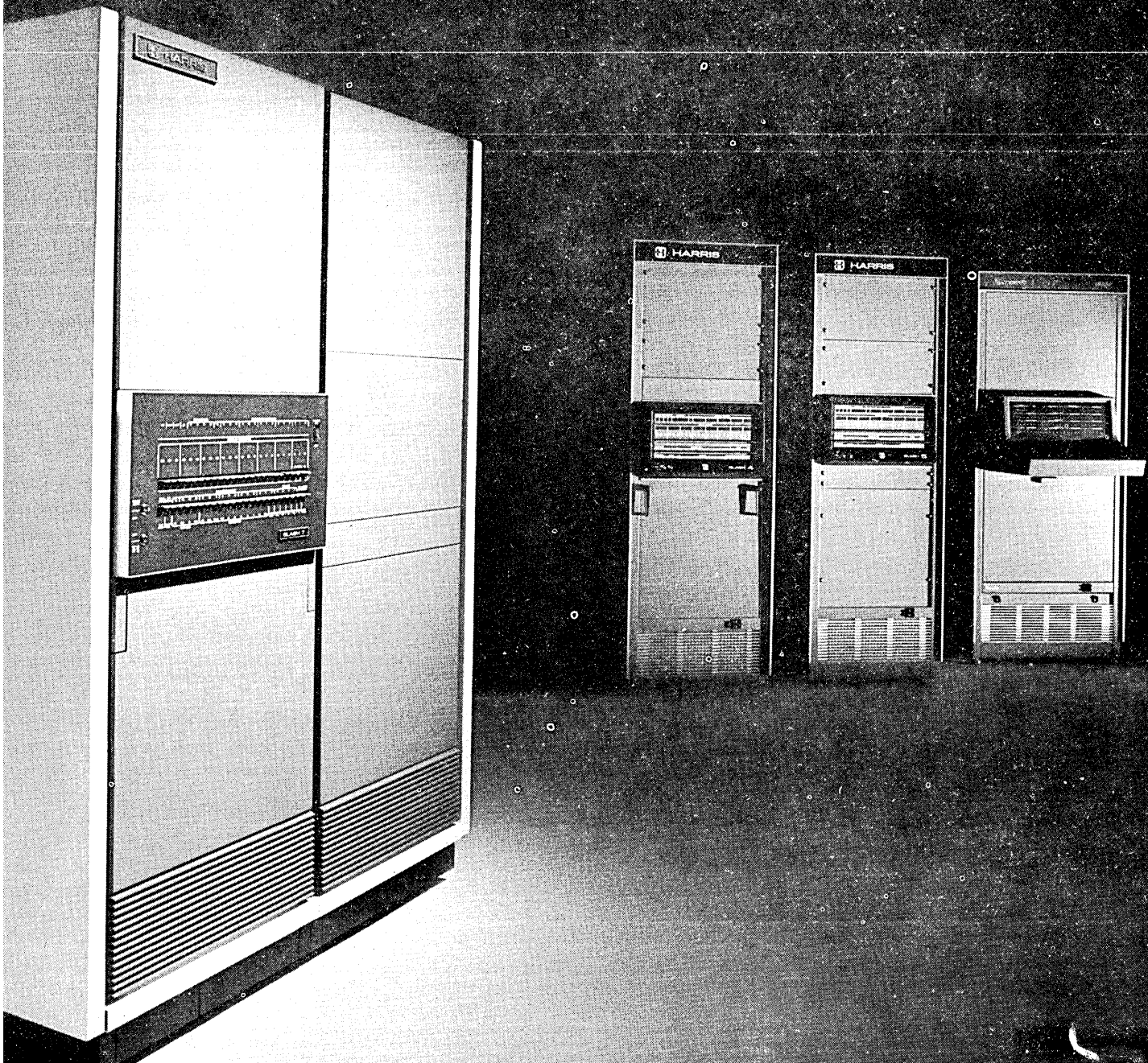
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The Harris SLASH 7's super specs and capabilities are impressive. For example: multiprocessor capabilities, multiported core and bipolar memories, I/O

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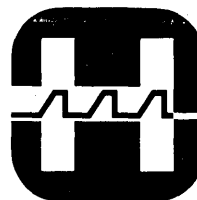
CPU cycle time: 425 ns (minimum)
Maximum DMA rate per second: 15MB
Integer add (register to memory): 0.95 microseconds,
multiply: 2.22 microseconds,
divide: 6.37 microseconds

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**COMMUNICATIONS AND
INFORMATION HANDLING**

CIRCLE 42 ON READER CARD

ECSSL, EAI's new hybrid computer program generation system, is now in routine use on Redstone Arsenal's CDC 6600 digital computer. ECSSL's FORTRAN-based compiler automatically prepares analog and digital programs, plus routines for analog computer set-up, check-out, and control. Six analog/hybrid computer consoles at Redstone's Advanced Simulation Center are linked by an EAI Trunking Station and "MOR" Multiple Or Switch for analog computer control of three simulation cells from any of several digital computers.

An experimental network will link hybrid computer laboratories at Defense Communications Agency (Reston, Va.), Purdue University (Lafayette, Ind.) and Martin Marietta Aerospace. The network's special interactive terminal was demonstrated by DCA in association with Martin at a seminar on Advanced Hybrid Computers, using a 'phone connection to Martin's highly sophisticated, EAI-equipped hybrid computation center in Orlando, Florida.

Features of a Real Time Operating System for hybrid computers was one of several topics discussed at a recent EAI User's Group Meeting in Cedar Rapids, Iowa. Major advantages reported by users at General Electric's PACER™ 600-equipped Industrial Simulation Center include background operations during foreground free-time, ability to share or switch peripheral assignments, a comprehensible job control language, and real time clock for program execution at specified intervals. RTOS as used with PACER 600, along with man and hardware-in-the-loop simulations, was demonstrated to meeting attendees during a tour of host Collins Radio's hybrid facility.

High speed data acquisition is the primary task for an EAI PACER 600 Hybrid Computer at the Naval Aerospace Detachment in New Orleans, Louisiana. Advantages include not only the hybrid's ability for data conversion at up to 100,000 points per second, but also use of the analog computer to preprocess and condition incoming data on-the-fly. Meanwhile, the digital portion of the system calibrates the instrumentation, validates the data, and documents results for each experiment. PACER-acquired data is used to study physiological effects of crashes simulated by a high speed sled imparting up to 200 G's on instrumented test subjects.

User-interactive demonstrations of hybrid computation are now being conducted world-wide, using EAI's "RAH" Remote Access Hybrid terminal. Communications with the EAI PACER 600 laboratory in West Long Branch, N.J. are via conventional voice-grade 'phone circuits. Simulations currently available via RAH include rotor bearing dynamics, six DOF flight, homing missile-target interception, aircraft jet engine control, fractional distillation, nuclear power plant operations, compressor surge control and mining shovel control dynamics. EAI field offices can provide detailed information on these and other "in-your-office" demonstrations.

For further information on developments of interest in hybrid computation and simulation, contact . . .



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The Hybrid Computer People

SALARY SURVEY

Lead Applications Programmer
Assists in scheduling programming projects. Coordinates the activities of the programming section with other sections of the computer department. May act as programming project manager.

Senior Applications Programmer
Analyzes problems outlined by systems analysts in terms of detailed equipment requirements. Designs detailed flowcharts. Verifies program logic by preparing test data for trial runs. Tests and debugs programs. Prepares run sheets for routine programs. May do coding from flowcharts. May assist in determining the causes of computer or program malfunctions. May confer with technical personnel in systems analysis and application planning.

Applications Programmer A
Conducts detailed analyses of defined systems specifications and develops all levels of block diagrams and flowcharts. Codes, prepares test data, tests and debugs programs; revises and refines programs and documents all procedures used in finished programs. Evaluates and modifies existing programs to take into account changes in system requirements or equipment configurations.

Applications Programmer B
Assists in coding and in analyzing previously defined system specifications. Assists in—and in some cases carries out on his own—the preparation of all levels of block diagrams and flowcharts. Codes; assists in preparing test data and in testing and debugging programs. Assists in the documentation of all procedures used in the system.

Applications Programmer C Trainee
Assists in the analysis of system specifications and coding. Performs all work under close supervision.

Operations

Manager of Computer Operations
Plans, organizes and controls the Computer Operations Section. Establishes detailed schedules for the use of equipment. Assigns personnel and instructs them where necessary. Reviews equipment logs and reports to the Manager of Data Processing on operating efficiency.

Lead Computer Operator
Assists in scheduling the operations and in assigning personnel. Coordinates activities of the section with

other sections in the data processing department. May act as shift supervisor.

Senior Computer Operator

Usually operates the central console. May give some direction to lower level classifications. Studies run sheets. Re-runs job steps to recover from machine error or program error, consulting with technical staff where necessary. Maintains machine performance and production records.

Computer Operator A

Assists in running the machines and maintaining records. May assist in error recovery.

Computer Operator B

Assists in operating the computer and peripherals. May keep records regarding output units and use of supplies.

Computer Operator C

Carries out minor duties in accordance with detailed instructions. Usually works on only one activity under very close direction with the work being carefully checked.

Tape Librarian

Maintains library of magnetic and paper tape. Classifies, catalogs and stores reels. Maintains charge-out records. Inspects tape for wear or damage.

Data Control

Data Control Supervisor

Plans, schedules, supervises, and directs preparation of records for data entry and distribution of reports. Maintains files and records, and supervises personnel. Reports to Operations Manager.

Data Control Group Leader

Assists in supervising group activities, in maintaining and revising lists, control records, and source data for recurring records and reports.

Data Control Clerk A

Maintains various control records and source data for recurring reports. May code source data and lists according to prescribed code designations. Performs related clerical and typing duties.

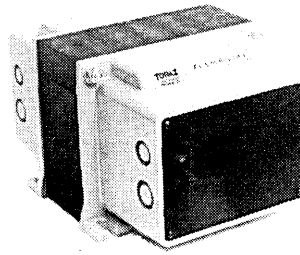
Data Control Clerk B

Processes various lists and source data for recurring records and reports. Prepares and types lists. Performs related clerical and typing duties.

Data Control Clerk C

Usually works on one data control activity. May assist higher level clerks on other activities. *

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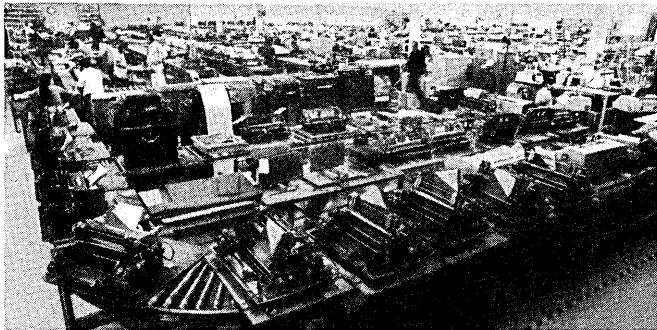
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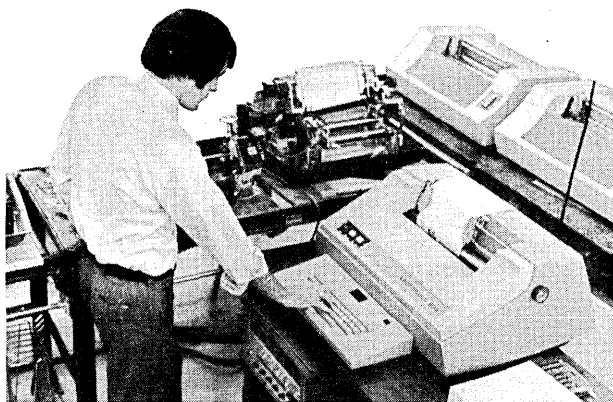
Centronics can say more because we offer more. The widest selection of printers on the market. Over 30 different models. Speeds from 88 cps to 340 lines per minute. 51 different character sets including more than 20 national language character sets. Over 100 features and options — many available nowhere else. A unique step pricing arrangement which continually lowers your cost of ownership. Plus one of the most efficient customer service networks of any printer manufacturer.

Available from stock. Centronics is a leading producer of computer printers. We've shipped more than 50,000 units. Substantial yearly investments in R&D, engineering and



large scale manufacturing help keep our production high and your costs low. And assure prompt deliveries worldwide. A big reason why over 350 OEM's specify Centronics Printers more than any other.

Interface compatibility. Centronics makes 24 interfaces to help you take advantage of our unique cost efficiencies throughout a wide range of data handling systems, small business systems, computerized industrial control... wherever printers are used today, and those envisioned for tomorrow.



Quality assured. Every Centronics Printer must pass 22 tests before it gets shipped — from computerized quality control tests for vibration tolerance, machine integrity, and component reliability to final burn-in at 140° F. Almost 25% of the entire manufacturing work force is in quality assurance. What's more, we carefully test and report MTBF down to the component level — and stand firm on our claims.

Unique diagnostic test center. Located in our home office, this exclusive troubleshooting service is our special way of solving your problems on the spot.

Using a telephone, we can put your system on-line with our computer, analyze your system, and tell you if the difficulty is in the modem, the communications lines, the mainframe or the printer.

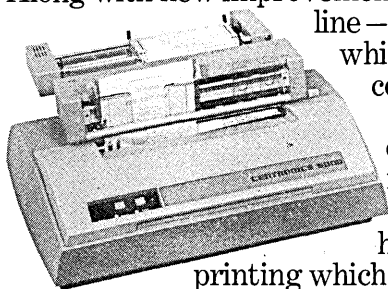


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“We don’t just ship printers, we satisfy customers.” says Robert Howard, President of Centronics. This commitment really starts at your receiving dock. It’s everything from diagnostic testing to customer service. In addition, 15% of our full time employees are working in engineering, research and development—the largest single group other than manufacturing—to continually develop new printers that give you the maximum in system cost/performance and uptime. It’s also why we invite customers to attend tech-



nical training sessions at frequent periods throughout the year. As part of this program OEM and end user people alike learn the correct procedures for receiving, inspection, and full system check-out. Centronics also prepares audiovisual courses for OEM service personnel and runs field programs on up-dated techniques.

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The GE TermiNet* 30 if you think its speed is special... wait 'till you discover the flexibility.

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The new GE TermiNet 30 mag tape ASR matrix printer... gives you the speed you need. Dashes off 30 characters per second. But time isn't the only thing you'll save. You'll save money and trouble, too! It's simply more economical to lease the TermiNet 30 matrix printer from RCA.

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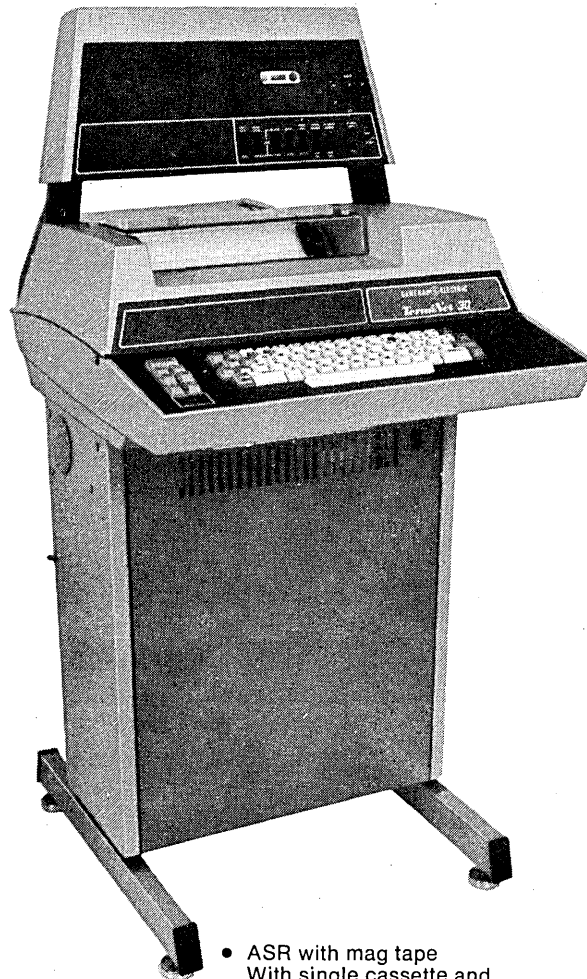
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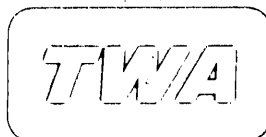
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CIRCLE 5 ON READER CARD



They Lit a Candle

by Robert L. Patrick, Contributing Editor

This fire-fighting scene could have been written by the Marx brothers. It was too ridiculous to be true. Yet the same "comedy" of errors could be repeated in any number of dp installations.

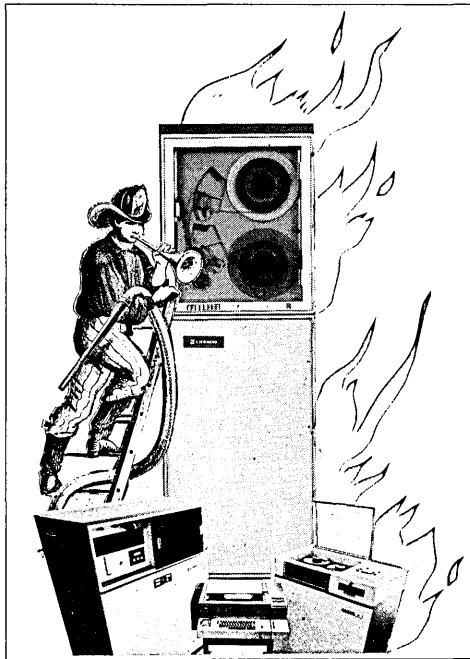
In March of last year, an air conditioning maintenance crew was searching for building leaks in a nuclear power plant with an open candle flame, and they found one. A two by four inch opening in the wall had three or four cables going through it, and when the hole was tested with the candle, the flame was drawn toward the opening. The crew stuck in some pieces of sheet foam to plug the leak. They tested again with the candle and the foam caught on fire. They then tried to knock the plug out with a flashlight, smother the fire with rags, drown the fire with CO₂, and smother the fire with a dry chemical extinguisher—all to no avail.

The fire grew, got seated in the wall insulation, and started feeding on cable insulation which was also flammable. An electrical short occurred, equipment was shut down, fire departments were called, a big debate ensued as to whether to use water on an electrical fire, acrid smoke was produced, an overhead CO₂ system failed due to improper installation, cartful of dry extinguishers were fired off without halting the blaze, smoke masks were brought in, and the agonizing decision-making continued.

Finally when the decision was made to use water, inept firemen didn't get hoses properly strung; incompatible threads were discovered between nozzles brought in by the local firemen and the plant fire hoses, and the fire was not put out until seven hours later.

The above scenario was reported in a 463 page report published by the Nuclear Regulatory Commission on the Browns Ferry Nuclear Plant fire near Athens, Alabama. Upon reading an extract of that report, ("The Frightful Log of a Nuclear Near Miss," *The National Observer*, August 23, 1975, p. 5) one should wonder "Would we really do any better if a fire started in our computer shop?"

Most computer center managers take building services for granted. Do you? Have you talked with your local fire marshal so both you and he know what's to be done in an emergency? Where the computer power switches



are? Where the air conditioning switches are? And where water is not to be squirted?

Have you and he had a tour of your shop lately? Even if you have emergency power switches mounted next to your exits, they merely drop the circuit breakers feeding your system; the mainline feed is still hot, and that should be well marked. Is it? High voltage and water just don't mix.

While you were touring with the fire marshal, did you check to see how the water drains? In one shop I visited the water was allowed to drain toward the 4800 volt substation. Even if you have a fire in your shop and suppress it successfully, you may take on several hundred gallons of water. Have you ever figured out how you would get it out? It is very difficult to control humidity in a computer shop with six inches of water under the floor. Further, those wet cables may give you a hard time for months, particularly if you have any cable connections under the floor.

How long has it been since you actually checked your emergency lights? If you have an emergency stand-by generator that feeds your shop, does

someone cycle it every month? When they cycle it, do they just make it start, or do they really put it under load to make sure that it will work when it is required to?

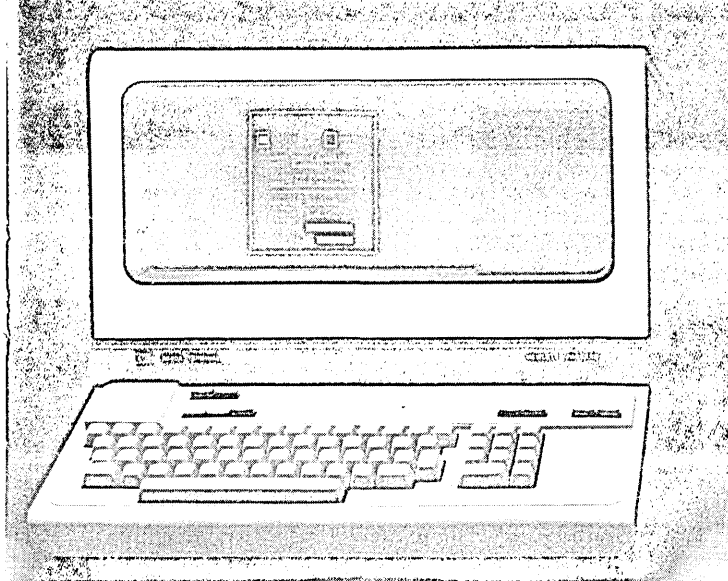
During one computer center audit, I found the first aid kit hadn't been restocked in three years. The shop also had an emergency respirator, and it had not been inspected since it was purchased eight years earlier.

While you're wandering around your shop and wondering what an emergency would do to you, you might check to see if your portable fire extinguishers have been inspected recently; that your operators know how to use them; that tape personnel are cool-headed and properly trained so the tape vault door gets closed in an emergency; and if you have a CO₂ system, that the chief operator knows he must get everyone out of the room before flooding it with CO₂.

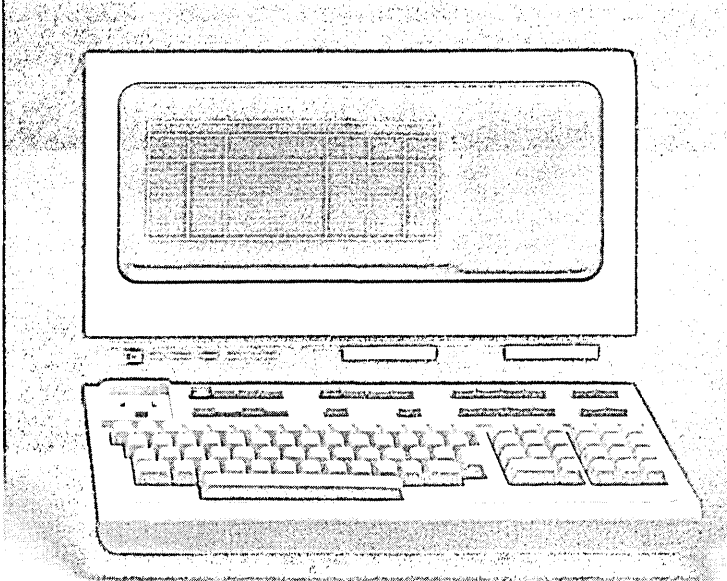
One wonders why the designers of a nuclear control room didn't specify high temperature electrical insulation throughout and nonflammable insulation in the walls. One also wonders how a crew of air conditioning mechanics could be so ill-trained in such an important facility as to wander around with candles searching for leaks.

But in our computer shops I've seen air conditioning service men shut down the compressors to reduce the noise while changing filters, not knowing they just killed the computer. I've seen tape safes left open during fire drills. And some shops with tape vaults have no battery operated lights. (You know facing an emergency in the dark will cause panic and result in leaving the vault door open as the room is evacuated.) I even saw a computer room with a pan floor with no water drain in it, and water cooled computers sitting on top of the raised decking.

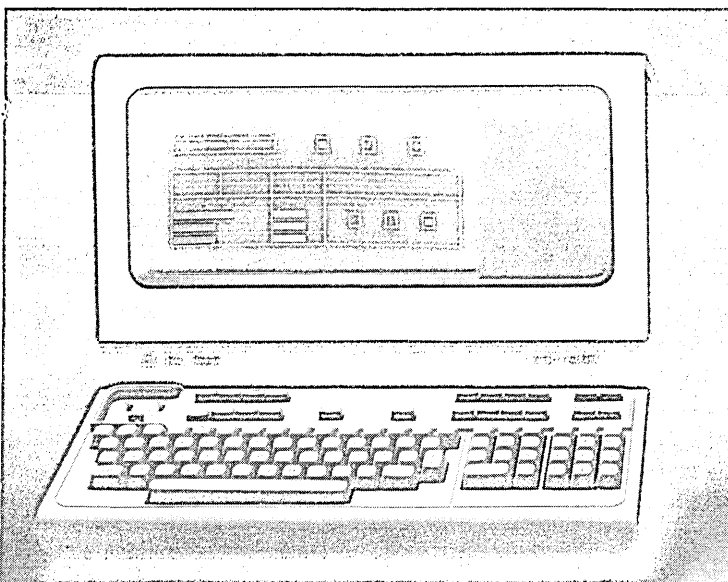
You presumably have an operations manual. How long has it been since you reviewed the emergency section? Have you had any turnover of personnel since the last fire drill? Don't you think a runaway fire could happen to you too? *



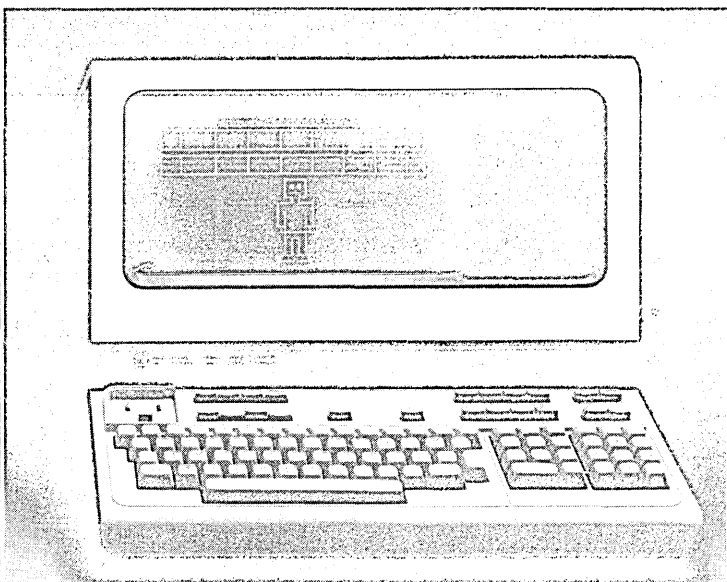
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HP 2640A—includes modular design, self test and many other standard features.



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The Hewlett-Packard 2640 terminal series offers, in addition, powerful local editing and formatting capabilities. Modular design. Built-in self-test. An unusually readable display. Optional character

fonts (you can even design your own). Or, choose the 2644A Mini DataStation for the same features in a terminal with mass storage capability for stand alone operation and the convenience of two 110,000 byte, pocket-sized data cartridges.

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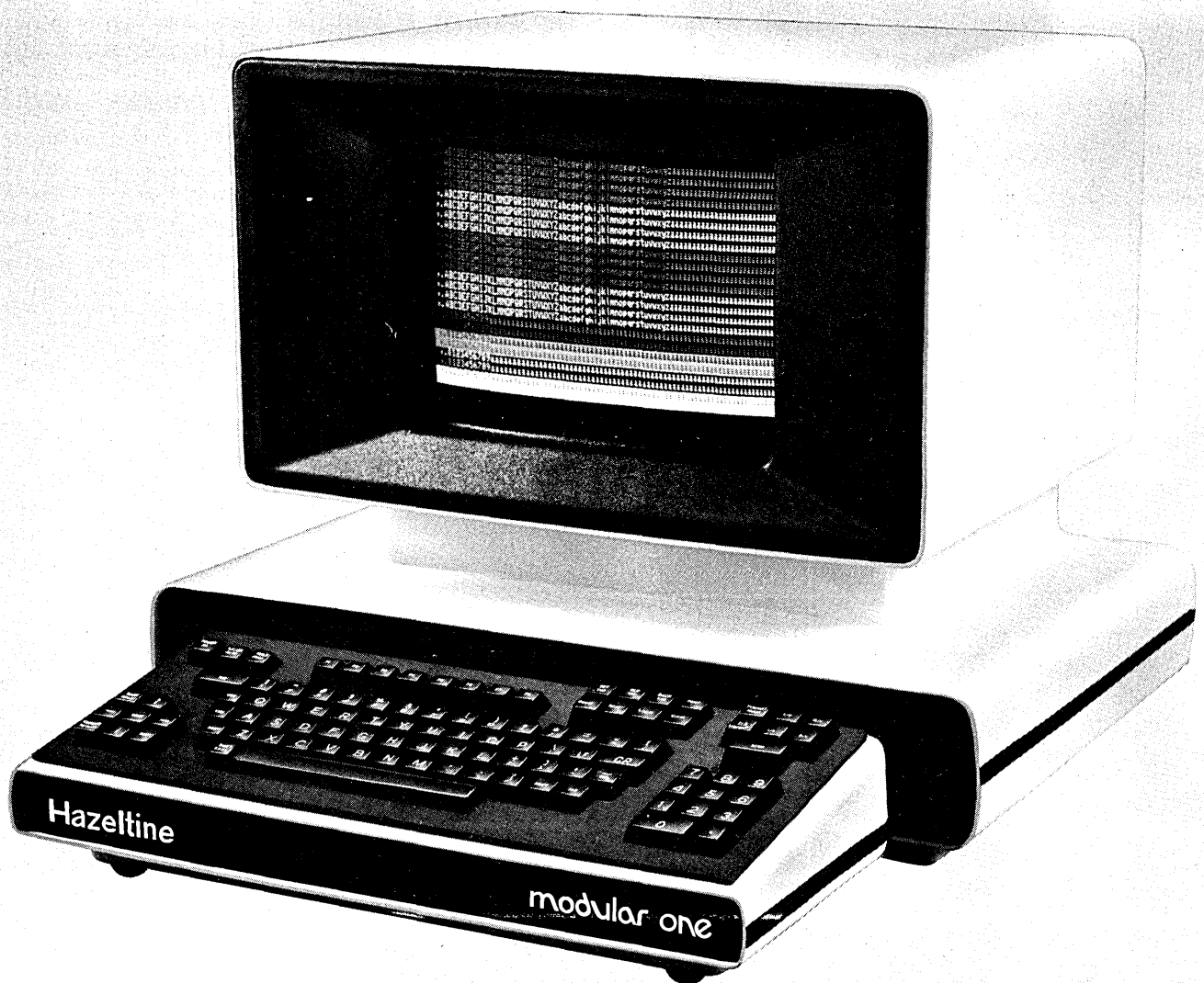
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THE TEACHER IS WEINBERG, THE SUBJECT IS YOU.

Jerry Weinberg and his associates will conduct Ethnotech's highly regarded Technical Leadership Workshop the week of March 7-12 in Tarrytown, N.Y. The entire program has been arranged under the auspices of Yourdon inc. Enrollment will be strictly limited.

THE TEACHER

Jerry Weinberg is the president of Ethnotech—the leading organization in the world today on the human factor in computer programming. He has outlined Ethnotech's principles in his book, "The Psychology of Computer Programming" and the recently published "An Introduction to General Systems Thinking."

But the written word alone does not provide an adequate picture of this approach. Ethnotech believes people can be more productive. And, that this productivity results from a delicate balance of technical, behavioral, and humanistic learning. A balance all too often ignored in ordinary computer training.

The effectiveness of this individual approach as reflected in the Technical Leadership Workshop was best put by a student who complained, "Lunch was much too long."

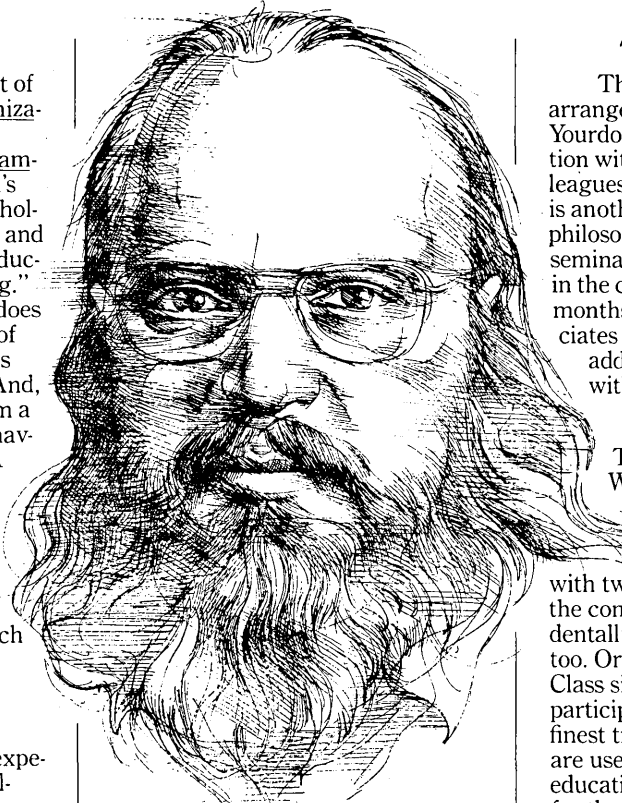
THE WORKSHOP

The Technical Leadership Workshop has grown out of the experience Jerry Weinberg and his colleagues at Ethnotech have had in over 60 person-years of consulting and training in various organizations throughout the world.

The Workshop lasts five-and-a-half-days. Classes will last each day from 9 a.m. to 1 a.m. (16 hours)—a total immersion experience for students and instructors.

The Workshop will concentrate on the technologies of open egoless cooperative programming, programming teams, structured programming, and top-down program design and development. The approach to these subjects involves each student in problem-solving activities that will ultimately have practical application.

Each day will involve: technical material; survey of literature; discussions; exercises; peer review practice; introduction strategies; and simulation gaming to teach means of overcoming resistance, avoiding pitfalls, and recognizing counter indications.



Jerry Weinberg will be joined by one or more of his Ethnotech colleagues, who include such noted instructors as Don Gause, Tom Plum, and Daniel Freedman.

THE RESULTS

In previous offerings of this course, 183 of 216 participants rated it "the best educational experience ever." In many cases, the resulting work improvement by course participants in their respective organizations has repaid the course investment many times over.

Here are some student comments on Weinberg's Technical Leadership Workshop: "a tremendous experience in introspection. Thank you." "This course has made me see the people I work with in a different light." "A fascinating course—unlike any I've ever taken—and better." "A profound educational experience."

THE SPONSOR

The entire program has been arranged under the auspices of Yourdon. We are proud of our affiliation with Jerry Weinberg and his colleagues at Ethnotech. We feel it is another example of Yourdon's philosophy of bringing you first-rate seminars taught by the finest minds in the computer industry today. In the months ahead, Jerry and his associates will be teaching a number of additional courses in conjunction with Yourdon.

THE VALUE

The Technical Leadership Workshop is actually a two-week course given in one week. Each participant will have 80 hours of contact with two of the finest instructors in the computer industry today. (Incidentally, participants are first rate, too. Or else they wouldn't be there.) Class size is strictly limited: twelve participants per instructor. Only the finest training facilities and materials are used. You get the most for your educational dollar. The complete fee for the Technical Leadership Workshop is \$1500. This includes all accommodations and meals at one of the finest training facilities in the country: The Tarrytown Conference Center.

THE PARTICULARS

COURSE: Technical Leadership Workshop

TEACHER: Jerry Weinberg and Ethnotech colleagues

DATES: Sun., March 7 thru Fri., March 12.

LOCATION: Tarrytown Conference Center, Tarrytown, N.Y. FEE: \$1500

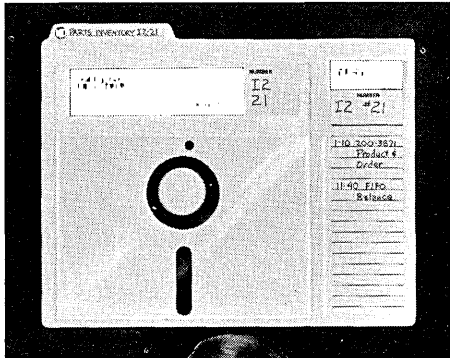
If you would like further information call Ms. Michol Beltrao (Registrar) at Yourdon inc., 212 730-2670 or write Yourdon inc. 1133 Ave. of the Americas, NYC, 10036

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who train the people
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Communications

AT&T's Big Plans for A Value Added Service

Communications functions of many peripherals would be transferred to the central office

American Telephone & Telegraph plans to offer before 1980 an end-to-end, value-added "communications processing" service that, among other things, would provide an "alternative" to IBM's proposed Systems Network Architecture (SNA).

The service would transfer to the telephone company's central office most of the communications-related functions that are now performed by central processor front ends, multiplexors, concentrators, remote controllers and intelligent terminals.

J. Roger Moody, vice president industry marketing for AT&T, says the service will be available "within much less than five years." He explained in an interview that the basic building block of the new service will be the telephone company's computer-controlled No. 4 ESS switch. The first of these units is scheduled to go into regular operation this month. Although restricted to switching for the present, it can be modified relatively easily to perform communications processing for users on a shared basis, Moody said. "We are well into the job of specifying what has to be done," he said.

Communications processing, as Moody defines it, encompasses the following: network control, speed conversion, error control, terminal polling, message routing and rerouting (for priority traffic and to get around busy or out-of-service links), formatting, editing and checking of input/output data. He considers communications processing to be one of three elements of data communications—the other two being transmission/switching/modulation-demodulation and media conversion which is the transformation of the bit stream into another form, such as crt display, hardcopy or holes in a punched card.

No dp service planned

The essential distinction between communications processing and data processing, says Moody, is that in communications processing the information content of the bits is not altered. He

emphasized that AT&T has no plans to offer its customers a data processing service. "They'll continue to write the application programs. We will provide standardized error control, formatting, network control and related software for broad application areas, designed to get messages from the sender to the receiver or receivers."

AT&T plans to develop a high-level programming language so that users can specify their communications processing requirements in a standard form. He said the company is now looking at "several" candidate languages. The programs will be stored in the random access memory of the new ESS switch, and a new set of microcoded instructions will be burned into the read-only memory of its control unit. Once these two jobs are completed, the ESS switch will be ready to serve as a communications processor as well as a transmission switch.

Moody thinks it will take "only about six months" to develop the new microcode. Writing the communications processing software, however, is much more time-consuming and represents the "pacing item" for the whole project. AT&T is now considering whether to contract out part of this job.

In business offices

For at least some applications, Bell anticipates supplying an on-site controller as well as a centralized communications processor. The Company's recently-introduced "Dimension PBX" is the prototype of such a device. Moody explained that it is capable of interfacing with a variety of data terminals likely to be installed in business offices during the next several years.

The office is one of the few places still largely untouched by automation, he pointed out, and it's also one place where costs are growing rapidly, in both absolute and relative terms. So Moody believes that automation is virtually inevitable within the next several years. Crt's will replace typewriters, on-line printers will replace copiers, bubble or magnetic memories will replace file

cabinets, he says, and all of these devices will be tied into a system through the Dimension PBX or a device like it—supplanting, at least partly, today's army of office clerks and secretaries.

No legal barriers

He insists that neither AT&T's 1956 consent decree, nor the FCC's 1970 Computer/Communications Decision bars the telephone company from offering



J. ROGER MOODY
Among other things, an
alternative to IBM's SNA

the new service—basically because he regards it as communications, not data processing. Asked whether others might have a different view, he appeared to smile but declined to answer directly.

Controversial or not, AT&T's projected service seems to offer some powerful benefits to the user.

For one thing, the user will be able to bypass the cost and complexity inherent in the present profusion of separate systems for different on-line applications. All of these disparate outputs could then be loaded into a single communications processing system capable of rearranging each set of bits, without changing their information content, to meet the requirements of the receiving terminal.

AT&T versus IBM?

IBM, through its SNA, is already promising a similar benefit, Moody admitted, "but we believe the user wants an alter-

native." Historically, he pointed out, IBM has set the de facto standards in the dp industry, but "has changed them without notice." The practical result, he indicated, has been to discourage the user from acquiring more cost-effective software and hardware offered by non-IBMs. AT&T plans to eliminate this problem by providing a communications processing system that's compati-

ble with a wide variety of hardware and applications software.

The user will reduce costs directly by sharing communications processing components that now must be bought or leased. And the equipment provided by the phone company will, in many cases, be more cost-effective than what the user can now acquire by himself. Also, noncompatible terminals and

computers will be able to talk to each other directly, and non-intelligent terminals will be able to communicate with intelligent ones, because a standard programming language will be used to specify the communications processing requirements.

Whether AT&T, big as it is, can bring all this off is an interesting question.

Aside from the formidable technical

Facsimile Markets Eyed in ITT, MCI Offerings

Facsimile transmission and communication among word processing terminals are two major markets International Telephone and Telegraph is targeting for the proposed packet switched network it will launch in 1977.

Called Com-Pak, the service would begin with switching centers in 14 cities as a "unique domestic data network enabling thousands of incompatible data terminals and computer-type devices to communicate with each other for the first time," says ITT's Francis T. Cassidy.

Cassidy is executive vice president of ITT Domestic Transmission Systems, the wholly-owned ITT subsidiary that will operate the network if its license application is approved by the Federal Communications Commission. The company filed its application late last fall.

ITT said a facsimile service called "Fax-Pak" will be the first offering. "It will permit primary compatibility between the majority of facsimile equipment types, and between certain types of data terminals and the majority of facsimile equipment types." Cassidy says seven prospective customers already have seen a demonstration of how the system can interconnect five different makes of analog-type, 3-6 minute facsimile machines installed on the East and West coasts.

He said that digital fax service would not be part of the initial Com-Pak offering. In its application to the FCC, the ITT subsidiary said it will compress each facsimile message prior to transmission, typically reducing the number of bits 75 to 80%.

The illustrative tariff also allows the user a credit on his "fixed monthly charges" where service is interrupted for one hour or more.

ITT said Com-Pak will be a "modified" packet switched network. It will provide either circuit-switched service on a virtual basis, or store-and-forward service. The latter will include dynamically-balanced alternate routing to get around busy or out-of-service links, and expedited handling of priority messages. An error performance of $1:10^{-6}$ to $1:10^{-7}$ was promised.

Asked what protocol would be used, Cassidy said it will conform to ANSI and ISO requirements, when these are finally established, and will be compatible with IBM's SDLC. Will the user be able to specify his own virtual call protocol? ITT/DTS will handle such requests "on an individual basis," answered Cassidy.

The 14 cities to be served initially by Com-Pak are Atlanta, Boston, Chicago, Detroit, Houston, Kansas City, Las Vegas, Los Angeles, Miami, New Orleans, New York, Pittsburgh, San Francisco, and Washington.

MCI offerings

Meanwhile, Microwave Communications, Inc., the specialized common carrier, announced plans to offer two new services—switched data transmission at up to 4800 bps, and high-speed switched digitized facsimile.

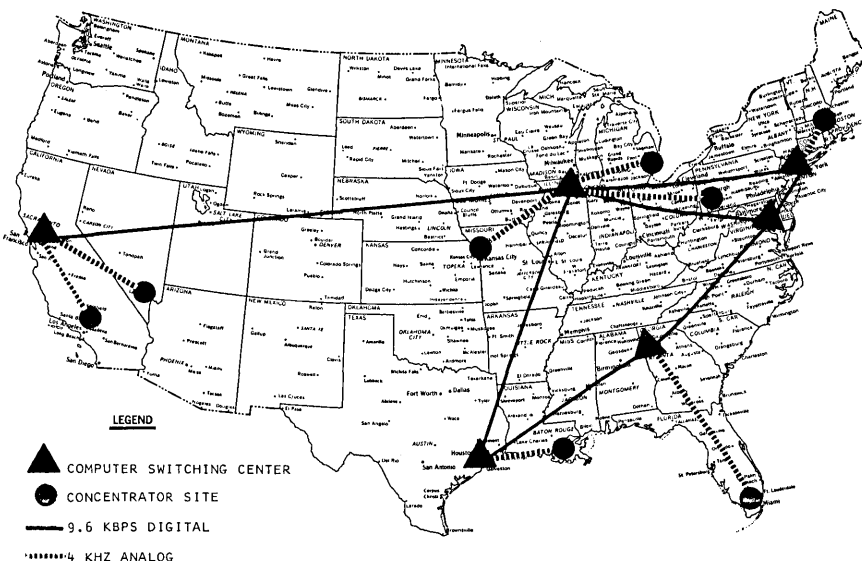
The facsimile service, dubbed "Faxnet," will include terminal equipment as well as transmission. Charges will be distance insensitive and will vary according to the number of pages sent per 24 hours. There also will be a monthly subscription fee.

The new services will be offered

by MCI Data Transfer Corp., (MDT), a wholly-owned subsidiary of the specialized carrier.

MCI/MDT proposed three classes of Faxnet delivery service: immediate, priority (the same day), and overnight. Rates for the latter will be "significantly lower" than those for priority transmission, the company said. But not much more information was disclosed, beyond the statement that Faxnet would be priced on a per page basis plus a monthly subscription fee and the page rate would decrease as volume increased. One source said present plans call for a Faxnet customer transmitting more than 100 pages per 24 hours to pay about 25 cents per page.

Four computerized switches, each having 1,000 ports, are now installed in Chicago, New York and Dallas to support the new offerings. MCI vice president Burt Roberts said "a significant number of additional switches" will go into operation within the next several months. Store and forward capability, automatic call back, code-and-speed conversion will be added "later on," as the company gets ready to offer packet switching. Roberts said that service "is a little over a year away." *



FOURTEEN CITIES: ITT subsidiary hopes to launch packet switched network service in 14 cities next year, if given government approval.

news in perspective

complexities involved in developing a universal communications processing system, competing suppliers are certain to fight Bell's market invasion with every weapon they can muster.

An opportunity

Moody said Bell's communications processing concept doesn't encompass VTAM and other telecommunications access methods, but does include network control—e.g. NCP. This feature may provide IBM and other prospective competitors with an opportunity.

According to a recent analysis of SNA by Auerbach Publishers, "NCP is advertised as assuming functions formerly performed at the central processor—for example, translating character codes, controlling dynamic buffering, providing error statistics to VTAM, and handling recoverable errors . . . However, while (these) functions are actually performed in the communications controller, they are controlled by VTAM. For example, when NCP wishes to deactivate

a line, it must check with VTAM; it is VTAM that actually issues the deactivating command."

Given this architecture, it may prove difficult for AT&T to develop an SNA interface that IBM can't change more or less at will by altering VTAM.

Spurring all the contenders onward is the knowledge that data communications represents the fastest-growing segment of the computer systems business. Moody says the value of installed hardware and software used for data communications in the U.S. in 1975 was supposed to reach \$5 billion. "By 1978," he said, "we expect more money to be spent on data communications products and services than on dp products and services."

He declined to say where AT&T will begin marketing its new communications processing service, but it may be significant that Moody recently discussed the basic concept at a meeting of the National Retail Merchants Assn. in New Orleans.

—Phil Hirsch

Bell's Exclusive Right to Long Distance Service Questioned in Execunet Issue

Execunet continues to live and appears to be prospering.

The service, offered by the specialized common carrier, Microwave Communications, Inc., is regarded, however, by AT&T and the Federal Communications Commission as an illegal back door invasion of Bell's switched toll telephone service market.

For users—particularly those with relatively small traffic volumes—Execunet represents an opportunity to lower their costs significantly. For MCI, which is gradually sinking deeper into a sea of red ink, the service represents a life preserver. This, at least, is what the company has indicated to the FCC. Cynics suspect that even if MCI's predicament isn't that bad, it's smart strategy to display the financial sores prominently—in the hope the commission will take a more lenient attitude.

Possibly the most fascinating aspect of the battle is the possibility it will lead to a basic restructuring of the MTS/WATS market—one which destroys Bell's monopoly and gives specialized carriers access to the most lucrative part of the telecommunications business.

Execunet went into operation in late 1974. Basically, it's a shared foreign exchange service, but with some extra features. A customer in any of 15 cities can place an Execunet call through any telephone—even a public one—to any telephone in one of the other cities. The links at either end of the message path

are AT&T local exchange circuits (local loops). They're linked by an MCI F-X line which the Execunet patron shares with others.

Charges compared

He pays a minimum of \$75 a month for the service. There's a per-minute charge for each call, based on time and distance, and a \$30 a month connection charge for each dedicated Execunet termination. In material submitted to the FCC, the company compared Execunet rates with those of competing services. For daytime calls originating in Washington D.C., the Execunet charge per minute to Philadelphia is 14 cents, compared with 42 cents for the first minute and 27 cents for each additional minute on a station to station call and 29 cents on a WATS line. The rate charged by Execunet on a call from Washington to Houston is 38 cents per minute, compared to the station-station charge of 52 cents for the first minute and 36 cents thereafter and 43 cents for a WATS line charge.

Last spring, AT&T charged that Execunet is a switched, long-distance dial-up telephone service under another name, and asked the FCC to terminate it. The phone company argued that MCI is licensed to provide private line service only.

The FCC agreed with this interpretation last July and gave MCI 30 days to cancel Execunet. But the company per-

sued the U.S. Court of Appeals in Washington to review the commission's order and meanwhile delay its implementation. Late last October, in response to a petition from the FCC and the telephone company, the court referred the case back to the commission for consideration of new charges made by MCI—one of which was that AT&T lawyers had improperly discussed the case privately with the FCC's common carrier bureau before the July termination order was issued.

On the day the dispute went back to the FCC, the telephone company accused MCI, in effect, of violating an earlier promise not to expand the service while litigation was underway. Bell asked the appeals court to issue an order that would force Execunet calls to originate from only three cities instead of the 15 where such service is available at present. The court rejected AT&T's petition in November.

Next act this month

The next act in this drama will begin this month when interested parties are supposed to submit briefs to the commission regarding MCI's new charges. The FCC then will determine whether further proceedings are required. Regardless of what it decided, though, the case will go back to the appeals court for a final disposition—a process likely to take many months. During this time, of course, MCI will be free to sign up additional Execunet customers.

The big question raised by the Execunet hassle is whether a specialized carrier can offer dial-up service. If it can, even on a limited basis, AT&T's monopoly is threatened, the future profitability of MCI and other specialized carriers become more probable, and David acquires a club capable of beating Goliath down to a far less formidable size. Also, the conversion of long-distance service from a monopoly to a competitive offering would almost certainly result in lower toll rates.

So, what's new?

MCI, although it disagrees with AT&T's characterization of Execunet as a switched, dial-up service, has nevertheless indicated that even if the new offering is what the phone company says, there's no reason a specialized carrier can't provide the service.

MCI vice president Burt Roberts said in a letter to the commission last July: "So far as I know, AT&T has never been authorized by the commission to furnish interstate long-distance message toll service either, but simply does so by virtue of having constructed facilities and filed tariffs to provide the service. MCI has done the same thing with respect to Execunet."

A similar view is held by John Eger, acting director of the Office of Telecom-

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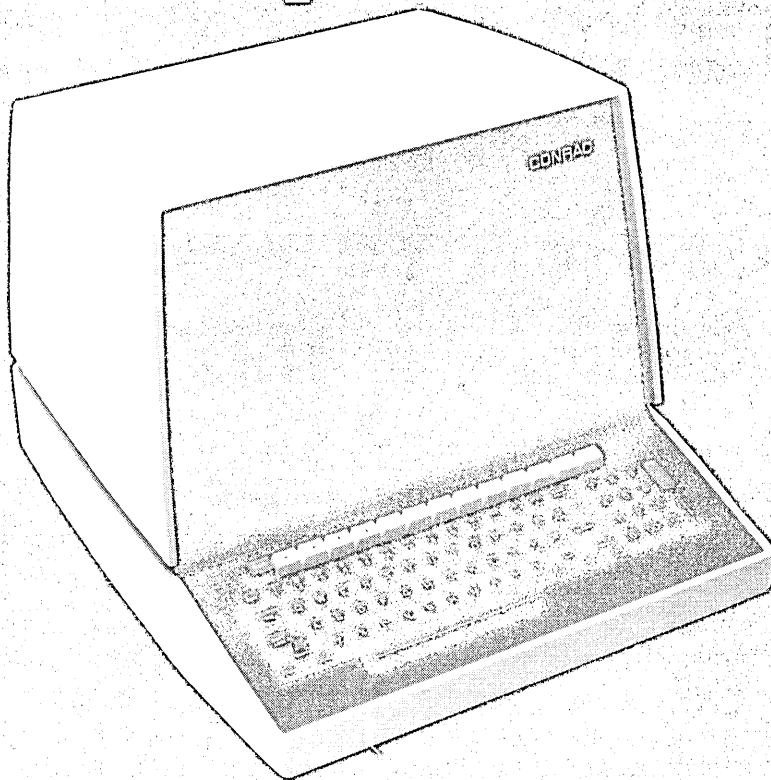
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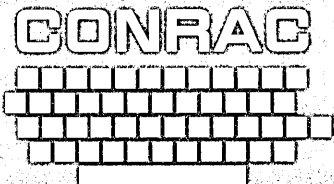
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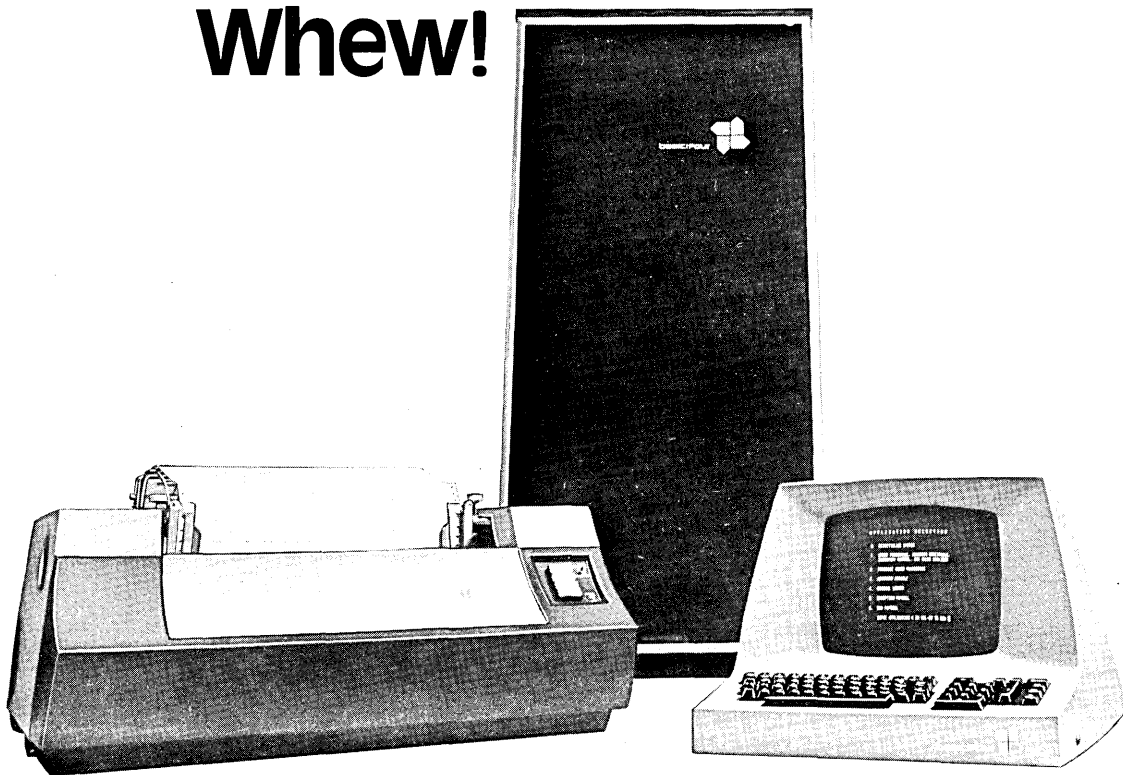
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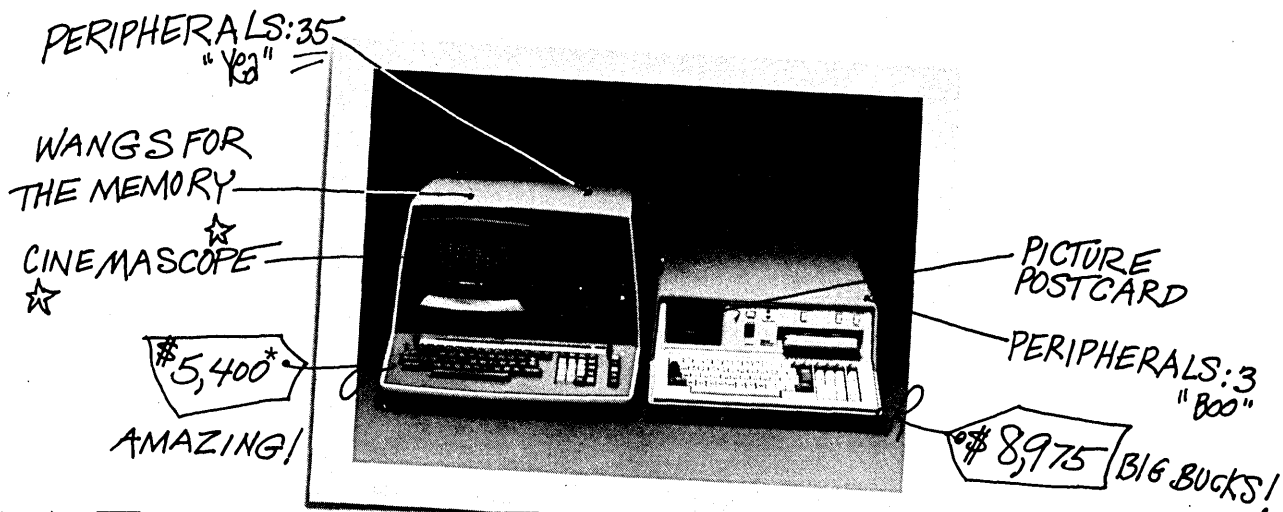
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news in perspective

too much question as to who is going to control the delivery systems for financial services."

The dude who goes to jail

Browne quipped that his role with the Comptroller of the Currency is a dual one. "When I was hired I was told I was not only to be director of payments systems, I also would be the dude that goes to jail in the event we lose the lawsuits."



SHOP AND BANK: Customer at this Smith's Food King supermarket can shop and bank at the same time via a TRW terminal linked to Glendale Federal Savings. On the cashier's side of the terminal is a plastic card reader, an eight digit graphics display, a multiple transaction alphanumeric keyboard and an imprinter. On the customer's side is a 10-key push button panel for the customer to key in a secret password.

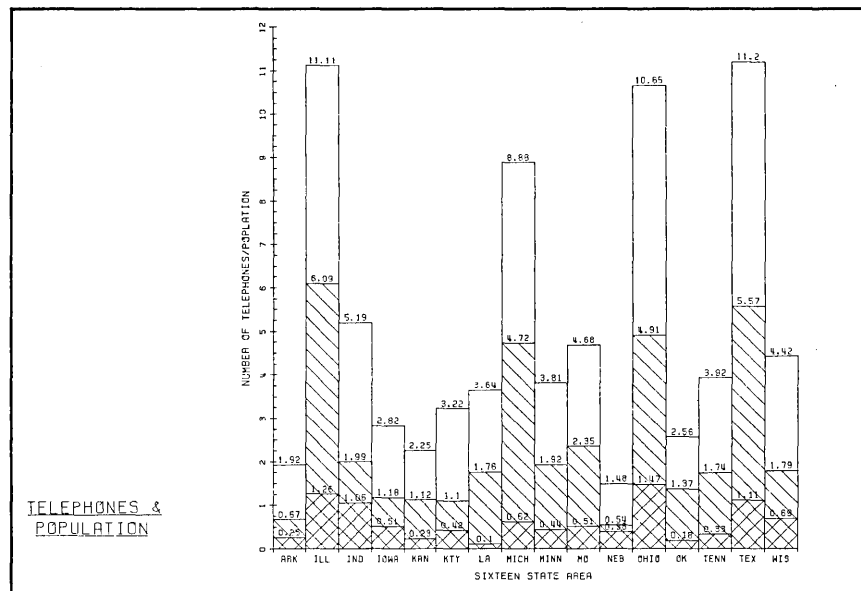
The suits referred to have been filed against the comptroller in a number of states charging his ruling that remote terminals, called Customer Bank Communications Terminals (CBCT's) by commercial banks, are not branches, is illegal and that banks using them are violating the law. The ruling itself is now dormant pending appeal by the Comptroller of a Federal District Court ruling against it. Browne said they expect a decision on the appeal sometime this month.

But, he doesn't think the answer to the regulatory hassle surrounding EFT will come from the courts. "It's a question of 1975 technology standing up to a 1927 statute." He was referring to the McFadden Act.

Congress currently is considering legislation that would update banking laws and Browne sees something coming out

January, 1976

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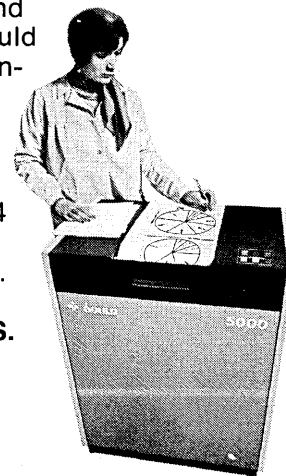


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of this consideration in 12 to 18 months time. "That's about the same time frame as it will take to get the issue to the Supreme Court."

Browne's contention that the issue belongs to Congress was reinforced by a decision handed down in mid-December by Federal Judge Hubert L. Will in Chicago. Judge Will ruled that remote teller facilities operated by Continental Illinois National Bank & Trust and First National Bank of Chicago constitute branch banks and were being

operated in violation of the McFadden Act which prohibits branches in non-branching states like Illinois. Both banks have said they will appeal.

In handing down his decision, Judge Will urged the banks to seek revision of the federal law. "The banks are powerful enough to get Congress to do something about it . . . The act is very explicit. Give me a little ambiguity and I would have given the right result. But here we have no ambiguity."

The suit was brought against the

banks by the Attorney General of the State of Illinois. Judge Will said he would postpone enforcement of an injunction pending appeal.

One that listened

Continental Illinois is considered an EFT pioneer and is one bank that started listening to retailers some time ago.

The Illinois bank has installed terminals in stores owned by Dominick's Fine Foods Inc. These began operating last March. By next March they expect to have terminals installed in stores operated by National Tea Co. These terminals, Addressograph-Multigraphs, do not perform banking functions now but they're capable of being upgraded to do this should it become permissible.

Joe Saunders and Tom Walsh of Continental described the Dominick's system at the Los Angeles symposium. "We got started with Dominick's to help them compete with Jewel stores which had such terminals," said Saunders.

"We visited retailers and tried to find out what they wanted so we could build in special features," Walsh explained. The terminals essentially perform a transaction verification function. One of the special features built in, because it was what retailers wanted, was the addition of a unique code for store managers so they can override the system. Another was keeping track of the time each check is cashed so that if an individual cashed a check in one store then tried to cash one in another 10 to 15 minutes later this fact would be flagged.

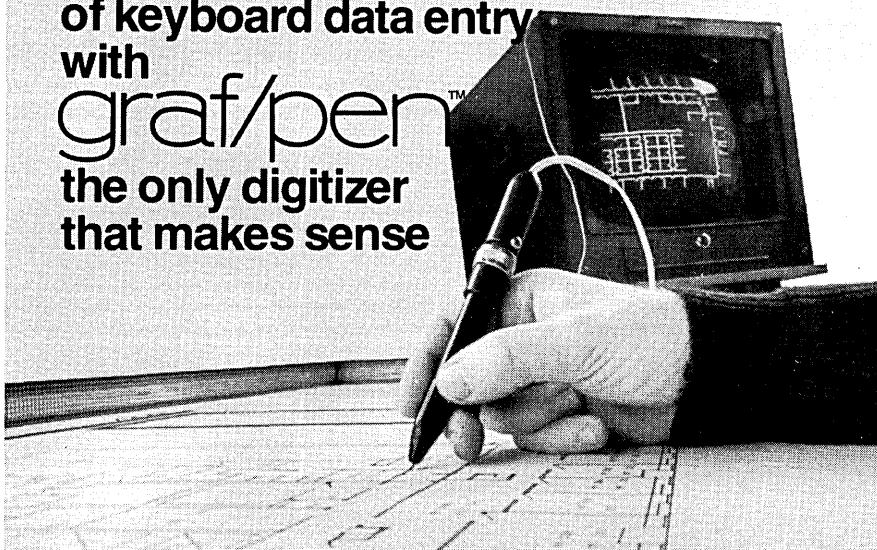
The AM terminals were selected, Walsh said, because they are not single purpose. They can handle multiple type cards. In the Continental system they handle three types—Master Charge, Continental's automatic banking card, and a private label card produced by Continental for Dominick's. Continental also is a producer of plastics. The terminals are connected by leased phone lines to dual 370/168s in Continental's data center. They also can be switched to National Data Corp. in Atlanta for an open-to-buy on Master Charge.

Another transaction verification system was described at the symposium by Peter Overmeyer, vice president of Wells Fargo Bank. Called WellService, this system was announced last June and had its first installation in October. In December the system consisted of 18 terminals operating in a dozen locations. This month, Overmeyer said, Wells Fargo will begin installing 50 terminals per month.

Building block strategy

Overmeyer said the bank used "building block strategy" in developing a system that led to WellService. They started building an internal system

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using Teletype Model 28 terminals in 1965. By 1967 they had a complete network in place which cost them \$1.4 million a year to operate. In 1975 they upgraded to TRW 4103 key pads and displays at a savings of \$300,000 a year. They have 1800 4103s in Wells Fargo branches. "It was easy to drop them into external locations and this is WellService."

The benefits of WellService to Wells Fargo? "Profit and cross sell," said Overmeyer. The bank charges installation fees and transaction fees ranging from 4¢ to 7¢ per transaction. "The total tab averages \$60-\$70 per month."

He said the bank is reordering TRW terminals and has ordered a large number of terminals from Texas Instruments. "We believe in the dual vendor approach."

The system handles check approval on checks drawn on any California bank and credit card approval. The terminals are linked to Wells Fargo's own data base and to Telecredit, Western States Bank Assn. and Validata.

The WellService terminals are located in hotels, restaurants, department stores, and automobile dealers. Asked if they'd considered food stores, Overmeyer replied, "not yet." Maybe they never will if they heard a plea from another symposium speaker.

"Don't charge us," said Stan Johnson, Executive Director, Bay Area Grocers Assn. "We're not the fat cats."

No charge to the grocer

A financial institution which has terminals in grocery stores and doesn't charge the stores is Glendale Federal Savings, headquartered in Glendale, Calif. Don Barney, senior vice president, described the system. He said the first terminals were installed in a Smith's Food King Market in the Santa Barbara area on Aug. 23. They are installed both at convenience centers and at checkout counters. Glendale Federal customers can make automatic deposits to their savings accounts and can set up separate household savings accounts which can be used to transfer funds to purchase goods at Smith's.

Barney said the project is strictly an experiment and he was going to "cop out" as to the results since it's been in existence such a short time. He views extending banking services at the retail point of sale as "competing for deposits."

Glendale Federal's terminals are based on TRW 4103s "with some modifications." Barney said they may use a variety of terminals should they decide to expand.

Edward O. Boutwell, Jr., President of Compata, Inc., which currently is in various stages of discussion, study or performance on a number of teleprocessing systems and software develop-

ment projects for commercial banking, thrift, credit card, and retail organizations, says that while more or less standard configurations of front end mini-computer hardware, software, and terminals eventually will be available and acceptable to banks, systems presently in planning or development stages at major institutions are heavily customized and are viewed as experiments or pilot projects.

He said bankers he has interviewed in recent months seem to favor a terminal system approach which uses a mini-computer to control network access to on-line files so that disrupting a smoothly functioning existing batch system is avoided.

In the switching area of EFT IBM would appear to have a costing edge following a report issued in late October by the Federal Home Loan Bank board assessing technologies available to serve a funds transfer function in metropolitan areas of five million residents.

Two ways with IBM

IBM proposed two ways, a System 370 for both accounting and switching and a System 7 for switching only. Transaction cost was estimated at 87¢ and 41¢ per 100 transactions respectively. Transaction costs of systems proposed by other vendors who responded to the FHLB's Qualified Vendors Solicited (QVS) were higher. These vendors in-

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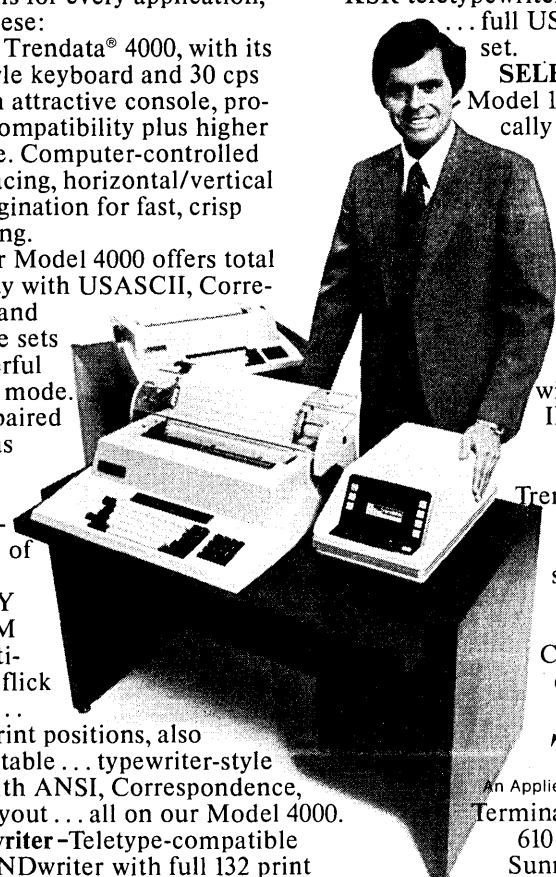
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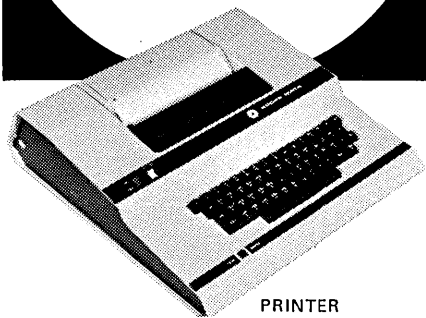
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cluded Burroughs Corp., Compaq, Concord Computing Corp., Control Data Corp., Financial Industry Systems Inc., NCR Corp., System Development Corp., and Sperry Univac.

It was this QVS that prompted the Justice Dept. to urge the FHLB not to sponsor computer networks but to leave such developments to private industry. Melinda Mount, EFTS coordinator for the FHLB, told the December POS/EFT symposium. It was not a reaction to a proposal by the San Francisco Home Loan Bank board that it would operate a switch, as many had suspected (Dec. '75, p. 107).

Mount said the FHLB agrees that industry should be the one to "decide how these things are going to go" and that the impetus should come from the consumer.

The NRMA's Schuman called the consumer "the most overlooked person at this meeting."

But he (the consumer) is not without a spokesman where EFT is concerned. Consumer advocate Ralph Nader got into the act last month when he urged a Congressional subcommittee to draft legislation that would bar interstate use of electronic fund terminals unless expressly authorized by state law.

So the EFT/POS performers are talking to each other though agreement appears far down the line. James Hatch, vice president of Lenox Bank, Lenox, Mass. sees the situation as "a three ring circus. Who owns the circus," says Hatch. "Why the consulting industry, of course."

—Edith Myers

Antitrust

The Press and IBM And Pretrial Order 4

More than three years ago, when IBM initiated a press gag order in the IBM-Justice Dept. antitrust case, it called the court order a "landmark order" and one that "could well be adopted as a model by all courts in all cases." But, in recent months, IBM has been pushing to have the gag order—called Pretrial order No. 4—removed.

What happened to produce the 180 degree turnabout by IBM?

IBM's attorneys argue that the court order prevents the firm from keeping its 290,000 employees and 600,000 stockholders informed about the progress of the case. Moreover, IBM complains that the court order has kept the firm from responding to "defamatory and erroneous press reports." And IBM's vice presi-

dent and legal counsel, Nicholas deB. Katzenbach, charges that the court order has prevented him from defending himself from press reports that he says have accused him of "unethical conduct" and that have suggested he may be guilty of "criminal conduct."

The ironic twist to the debate is that virtually no one besides IBM has ever supported the press gag order and the firm is now in the position of having to attack its brainchild. In 1972, for instance, IBM strongly resisted a vigorous attempt by the Assn. of Data Processing Service Organizations (ADAPSO) which sought to vacate the gag order. ADAPSO called it "an order of secrecy."

Jointly written

The press gag order was written jointly by IBM and the Justice Dept. and approved by Judge David Edelstein, who presides over the case in a federal district court in New York. The order has long hampered the press in its coverage of the case. (One reporter tells the story of a member of the Justice Dept. team who refused to state his name to the reporter because he thought the gag order prevented this.)

Judge Edelstein has been asked to vacate the gag order and there has been speculation that he will indeed do just that.

In its drive to have the gag order removed, IBM has singled out the Computer Industry Assn. for special attention, charging that the gag order has prevented IBM from countering the CIA's "concerted campaign of anti-IBM propaganda." IBM has also charged that the CIA serves as a "consultant" to the Justice Dept. The CIA dismisses IBM's charges as "absurd" saying that the CIA serves its members alone and is not a consultant to any outside party, including the Justice Dept. Further, the CIA says that its press activities are not directed against IBM. The CIA states: "While the association has no enmity toward the IBM company, it has been concerned with the dominant position that company occupies in the computer industry and with means of achieving a more competitive industry structure."

Harassment charges

In another development, the CIA has been resisting what it terms IBM harassment of the association. Last summer, IBM served the CIA with a subpoena in connection with the government case, and the CIA maintains that the subpoena was one of "exceeding breadth."

"IBM has very deliberately very nearly cleaned out the Association's files," the CIA says. "IBM had access to 5,246 documents totalling 19,848 pages; and co-

pied 8,763 pages . . . In the Association's opinion, the vast majority of the material produced will have no use in the trial or is duplicative of material already in IBM's possession."

The CIA has also protested IBM's attempts to use its private records of its contacts with the press. The CIA maintains that IBM's search of the CIA press contacts violates the established right of the press to protect its sources and that the information represents "reporters' notes."

"The essential question," the CIA states in a motion filed with the court, "is the extent to which the free flow of information necessary to the proper function of a free press will be choked off by the compelled discovery . . ."

—W.D.G.

And Another CIA Surfaces

When IBM and Comsat General Corp. picked Aetna Life & Casualty Corp. as the third party in their communications satellite venture, CML Satellite Corp., they put together a group whose initials spell CIA.

And there's at least one antitrust expert who thinks there's something wrong in that—not the initials, but the antitrust implications. He's William Wewer, a staff member of the Senate subcommittee on computer services who was trained as an antitrust lawyer. He thinks the joint venture, if it is authorized by the Federal Communications Commission to go into the domestic satellite business, is certain to

Mainframers

Honeywell Clears the Air on Used Computer Policy, But What's Next?

While a few threats of individual suit or class action over the Honeywell second user policies were made at the Midwest Honeywell Users Group meeting, the real results could be more constructive. First, Honeywell's Ridley Rhind, director of Western operations, indicated to reporters that the firm would negotiate with any users or group of users and their lawyers on the legal questions of the software licensing policy. (Honeywell last summer began requiring a signed license and charges for operating software used by anyone not buying their system from Honeywell—November '75, p. 132)

Second, many users at the November meeting in Chicago applauded the message in the speech given by William Grinker of American Used Computers: Users are going to have to learn to control the quality, conditions and source of service and support rather than rely

be shot down by the Supreme Court.

Wewer in a paper prepared for the IEEE's National Telecommunications Conference said that the IBM/Comsat General/Aetna joint venture would lessen competition substantially and thus would violate the Clayton antitrust act. In prior pronouncements on the Clayton act, the Supreme Court consistently has barred potential competitors from combining their forces and entering an economically-concentrated market as a single entity, he explained. Mainly, he said, this is because the Court has felt the combined firm would have a chilling effect on the entry of other potential competitors.

This chilling effect, Wewer argued, is only one among many reasons the Court probably will decide the proposed joint venture violates the Clayton act. Another is that IBM could bundle its dp equipment and services with the satellite organization's communication services in a way that would prevent customers from migrating to other suppliers.

"IBM has a long history of using such tying arrangements," said Wewer. "In this case, it would not be necessary for IBM to overtly tie the two products together." IBM could design its computers so they could communicate only via non-standard protocols offered by CML, he explained, and the tie would occur by default.

The Supreme Court "has cited the mere possibility of such tying arrangements" as a basis for concluding that a proposed acquisition would lessen competition and thus violate Section 7 of the Clayton Act, he pointed out. *

on the "great white father," the vendor. It wasn't clear how they would accomplish this, but the audience seemed to like the idea of applying what they considered to be sound business practices to computing.

And third, Honeywell gave evidence it had heard at least some of its users' cries in the past few months. Many of the 42 persons it sent to the meeting (led by Rhind as featured spokesman) were there to clarify the issue—where Honeywell will and won't back down on the policies—and to apologize for poorly handling the announcements internally and to the user. This was in stark contrast to two previous user meetings in Chicago and Cleveland, where users were outraged and Honeywell spokesmen who were not properly briefed or supported on the policies had been embarrassed.

Although most of the large audience



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(a record of about 180) were quiet (some said they were not concerned, others said they "boiled inside"), many of the same user arguments previously discussed were rehashed. Rhind first clarified his company's maintenance policy. He emphasized that when a user sells his own system on the open market, Honeywell will indeed inspect the system at the selling site and detail its maintainability and any need for refurbishment. Users need not fear that the story will change when the equipment reaches the buyer's site, as long as that occurs within 30 days after the inspection. In the early months of the policy, the threat of unexpected refurbishment was understood to have been used to discourage buyers on the open market.

John Allen, of used computer dealer Oliver-Allen Corp., was billed at the meeting as a teller of "war stories," but he demurred. "Not since September have Honeywell personnel made unbridled attempts" to use refurbishment as a marketing threat, he said. Rhind admitted openly throughout the meeting that the firm had not "strongly communicated" its policies to its own people, leading to misunderstanding in their application. He encouraged users

to report any unreasonable demands by HIS personnel. Users in the audience said "war stories" should be reported to the user group as well.

Resale value affected

Some users concurred that Honeywell had a right to reward for its work at second user sites. But many did not agree with the method, especially the purchase customers, who complained about the effect on the resale value of their systems. One user groused that although he had bought his cpu and half the memory from Honeywell, he now had to remarket it without the key—the operating software—and his whole 4200 configuration was now worth less than \$100,000. (Original value, he said, was \$900,000.) Another user was bitter that although he purchased part of his system from Honeywell, he still had to pay the software fees because he hadn't purchased the full "basic configuration" from Honeywell. (In other words, whatever basic system is required to run the software used, down to the last 1K of memory, has to be from Honeywell, or else.)

Rhind argued that since 1970 contracts contained a software license and

non-transferability clause. "The practice has not been to enforce it, I acknowledge that." He dismissed "waiving rights" and other legal claims. "I don't think you can allege Honeywell did anything contrary to its contract . . . It did nothing not defensible in law."

In a "policy" special interest group meeting, Charles Barc of Business Mailers, Chicago, said his lawyer felt Honeywell had no right to charge any fees. He proposed that interested users put up \$1,000 each to hire a law firm to investigate taking legal action. As a start he suggested that the Midwest Honeywell Users Group "send out a questionnaire" on this issue to the purchase customers.

Talking out of court

Rhind agreed that the legal issues surrounding the license—whether the software at issue is already in the public domain, what copyright protection Honeywell has, etc.—probably can be argued only "before a judge." (Honeywell had refused to sit on a proposed panel consisting of users, a lawyer, a used computer dealer, and a trade journalist, no judge. The user group cancelled the panel idea.)

Rhind felt that the question of ownership of software rights will become a major issue. For example, Amdahl Corp. uses IBM software on its systems: "It is unlikely IBM will give him a free ride

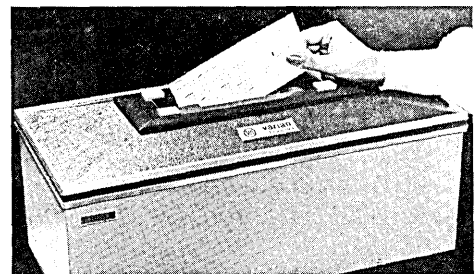
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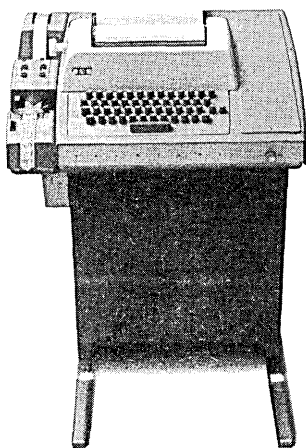
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for long on os/vs. I think it's wrong (meaning the free ride.)" After the meeting, Rhind was asked by a reporter if the interests of Honeywell and the user wouldn't best be served by negotiation out of the courts rather than in? Rhind said that the firm would indeed sit down with the users and their lawyers.

Rhind also addressed the "resale value" complaints, noting with sarcasm that it is the used computer dealers who are offering low and hurting the market

prices. Honeywell, itself, also in the used market, hadn't lowered its prices. Bill Grinker of American Used Computer offered his perspective. Because of the increasing age of the pre-Series 60 systems (Honeywell's current line), "were the market to go on without the new policies, it would chug along for two more years. But the policies are bringing that market to a clearer finish sooner." He contrasted this with the IBM 1401, which would have been worthless in the 360 era without software docu-

mentation. "Honeywell has helped better than any other vendor to kill residual value."

"You no longer can depend on the great white father," he told the audience. "The old equipment is a drain on him," he said, urging the users to greater self-reliance in the service and support of their systems. This left a few wondering where they would get things like spare parts if they opted to maintain their own systems. Grinker offered his services and pointed out that maintenance firm Raytheon is buying up all the 200s it can to service its Honeywell customers.

What's next?

Paul Jarvis of Technical Publishing Co., who chaired the special interest group meeting on policy, tried to broach numerous other issues that his group could address. While the reaction to them was slim, they are noteworthy:

He asked if the group shouldn't ask for a clearer reading on Honeywell's future unbundling plans in the wake of the second user policies. "When will the other shoe drop" for Honeywell customers?

Honeywell is not allowing extended-lease customers to upgrade to the Series 60 without penalty (generally it is requiring the user to buy his current equipment and trade it back to Honeywell).

Users on extended leases who wish to buy their systems are being quoted higher prices than those stated in the contract. The lease contract states a price under Schedule A, but stipulates this schedule can be replaced by a Honeywell-set "fair market value," whichever is higher. "A year ago you would have been given Schedule A." Jarvis said he was uncertain how fair market value is determined.

Finally, Honeywell is no longer building medium-size machines in the U.S. (The 64 level is built in France and won't be built here until the French operation can no longer handle the production volume, according to Honeywell.)

There was no hue and cry over any of these issues, but the policy group agreed to meet if and when they arise.

—Angeline Pantages

XDS is Gone But Exchange Lives On

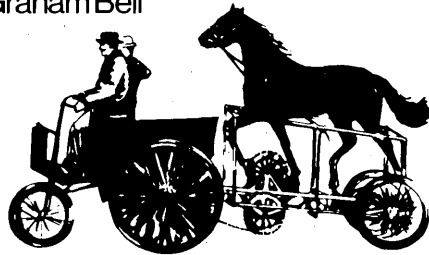
Xerox Corp. and Honeywell Inc. were negotiating non-stop last month in Waltham, Mass. and Stanford, Conn. on details of an agreement for Honeywell to take over maintenance and service for installed Xerox computers and to acquire some manufacturing rights.

In mid-December it was not clear as to whether any manufacturing rights to be acquired would be exclusive. Ob-

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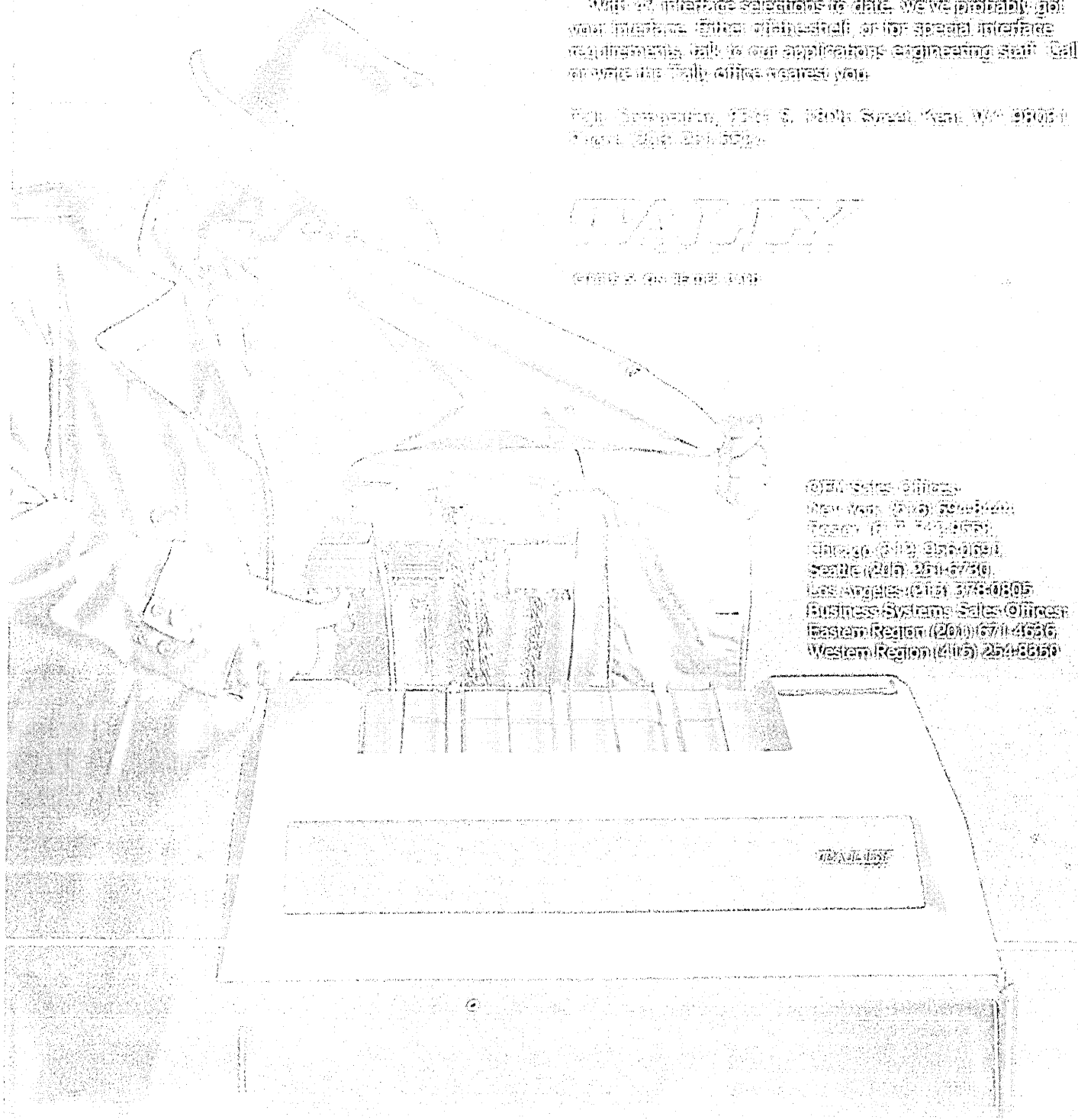
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news in perspective

servers close to the negotiation said a final contract almost certainly would be signed before Dec. 31.

Discussion of manufacturing rights is a late entrant in the negotiations which began last October when Honeywell signed a letter of intent to service Xerox equipment that had been purchased or rented by customers. Xerox decided in July to drop its computer operations (Sept. '75, p. 102) and talked to a number of companies about selling all or part of the operation prior to the announcement of the letter of intent from Honeywell.

Freeze out competitors

That the manufacturing rights might be part of the Honeywell deal surfaced during a Xerox users meeting last month in San Diego. The move was seen by some as an effort by Honeywell to freeze out competitors from Xerox technology. Of course this could happen only if the rights they acquire are exclusive.

Honeywell told members of Exchange, the Xerox user group, it will try to offer a bridge between existing Xerox equipment and Honeywell machines and would hire about 100 senior hard-

ware and software engineers to be stationed at a Los Angeles refurbishment plant.

Some 250 users attended the September Exchange meeting. Bill McAlpin, Western Electric, president of the group, said "most of us found the meeting encouraging. We talked to both Xerox and Honeywell development people and at least they didn't close the door on anything."

For those who weren't encouraged, McAlpin said, "I urged them not to make any hasty judgments."

Exchange had a close working arrangement with Xerox Data Systems, he explained. It had technical committees that worked with the vendor "on each area of enhancement users wanted." He hopes to reactivate the technical committee system on a similar basis with Honeywell.

McAlpin said Exchange has scheduled a meeting with Honeywell development people late this month which he hopes will be "a starting point . . . a meeting at which we can negotiate, talk about the enhancements we want and about reactivating the technical committees."

The Exchange president likes the idea

of a bridge, "something which would protect our hardware and software investment."

"Xerox equipment is special," he explained, "we can't just replace it. We have a lot to lose in terms of hardware and software investment."

McAlpin specifically hopes Honeywell will agree to enhance CP 5, a Xerox operating system which has been called one of the world's five fully versatile operating systems, and to provide additional hardware.

He said he could have wished for "more definite commitments" from the Honeywell development people at the December meeting but "I realize that nothing had been signed yet."

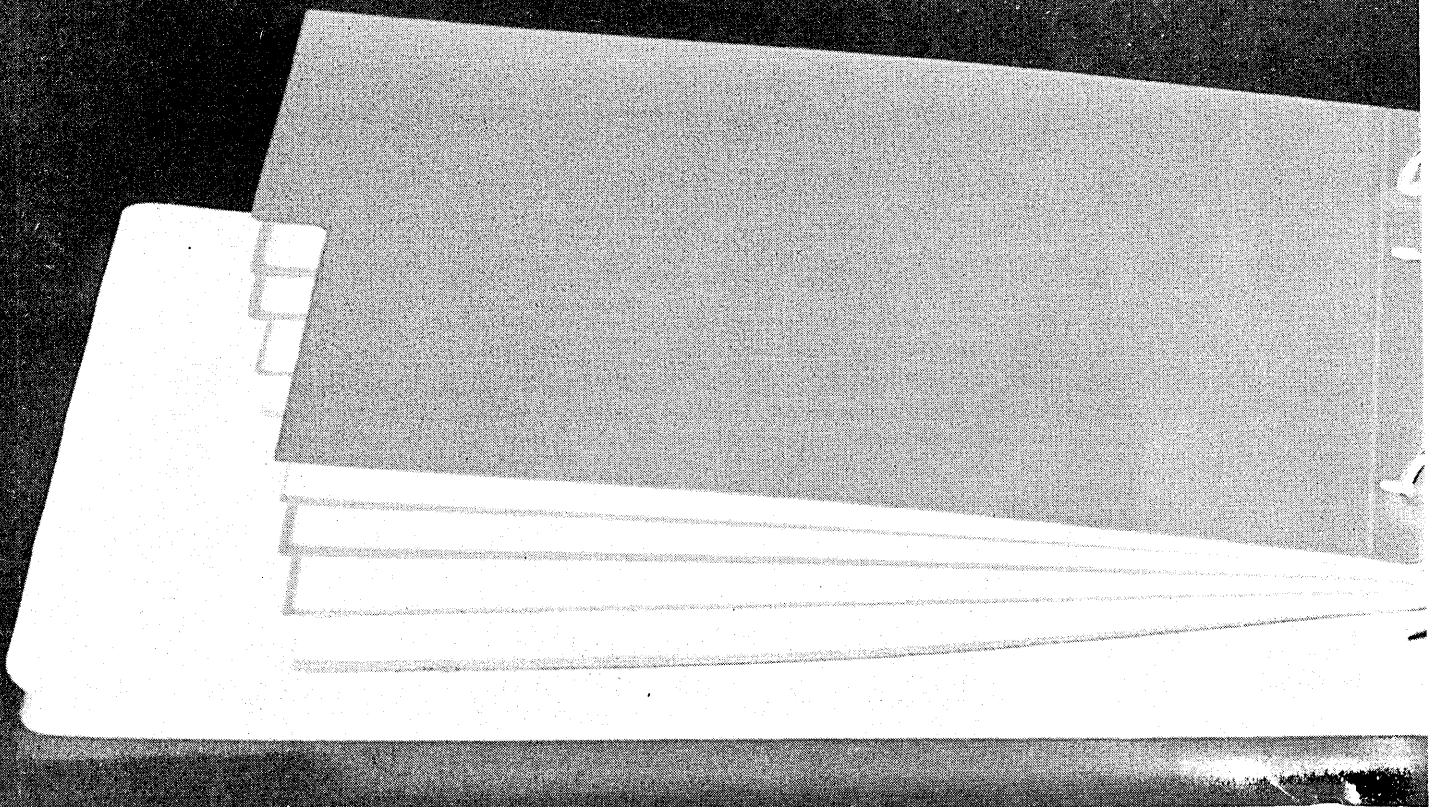
He hopes the more positive commitments will be negotiated this month and made formally in May at the next general meeting of the user group. This meeting was moved ahead from a June date and no location has been selected.

Asked if he thought Exchange might ever merge with Honeywell user groups, McAlpin said, "We're two different sets of users with different sets of hardware and software and different needs but . . . I don't rule it out in the long run."

And, although xds is gone, Exchange goes on. Ballots were mailed this month for the election of next year's officers. Results will be announced in February.

—E.M.

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Peripherals

Still Active in Peripherals Arena

Xerox Corp.'s acquisition of Daconics and its agreement to acquire Versatec, both announced last November, confirm what the giant copier firm has previously said. It leaves no doubt that the company remains interested in the business of marketing peripheral products, as well as innovative products for the office of the future.

In an exchange of stock valued at almost \$4.5 million, Xerox acquired Daconics Corp., Sunnyvale, Calif. The six-year-old firm, which employs 50, got its start making custom systems for scientific applications, moved into the manufacture of controllers for printers, disc and tape drives for HP minis, a business that continues, and more recently developed a powerful shared-logic word processing system.

Xerox makes a standalone text editing system, but nothing like the multi-terminal, minicomputer-based system at Daconics. The latter has a number of interesting options, such as the ability to do arithmetic calculations, perform automatic hyphenation, and output to a photocomposer. The firm has shipped about 20 systems.

Xerox has also agreed to acquire Ver-

satec Inc., Santa Clara, Calif., manufacturer of electrostatic printers and plotters. The value and the number of Versatec shares outstanding when the trans-



DISC DRIVE FAMILY: Another Xerox peripherals subsidiary, Diablo Systems, Inc., in December introduced a series of compact disc drives (under nine inches high and able to fit in a 19 inch rack) that range in capacity from 13.3 megabytes to 53.3. Russel K. Brunner, left, development program manager, and Martin Halfhill, engineering manager, said the new series 400 has been designed to let customers upgrade in capacity without having to write new software or redesign cabinets, interfaces or controllers. They said a family of eight drives will be offered. Production in oem quantities begins at mid-year.

action is completed will determine the number of Xerox shares involved in the transaction. Xerox, of course, was the first to introduce a nonimpact computer output device, the model 1200. Never highly successful in the marketplace, it has been leapfrogged by the IBM 3800, which leaves Xerox no choice but to trump that with a follow-on to the 1200. Frederick Withington of Arthur D. Little points out that the nonimpact technology is just starting to take off, offering more attractive price-performance, multicolor copies, and office graphics, and says the acquisition "obviously underscores Xerox' continued intent to participate in the dp industry." *

Government Procurement

Getting Around The Supply Schedule

Another procurement hassle erupted at year-end involving a familiar cast of characters—the Department of Defense, the General Services Administration and IBM.

Last spring IBM failed to submit a Federal dp Supply Schedule bid on time, accidentally or on purpose. Subsequently, the company signed a limited schedule contract with GSA, covering essentially the re-leasing and lease-to-

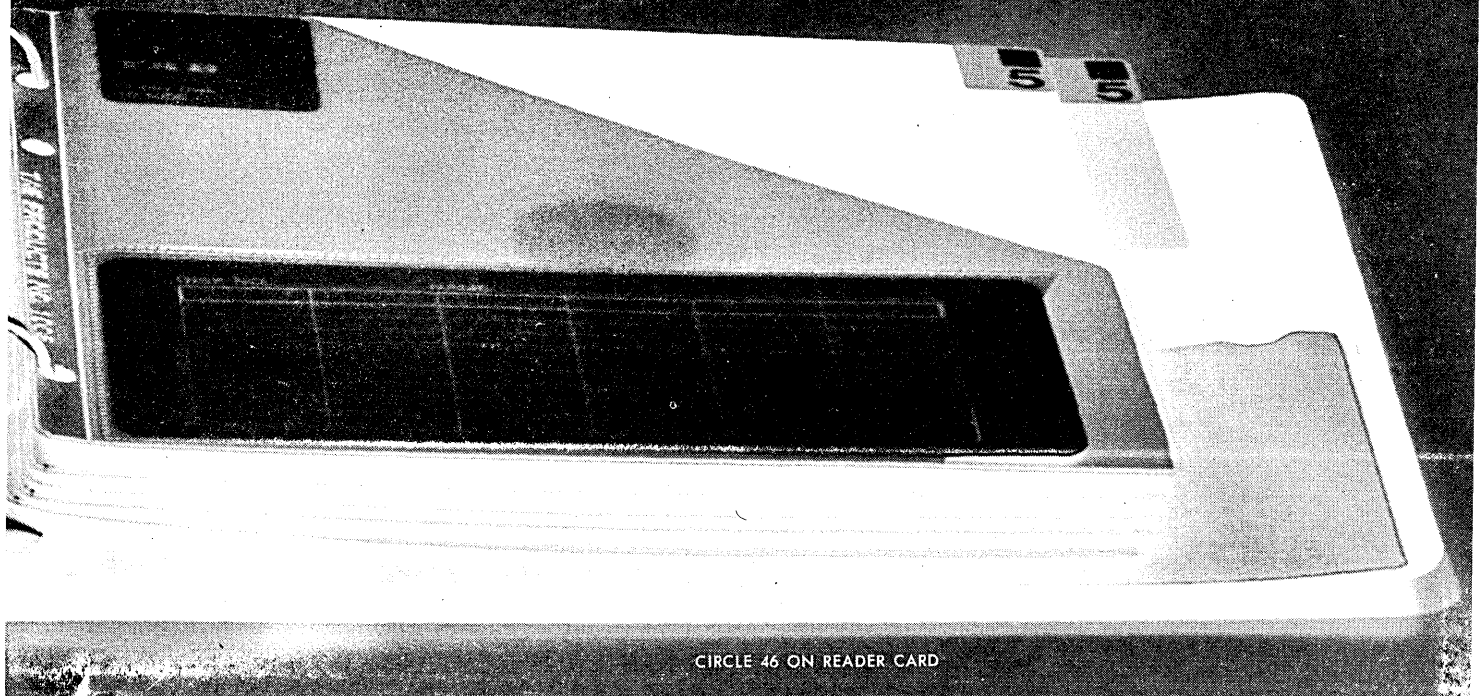
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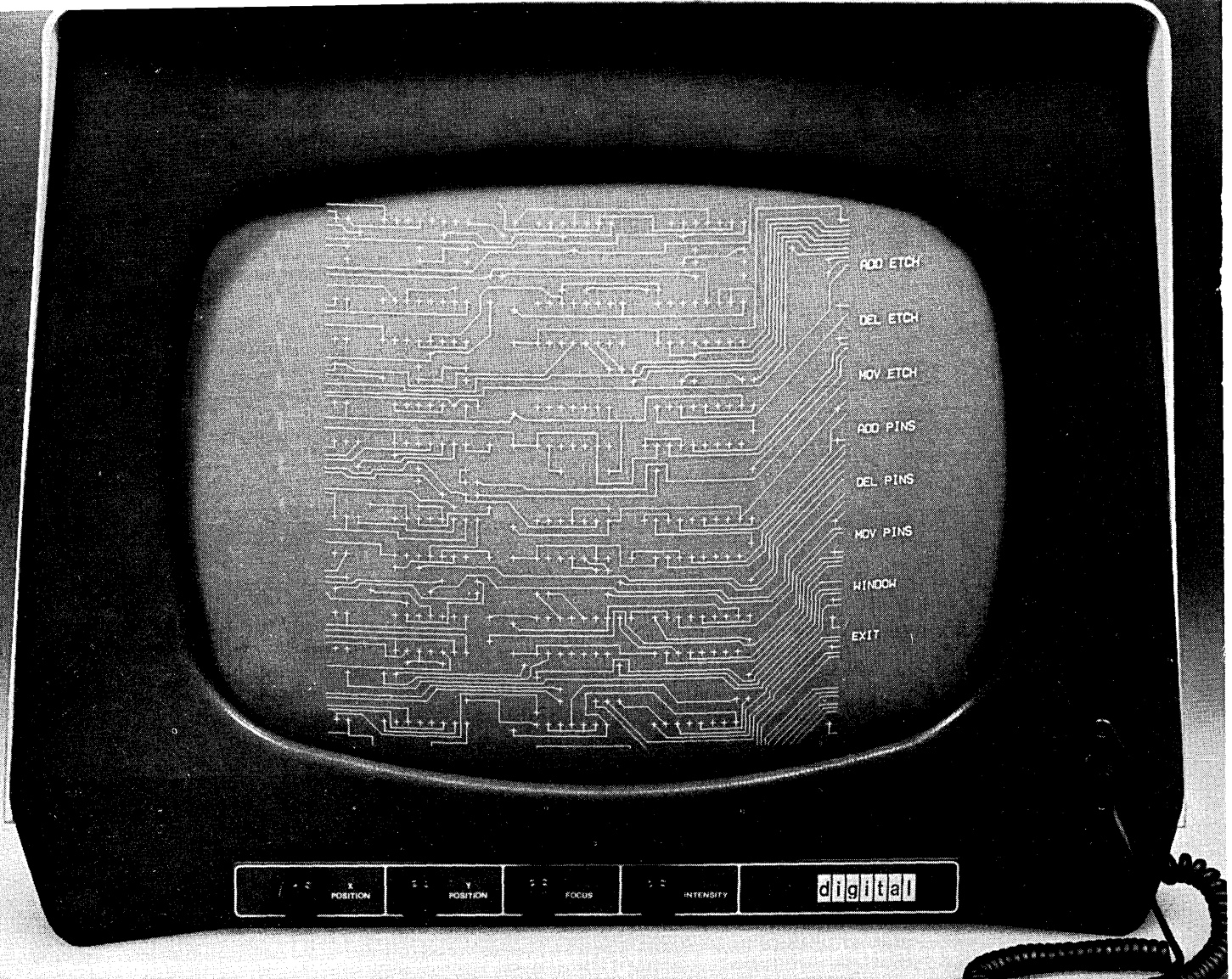
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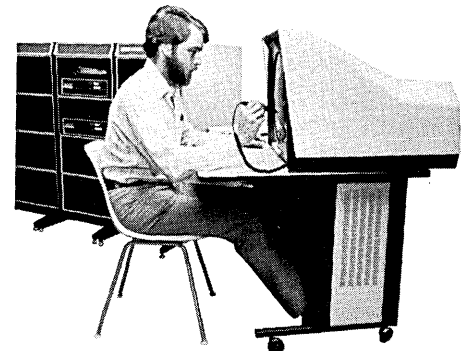
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digital

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purchase conversion of equipment already installed within federal agencies.

But in addition, IBM began negotiating a separate "indefinite quantity contract" directly with the defense department. It would apply basically to the acquisition of new dp equipment—the main item missing from the Limited Schedule Contract signed earlier with GSA.

The House Government Operations Committee, headed by Rep. Jack Brooks of Texas, reportedly feels this DOD-IBM agreement, if implemented, will make a mockery of the GSA supply schedule, seriously undermine the Brooks act, which is based on the idea of centralizing procurement of dp equipment, and establish a precedent for every other federal agency and mainframer to negotiate private deals with each other.

To cut red tape

DOD is understood to feel it needs the proposed agreement to avoid the red tape and delay connected with procurement of new dp equipment off the Schedule. Also, IBM would charge last year's prices which are somewhat less than this year's.

Sources within GSA argue that Congressional fears aren't justified. They point to the many restrictions in the DOD-IBM agreement, plus the fact that it would expire next Sept. 30. One restriction, for example, requires DOD to obtain a specific delegation of procurement authority from GSA before acquiring any cpu (other than a minicomputer) having a purchase price of more than \$50,000.

The IBM-DOD agreement hadn't been signed or implemented, in late December, and GSA had agreed not to give its blessing before consulting further with the Brooks committee.

Raise the limit

In October 1974, GSA proposed an amendment to its procurement regulations that would raise the \$50,000 limitation to \$500,000. In other words, an agency would no longer have to get GSA's prior approval (officially called a "delegation of procurement authority" or dpa) to issue an RFP for a system costing from \$50,000 to \$500,000.

The proposed amendment was almost promulgated in December, but at the last minute it was delayed—reportedly because the Office of Management and Budget (OMB), after receiving some flack from Capitol Hill, decided to take another look at the language.

This amendment, if adopted, will benefit all mainframers who sell to the feds, since some of their new systems

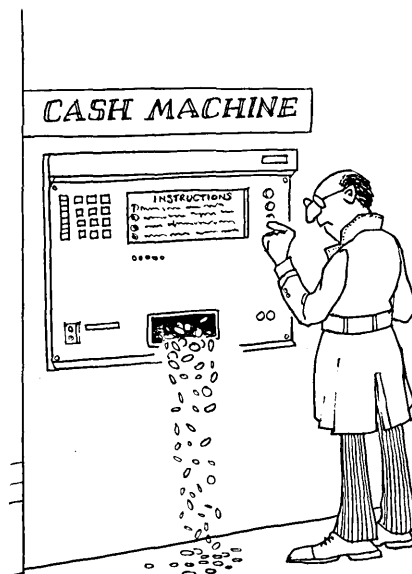
are contracted for on the basis of competitive, non-Schedule procurements. But IBM will cash in more than any of the others. Armonk doesn't have a GSA Supply Schedule covering procurement of new systems, so procurement of all such systems from IBM is governed by the non-Schedule regulations. It just so happens that the proposed amendment applies *only* to systems acquired off the Schedule.

* * *

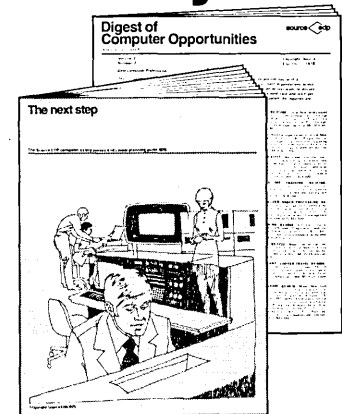
A watered down version of GSA's much delayed teleprocessing services RFP (request for procurement) is now supposed to be out on the street by Feb. 1. The "discount benchmark" provision has been removed in response to industry objections, and the liquidated damages section has been rewritten to reduce vendors' risks.

The key change is that the newly-drafted solicitation does not ask for price quotations. Rather, it calls for each bidder's adherence to specified terms and conditions. Suppliers needing these requirements will sign a "basic agreement" with GSA enabling them to compete with other approved firms on the basis of such factors as price and delivery, for the business of federal agencies.

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CIRCLE 107 ON READER CARD

News in Perspective BENCHMARKS . . .

Carrying On: In the face of an adverse decision by a Delaware Chancery Court which ruled its D-116 minicomputer was developed through improper use of maintenance drawings for Data General Corp.'s Nova 1200, (Dec. '75, p. 130) Digital Computer Controls, Inc. is continuing to produce the D-116 and has introduced a new minicomputer it calls the Mod 5 which it said had been planned as the successor to the 116 regardless of the outcome of Data General's trade secrets suit. Digital Computer has appealed the Chancery Court decision to the Delaware Supreme Court and has posted a bond of \$500,000. As a result, an injunction issued by the lower court against production of the 116 has been stayed.

Royalties Paid Part: A mechanical pipe organ now graces the home of Stanford Univ.'s Don Knuth, shown here with his wife, Jill. It's a 16-rank organ with 812 pipes for two manuals and pedals, and the pipes range in length from less than an inch to wooden ones eight feet tall. The instrument, considered by Stanford organist Herbert Nanney "the finest tracker (mechanical action) instrument I know of in a West Coast home," is installed in a two-story room designed for it in the Knuths' new home on campus. Knuth is winner of the ACM's 1974 A. M., Turing Award, last year was elected a member of the National Academy of Sciences, and is also

a member of the American Guild of Organists. He has completed three volumes of a seven-volume series of books, "The Art of Computer Programming," the first volume of which reportedly has been selling at a rate of almost 1,000 copies a month for the past seven years. He says some of the royalties have gone toward paying for the organ, which cost \$35,000. It was designed by Knuth and made by Los Angeles organ builders Richard L. Abbott and Uwe "Pete" Sieker.

Life Preserver?: Jerry E. Goldress, a principal in the Los Angeles management consulting firm of Grisanti & Galef, Inc., has been named president and chief executive officer of Cambridge Memories, Inc. He replaces company founder Joseph F. Kruey who was named chairman of the board. Goldress will remain a principal of Grisanti & Galef, a firm which has gained a reputation for bailing out financially troubled companies. Goldress' appointment by Cambridge came less than a week after the add-on memory systems house posted a loss of \$4,128,000 or \$2.43 a share on sales of \$18,858,000 for the year ended Aug. 31. This compared with a profit of \$1,040,000 or 70 cents a share reported on sales of \$23,140,000 for fiscal 1974.

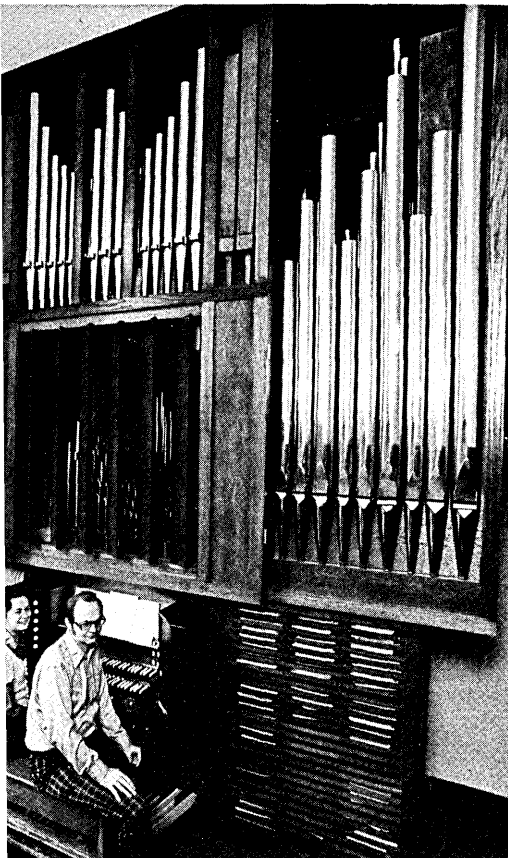
Itel Completes 360 Phase-Out: Itel Corp., San Francisco, which at the end of 1973 said it would sell its \$200 million portfolio of System 360 equipment over a period of two years, ending its 360 leasing activities, completed the phase-out on schedule. Peter S. Redfield, president, said the schedule was met without need to adjust the \$30 million applied against 1973 earnings in consideration of the discontinuance. He said Itel is the first company involved in the 360 leasing business to successfully implement its phase-out.

Better Late Than Never: One of the country's oldest and biggest supermarket chains, beset by financial and organizational problems, is one of the last of the big chains to get into electronic point-of-sale but it's in there now. The Atlantic & Pacific Tea Co. has signed a multimillion dollar, three year agreement with National Semiconductor Corp., Santa Clara, Calif., for Datachecker POS systems. Frank B. Bialek, vice president and general manager of National's Systems Div. said the agreement calls for model T-2500 standalone terminals with polling subsystems and for fully-computerized Datachecker 800 systems. Both types of equipment, he said, will interface with electronic scales and can be upgraded to Universal Product Code Scanning systems and teleprocessing.

U.K. Privacy Proposal: Britain's government issued a "white paper" last month recommending privacy protection laws that closely resemble those instituted by Sweden in which a data inspection authority would license and supervise the intrusion of computers into people's lives. The recommendations, which now must go into the legislative process, fall short of a proposed "white paper" in 1973 (Sept. '73, p. 121) in which security of personal information maintained in computer data banks would have become the legal responsibility of a named individual in each organization. But it does go beyond the highly-publicized Swedish law in that the government would license public data banks as well. The paper was due several years ago, but civil servants, pointing to the high costs of such a law, managed to delay the matter while it was more thoroughly thrashed out. (In October 1974, one official told the House of Lords the white paper would be out "before Christmas." A year later—October, 1975—a House of Commons speechmaker pointed out he hadn't mentioned which Christmas.)

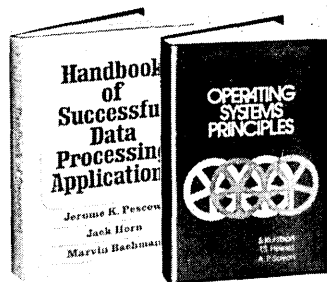
Service for a Year: The Federal Communications Commission has given Western Union International (WUI) a green light to offer International Digital Data Service (IDDS) for one year. Service will be available between the U.S., France, Italy, Spain, and Austria, and probably will begin in late spring. WUI said it is meeting with its overseas partners to finalize a tariff. The FCC order requires a tariff to be filed 60 days before service starts. IDDS consists essentially of parallel transmission paths—one provided by satellite, the other by cable—across the Atlantic, through which the user transmits simultaneously. Speeds range from 50 to 9600 bps.

Another Non-Carrier Service Complaint: Western Union has submitted a formal complaint to the Federal Communications Commission charging that a store-and-forward minicomputerized switching service offered by Wiltek, a Norwalk, Conn., terminal maker, is a communications offering which, under the FCC's 1970 decision in the Computer/Communications Inquiry, can only be offered by regulated common carriers. The telegraph company wants the commission to issue a cease-and-desist order against Wiltek. The FCC has a similar complaint pending filed by WU against Keydata, a Boston-based on-line service bureau. Another similar complaint has been filed with the commission by Telenet Communications against Tymshare Inc. (Dec. '75, p. 17).*



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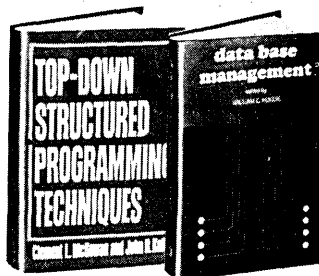
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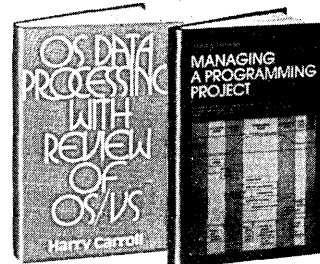
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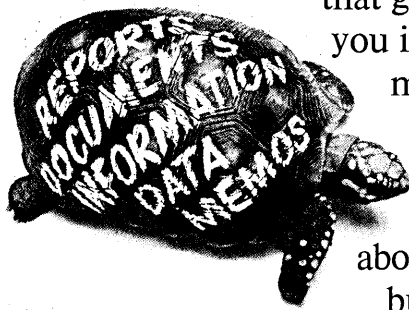
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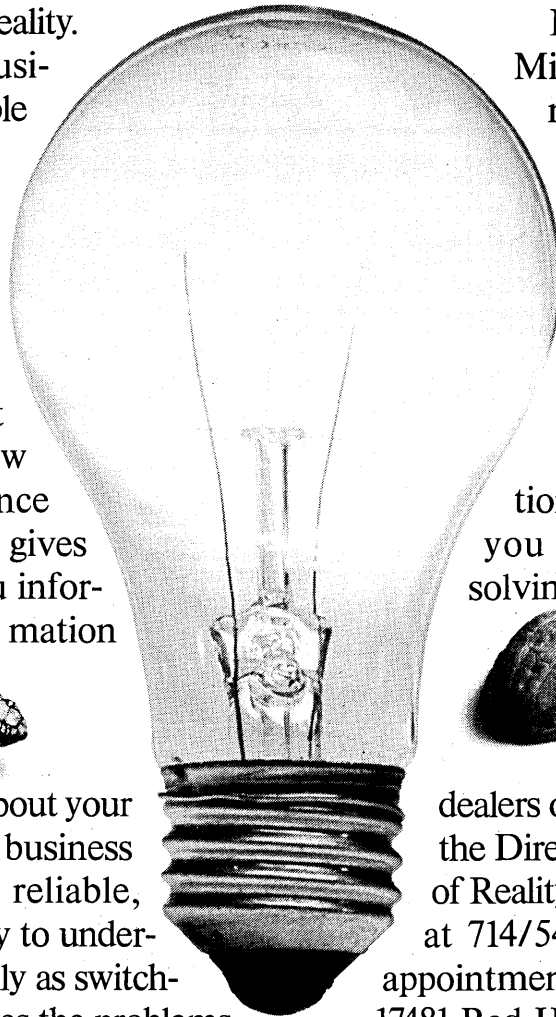
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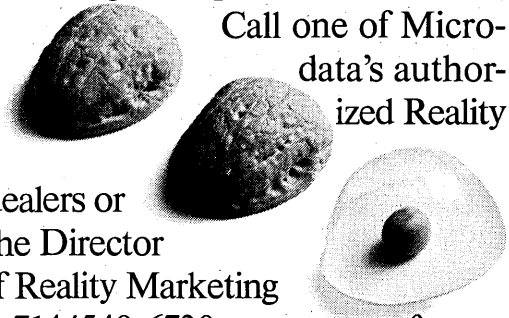
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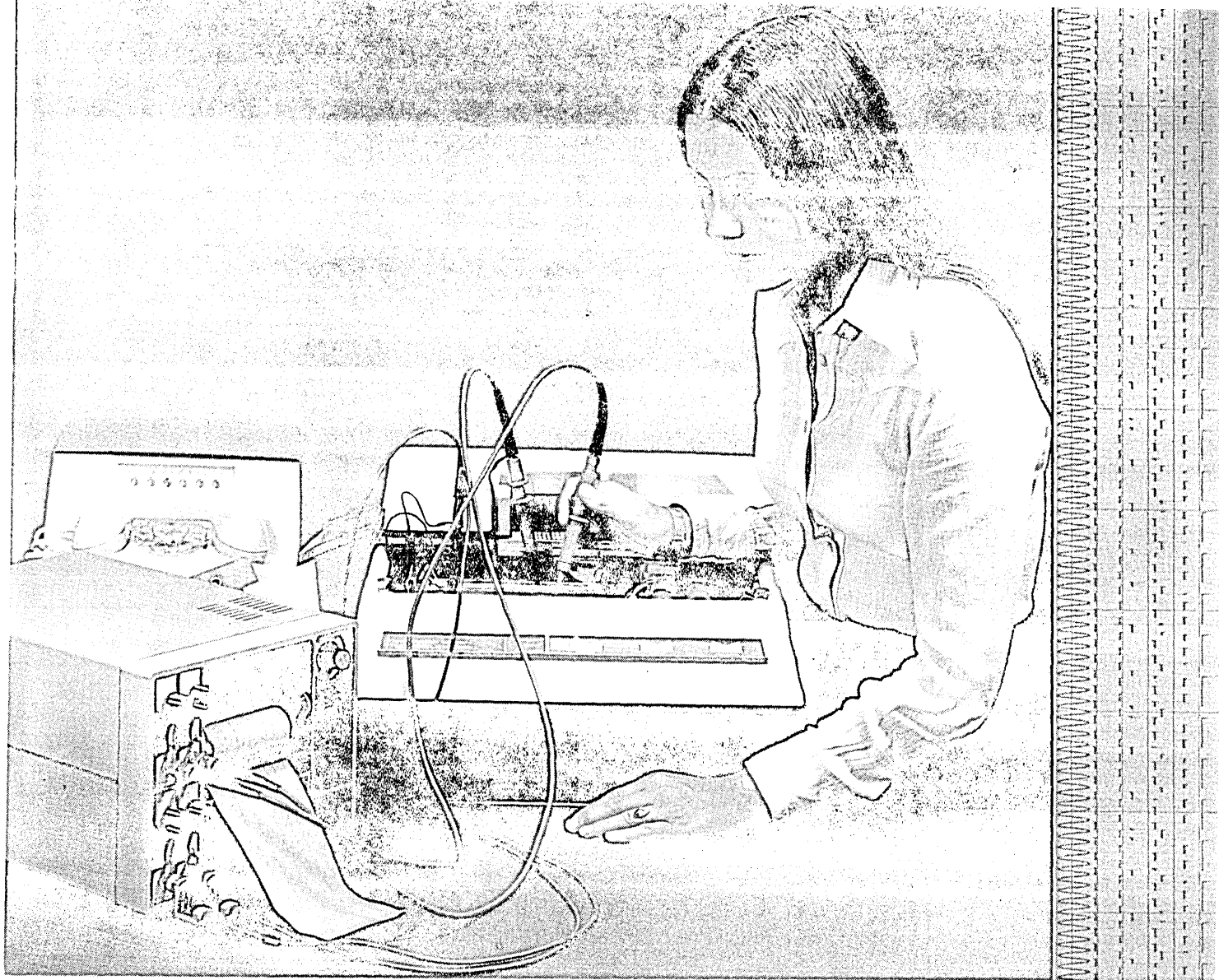


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hardware

Off-line

A consensus at a session on developing memory technologies presented at last year's National Computer Conference held that optical memories, much less optical computers, seem to be much further away than imagined. Optical interfaces may be another matter, however. IBM's Federal Systems Division has just delivered a package called ALOFT (Airborne Light Optical Fiber Technology) to the Navy for use on the Navy's A-7 aircraft. A cable weight reduction of 21:1 was accomplished by using fiber optic cables for communication between the craft's on-board cpu and various avionics packages. Data rates up to 10 megabaud can be supported using the optic cables.

Don't let your designers get fooled by the apparent ease with which a microprocessor can be selected and implemented in products warns Don McDonald, Manager of Computer Development for Technology Marketing, Inc., Costa Mesa, Calif. Misconceptions abound, says McDonald, including underestimating the complexities involved in their use, and not fully understanding the differences between available microprocessors in function and performance. It's every bit as complicated to design in microprocessors as it is to use minis, McDonald believes.

Time Sharing Resources, Inc., Great Neck, N.Y., is one of the first firms to offer IBM 5100 portable computers on three, four, and five-year full pay-out leases. TSR, an APL time-sharing services vendor in the New York metropolitan area, is offering its library of general purpose application programs at no cost to leasing clients.

Users who purchase flexible disc media from K/Tronic, Inc., Santa Clara, Calif., in the near future will get an added bonus: a "Be Happy/Go Floppy" T-Shirt for every 10 discs ordered. Prices are \$7.50 each in quantities of 5-100.

Warner & Swasey, the big U.S. tool manufacturer, has received exclusive rights to manufacture and market the "MICRAL" microcomputer line in the U.S. and Canada from France's Realisations Etudes Electroniques (R2E).

Portable Terminal

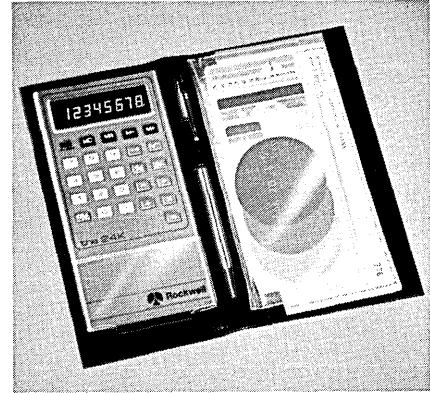
Will there be a consumer demand for portable computer terminals like there was for pocket calculators? Texas Instruments thinks so and believes that its latest portable terminal, the 745, will be the first one to sell in the tens of thousands. The price has been whittled down to \$1,995 (with considerable reductions for large orders) and the weight is down to less than 13 pounds—less than many portable typewriters. In addition to traditional markets where portable terminals have been used—primarily time-sharing and remote inquiry/reponse, TI sees large new markets among insurance, real estate, wholesalers, manufacturers, and educational users. The numbers are certainly there—there are more than 450,000 insurance agents in the U.S., most of them independents, by TI's count. The feature that will catch most insurance companies' eyes is that with such a terminal capable of talking to a central data base in the home office, contract closures can be made on the spot instead of having to pack up and leave and get back to the potential buyer—who has often changed his or her mind.

The 745 is a continuation of the "Silent 700" series of non-impact thermal printers. It runs at 10-30 cps, has a built-in acoustic coupler, communicates in half- and full-duplex mode, and has an ASCII keyboard complete with embedded numeric pad. The microprocessor controlled 745 uses programmable read only memories (PROM's) and can relatively easily be equipped with special keyboards. A KSR version of the 745 is priced at \$1,395. TEXAS INSTRUMENTS INC., Houston, Texas.

FOR DATA CIRCLE 226 ON READER CARD

Calculator/Wallet

If you have any belated Christmas shopping or business gift giving to do, consider the 24K, a combination wallet and built-in ultra-thin five function calculator, priced at \$40. The 24K includes a ballpoint pen, check or notebook pocket, and transparent credit card inserts. The calculator has a full four-key memory and functions include percent with automatic add-on and discount, square root and change sign. The 24K operates in algebraic logic and maintains trailing zeros in add and subtract for monetary calculations. It positions the decimal point automatically and also performs chain



calculations. Fairly impressive for a product that weighs less than half a pound and measures 5½ x 2¾ x ½-inches. ROCKWELL INTERNATIONAL, MICROELECTRONIC PRODUCT DIV., Anaheim, Calif.

FOR DATA CIRCLE 227 ON READER CARD

3270 Printer Alternative

IBM users of the 3270 intelligent terminal are offered the model 4165 as an alternative to the 328X series printers supplied by IBM. The 4165 prints at 165 cps and is plug compatible with the IBM unit. The price is \$6,750. INTERFACE SYSTEMS, INC., Ann Arbor, Mich.

FOR DATA CIRCLE 228 ON READER CARD

S/3 Model 15 Printer

Looking for a non-IBM printer to fit your new System/3 model 15? This firm claims it has the only one available in the country. It's called the DAC/3 and it operates at 750 lpm, compared to the 600 lpm offering of IBM. Depending on length of lease, the DAC/3 is billed as capable of saving \$5,232 per year compared to the IBM product. The product comes complete with sound deadening cabinet and static eliminator, single line memory, and paper slew rate of 20 ips. The printing mechanism uses what is called a "Chaintrain," character links which ride on a monorail track, to assure alignment and good print quality. DIGITAL ASSOCIATES CORP., Stamford, Conn.

FOR DATA CIRCLE 229 ON READER CARD

Flatbed Plotter

Versatec underscored just how big a plot its new 4472 flatbed plotter can generate by sending DATAMATION a 6 x 6-foot news release about it. The new model is very probably the widest electrostatic plotter ever made. Instead of paper drive stepper motors, shaft en-

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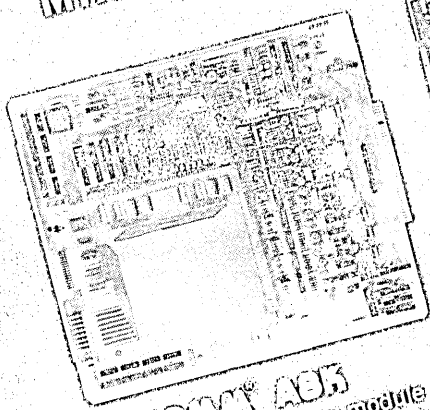
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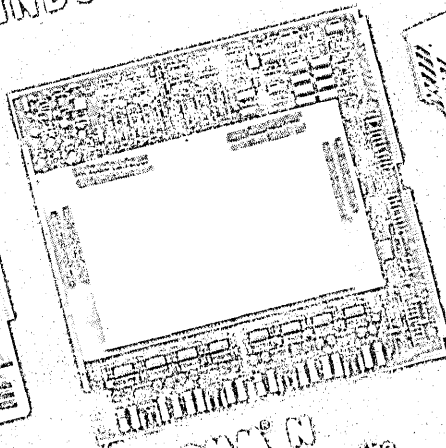
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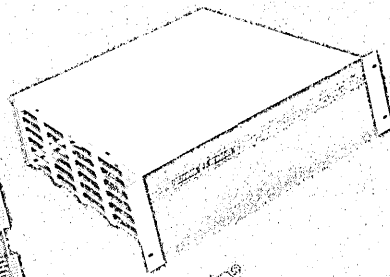
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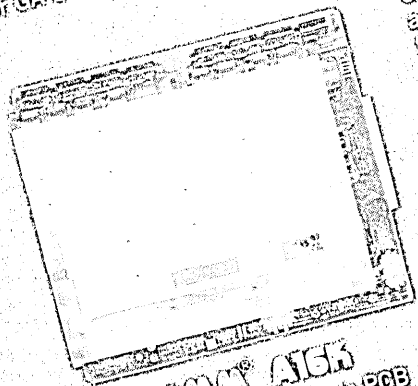
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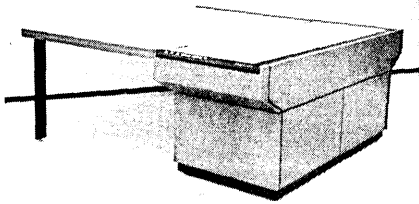
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hardware



coder and servo motor drive had to be used to insure plotting accuracy of .3 mil. Individual characters and plot lines are formed in an overlapping dual array, 100 dot per inch 7 x 9 matrix. Standard electrographic or translucent paper is viewed on a horizontal flatbed of over 12 square feet, or on an optional extension table that provides a viewing area of over 36 square feet. Integral paper winder and cutter simplify paper handling. A take-up roll handles paper lengths up to 1,500 feet. Paper speed is one inch per second. A second printer/plotter version is also offered. Prices begin at \$43,500. VER-SATEC, Santa Clara, Calif.

FOR DATA CIRCLE 230 ON READER CARD

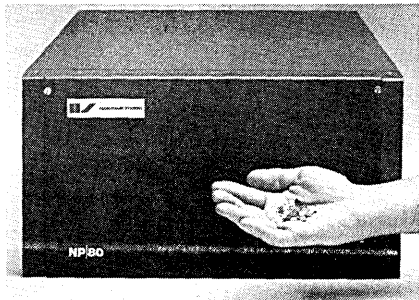
Video Digitizer

The model 270 video digitizer accepts standard CCTV signals and converts video information into 8-bit digital format for computer input. A matrix as large as 480 x 512 picture elements can be digitized with direct computer addressing of any point on the tv screen. The 270 can also reconstruct computer processed images by means of a photographic time exposure on a standard tv monitor. The unit is priced at \$4K. COLORADO VIDEO, INC., Boulder, Colo.

FOR DATA CIRCLE 231 ON READER CARD

Network Processing

The NP|80 is described by its developers as the "missing link" that will allow organizations to more closely pattern their distributed processing networks after the actual organization of the company. What the NP|80 is in



Hand Holding: Enough 16K bits-per-chip are held in the outstretched hand for 256K bytes of memory.

hardware terms is an impressive little box of from 16-256K bytes of memory optimized for data base management and high speed multiline communications. Compatibility with both current line disciplines and IBM's SDLC protocol is preserved by the NP|80. The unit is designed for use at intermediate network locations. Up to 64 local displays can access an NP|80 data base of up to 270 megabytes. The same displays can also access the central data base at line speeds up to 50 kilobaud. While performing data base management and communications services for local System IV/70s (the vendor's own display processing systems), the NP|80 can concurrently provide master multi-point control for a network of remote systems with speeds up to 9600 baud.

To build such a device, Four-Phase had to push the state of the art in circuitry design, and the memory chips used in the NP|80 are 16K (per chip) LSI random access memories—at a time when other manufacturers are just breaking in 4K/chip technology. The payoff is impressive performance and small size. The mini has a 500 nsec cycle time.

Monthly rental for an NP|80 with 16K bytes of memory and communications support for three 9600 baud lines is \$312 on a 42-month lease. A system with 16K, 67 megabytes of disc storage, and support for one 9600 baud line rents for \$771 on the same length lease. Deliveries begin during

the first quarter of this year. FOUR-PHASE SYSTEMS, Cupertino, Calif.
FOR DATA CIRCLE 232 ON READER CARD

Minicomputer

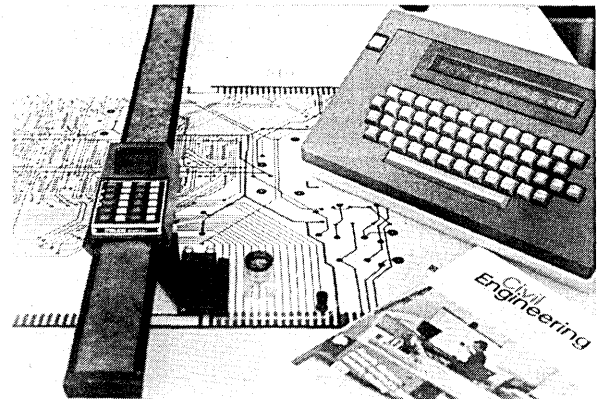
The 6/16 is the new low-end of this manufacturer's product line and has been brought out to compete with the DEC PDP-11/04 and PDP-11/05 and Data General Nova 3 products in the very price sensitive bottom end of the spectrum. The 6/16 should do well: it's 30% faster than Interdata's own 7/16, yet is priced in good aggressive fashion: \$1,736 for 100 8K core machines, or \$1,364 for 100 8K MOS units. Included in the architecture is an "IBM-like" instruction set, 16 general purpose registers, four high-speed direct memory access channels and vectored hardware interrupts to handle up to 225 I/O devices. Instruction execution times range from 900 nsec for register-to-register operations to 10 usec for fixed-point multiply with an optional multiply/divide feature. INTERDATA, INC., Oceanport, N.J.

FOR DATA CIRCLE 233 ON READER CARD

Key-to-disc

The model 77 remote entry system is probably the surest thing to a "can't miss" product announced so far this year. The manufacturer's considerable remote batch terminal base *asked* for the product. And though it doesn't look like one, the 77 might be very

product spotlight

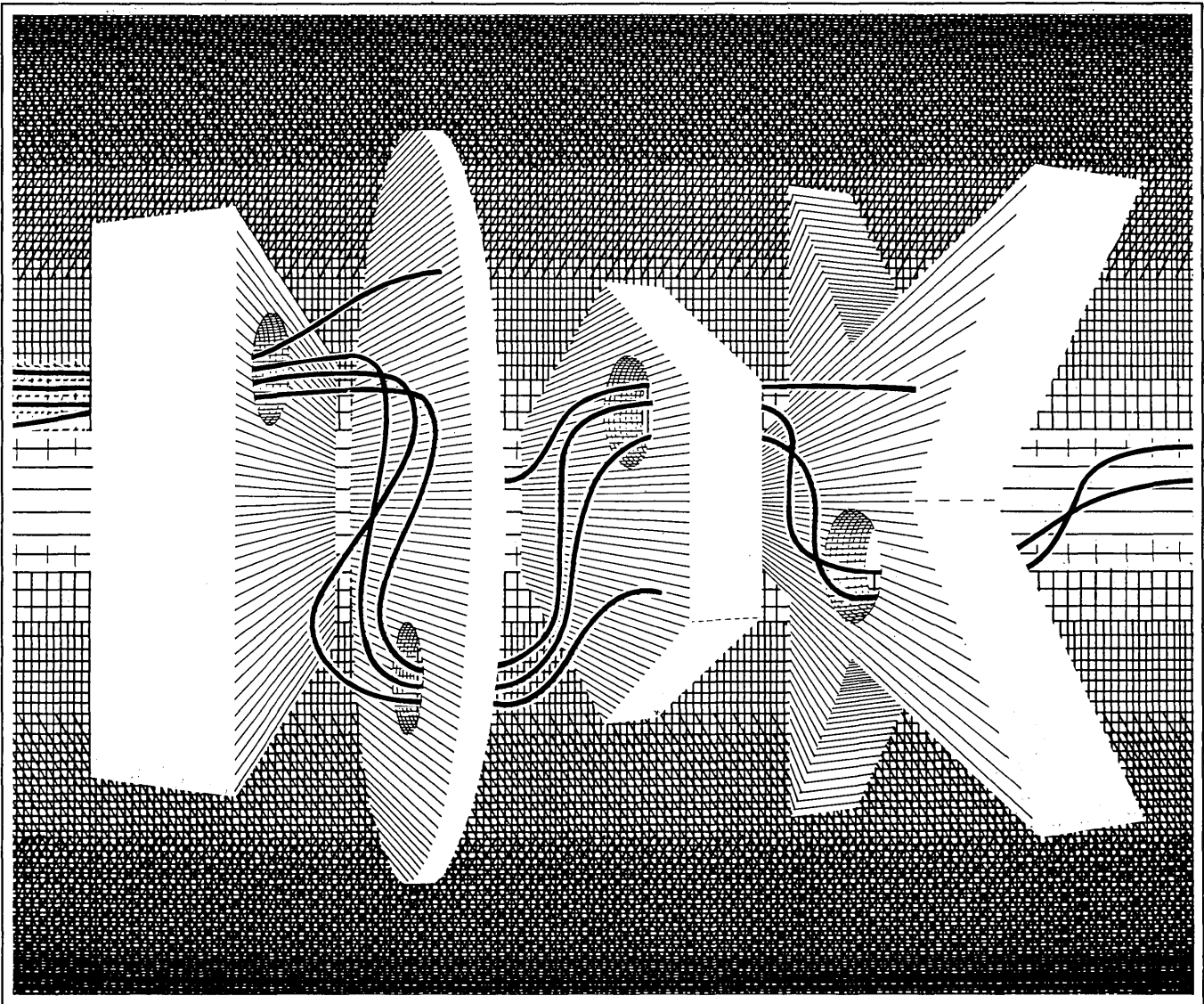


Digitizer

This manufacturer is one of the first to realize the advantages of using a microprocessor in a digitizer. The resulting product, called the Digitrac, has a number of interesting capabilities at a price that should insure its success. Besides converting a line drawing to X and Y coordinates, the Digitrac automatically converts to and from polar coordinates and computes areas and perimeters. With built-in scale factor conversion and grid round-off, the Digitrac can also be used as an English-Metric converter. The display readout is

located on a calculator-like keyboard at the operator's fingertips where it is easy for the operator to see. Dual six-digit coordinates are displayed in light-emitting diodes complete with sign and decimal point. An output connector is provided for cabling to other devices such as printers, Teletype teleprinters, cassettes, floppy discs, crt's, or other computers. The Digitrac has a resolution of .001-inch, and repeatability of .005-inch. The unit is priced at \$4,450. MELCO INDUSTRIES, INC., Denver, Colo.
FOR DATA CIRCLE 225 ON READER CARD *

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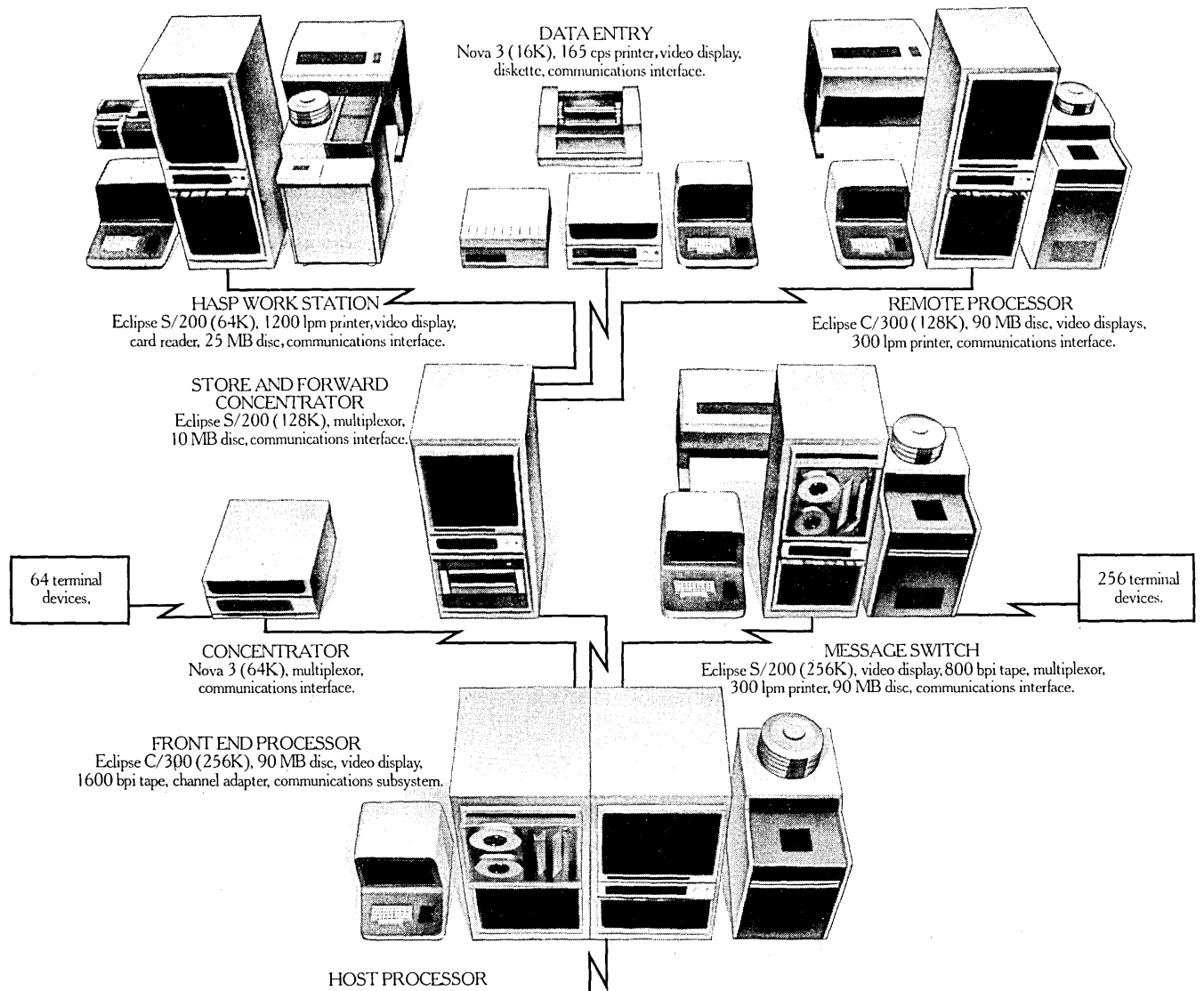
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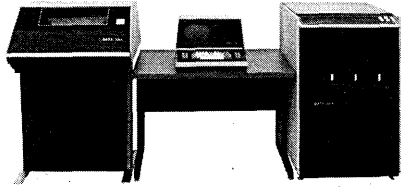
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hardware



competitive against distributed processing input systems sold by IBM, Data-point, Sycor, and others.

The system permits one or two operators to enter, edit, verify, and store data on removable diskettes. The data can then be transmitted in batch mode (attended or unattended) to a central processor. Off-line capabilities include diskette copying and formatted printing to an optional line printer. Data from the host processor is transferred directly to diskettes in attended or unattended modes. Two diskettes are standard, a third optional, each with a storage capacity of 242 kilobytes. The system's printer is available in two speeds, 62 or 125 lpm from a 63 EBCDIC character set. Full 132-column form widths are accommodated. A typical model 77 with communications (bisync) features, two diskettes, a sin-

gle keystation, a local formats feature, and a 62 lpm printer rents for \$585/month and sells for \$20,118. A second keystation and a third diskette rent for an additional \$110/month. DATA 100 CORP., Minneapolis, Minn.

FOR DATA CIRCLE 234 ON READER CARD

Communications Controller

IBM appears to have done a total rework of its 3705 communications controller with the 3705-II. Some specifications have changed: you can now get from 32-256K of monolithic storage—a new upper limit from the previous 240K. And the execution time is down to an even one microsecond from 1.2 usec. But the most novel feature of the "Mod Two" is a device called the communication scanner for managing the transfer of data between its storage and central control units and its communications lines. The scanner speeds data handling with a new "cycle stealing" feature that allows the control program to pause for one machine cycle while data moves directly to or from storage, bypassing the 3705's control unit. Additionally and significantly, the new scanner transfers data in blocks of up to 254 characters, rather than in single characters, which should significantly cut down 3705 and cpu overhead. Finally, there's additional high-speed line capability with

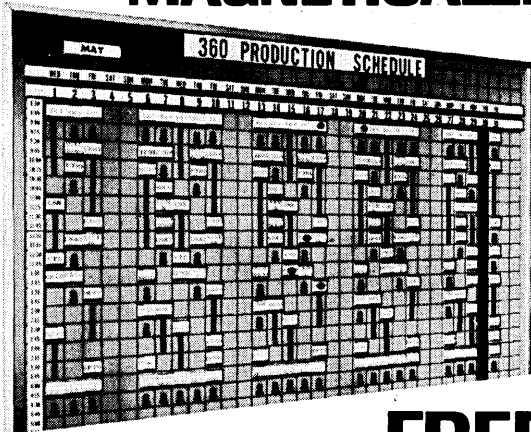
support of 56 kilobaud lines, compared to 50 kilobaud limits on the original 3705. The partitioned emulation program has been modified to allow the controller to be operated concurrently in two modes; as an earlier control unit and with the latest network control features, when attached to two host computers. Prices range from \$53K to \$228K for the 3705-II depending upon specific configuration, with rentals ranging from \$1,600 to \$7K month. IBM CORP., White Plains, N.Y.

FOR DATA CIRCLE 235 ON READER CARD

Data Entry

It's time for a new round of systems from the company that started the local key-to-disc concept nearly a decade ago. Mohawk has announced several new systems, the 2409-2 and the 2409-3. The 2409-2 key-display system is designed for large installations keying high volumes in multiple shifts and has a disc storage capacity of 90,000 125-character records. The 2409-3 is an expansion system from the 2409-2 and provides 150,000 125-character records of disc storage. Mohawk has also announced user programmability for 1204, 2409-0, 2409-1, and the two latest systems. Concurrent processing is also available now on all systems. In addition, the 2409 systems can be set-

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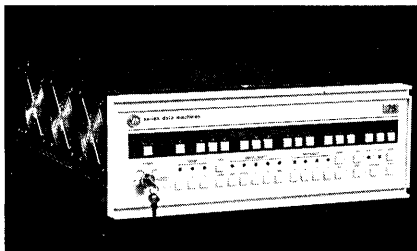
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hardware

up with three partitions to allow foreground, background and independent activities such as communications, media conversion and printing to occur simultaneously. Up to 64 subformats per job are now available on all MDS gear. A typical 16-key-station 2409-3 configuration averages approximately \$135/month on a three-year lease, including maintenance. MOHAWK DATA SCIENCES CORP., Parsippany, N.J.
FOR DATA CIRCLE 238 ON READER CARD

Minicomputer

The V76 sports some impressive features, including price, made possible by the use of 64K words of memory/



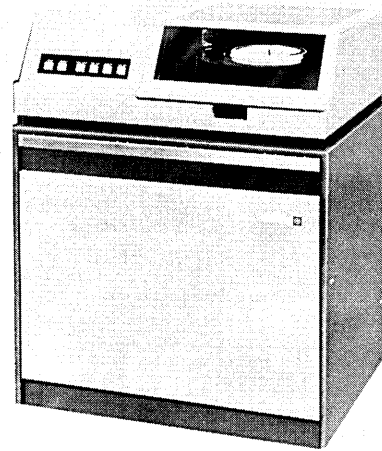
board packaging. A V76 with 128K words of 660 nsec semiconductor,

power supply and memory management system is priced at only \$28,450, compared to a similarly equipped V73 from this manufacturer that was priced at \$74K. These developments will help keep Varian competitive in its traditional real-time and scientific computation markets, and will get the firm into the transaction oriented data base management market where large memories are required. The V76 is software compatible with all other V70 computers. Deliveries are scheduled for the first quarter of this year. VARIAN DATA MACHINES, Irvine, Calif.

FOR DATA CIRCLE 236 ON READER CARD

Disc Storage

A full 30 megabytes of storage for Data General Nova, Eclipse and "similar" machines manufactured by Digital Computer Controls and Keronix is offered by this manufacturer for just under \$10K, which seems like a price breakthrough. The random access time is 55 msec; data is recorded at 2200 bpi on 203 tracks, with a transfer rate of 312 kilobytes/second. Storage media are 2316-type disc packs. A single circuit board controller is a fully embedded element in the host cpu and requires no external interface units. It cables up directly with up to four disc



drives. Delivery is 60 days. DATUM, INC., Anaheim, Calif.

FOR DATA CIRCLE 237 ON READER CARD *

A robot regretted the way
he was unfit for amorous play,
and sighed, "It is true
that I have an I.Q.,
but I don't have a bit of S.A."

—Gloria Maxson

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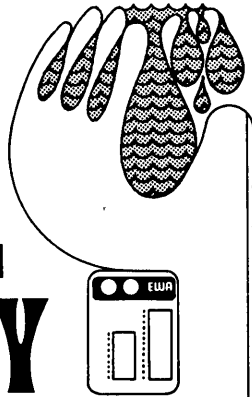
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It's no accident that magnetic transport and media manufacturers strongly recommend cleaning of magnetic heads. They know that regular maintenance is critical to prevent signal dropouts, wasted computer-time and needless damage to magnetic heads, discs and tapes.

The Kybe Kleen product line provides a safe, easy and effective way of maintaining your equipment for less than 25¢ a cleaning.

It includes everything



you need. And every product is designed and tested to meet the demanding needs of the data processing environment.

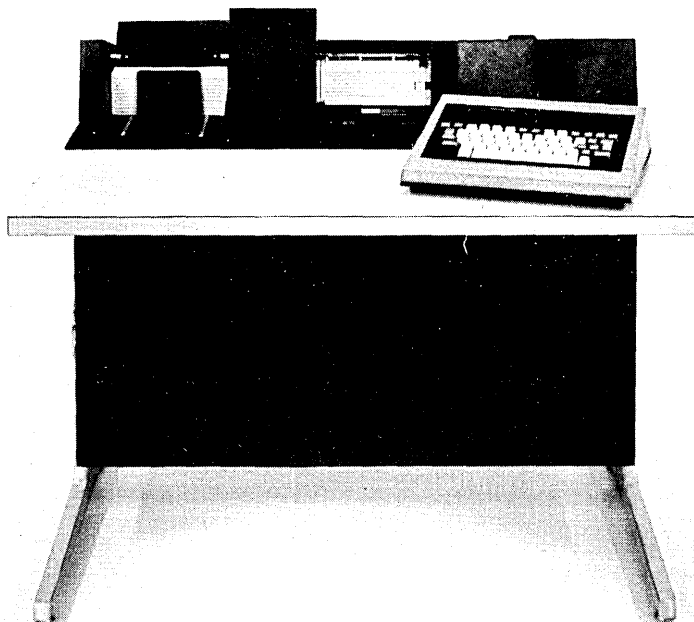
From Kybe—the company tape and disc manufacturers turn to for their own quality control cleaning systems. They know Kybe Kleen is the best you can buy.

Kv KYBE
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Houston—(713) 524-3111
Los Angeles—(213) 980-8365
New York—(212) 694-9273
Wash. D.C.—(703) 527-2292

CIRCLE 90 ON READER CARD

If you punch cards, read cards or do anything else with cards, we want to talk to you.



We want to talk to you about the Tab 501 Data Entry Microprocessor.

About the unique versatility and operating capabilities resulting from its built-in microprocessor, RS-232C interface and unmatched performance characteristics:

- Minicomputer card input or output.
- Data transmission via modem or cable for terminal applications.
- Interfacing to virtually any type of data entry or processing system.
- On-line or off-line versatility.
- Reading, punching, printing, verifying and interpreting capabilities.
- Attractive purchase or lease plans.

We want to tell you about our standard features.

- Constants from memory—up to 220 columns.
- Up to 28 program levels with automatic sequencing.
- Instant verification.
- Completely automatic error correction.
- High speed character duplication.
- Exceptionally quiet.
- Unparalleled operator acceptance of over 2,000 installed units.
- Easy to learn—easy to operate.

Let's talk about "specials:" We want your specials. Special applications. Special operating characteristics. Special interfaces. Special keyboard requirements. Because the Tab 501 Data Entry Microprocessor has this unique flexibility, we can give you what you want—easily and inexpensively. It's worth talking about.

Gentlemen: Let's talk.

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone _____

Let's talk:

Interfaces.

Terminal applications.

Special requirements.

Send more information.

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PRODUCTS CO

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The Varian System

A System Only a Few Will Fully Appreciate

When you want to apply your own knowledge to solve more than just traditional information processing problems, then you need the Varian System.

The Varian System offers you the opportunity to design specific solutions for your specific problems. You are the specialist in the demands of your business. Our business is to provide you with a broad, open-ended selection of computer hardware, software and software that will give you the performance and flexibility that you need to get your job done.

VOIRINDEX, one of the world's best real-time operating systems, offers efficient, proven software packages including the **TOTAL** data base management system.

Multi-therapy capability, **COBOL**, **RPG III**, **BASIC**, **FORTRAN IV** and **C** lets you select language best suited to your application.

VIFAM communications software provides a macro level facility for handling a wide variety of applications.

HLASP/IRIS software lets your Varian System communicate with large scale computers.

Micro programs

able 880ns processors give you high performance.

Varian's 190ns WCS, double precision floating point processors and memory map can give you even higher throughput of data during those critical run-times.

A wide range of peripherals and special interfaces, four I/O techniques and dual-port memory access also let you configure your system for maximum I/O throughput.

A network of field service engineers, analysts and a full staff of factory experts are committed to solving you with system configuration, hardware and software specials, installation, repair installing and systems maintenance.

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Helping a Fast World Move
Baster



CIRCLE 10 ON READER CARD

Understanding the economic impact of a Kodak COM installation.

The most cost-effective approach to COM is a lot easier to find now because of a Kodak service called PRINTCOM. It lets Kodak actually premeasure the savings you can expect, using your own cost figures, when you put a Kodak KOM-80 microfilmer to work in your EDP environment.



The
PRINTCOM
terminal.

During PRINTCOM analysis, we input as many as 300 of your cost variables into a PRINTCOM terminal and get back a detailed financial analysis of your immediate savings and of your long-term savings potential.

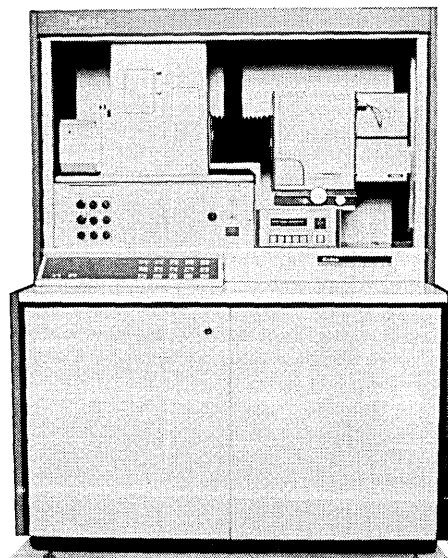
You will find this information invaluable, particularly in light of the emphasis being placed on return on investment.

Beyond PRINTCOM, Kodak is putting a great deal of effort into COM research. Some of this effort and investment has already paid off in technological improvements and versatile software pro-

grams Kodak can provide to its users.

A case in point is our new INFO-LINK I software package. It does away with the need for new application programs each time a microfiche job goes 'live.' It's just one more way Kodak can help you maximize your savings in the EDP environment.

The closer you are to COM, the sooner you should check with us. For an informative view of microfilm and the computer, write today. Eastman Kodak Company, Business Systems Markets Division, Dept. DP 6670, Rochester, N.Y. 14650.



Kodak KOM-80 microfilmer.
For top throughput speed
with high reliability.

software & services

Updates

A survey of what is being accomplished through the use of structured programming techniques is being compiled by Infotech, one of England's largest software concerns. Any firm contributing to the survey will receive a copy of the results in exchange. All evolving programming practices, including chief programmer teams, structured walkthroughs, improved coding and organization techniques under what IBM terms Improved Programming Techniques (IPT) will be covered. U.S. readers can send their materials to *Datamation*, 1801 S. La Cienega Blvd., Los Angeles, Calif. 90035 ATTN: Software Editor

Scientific Time Sharing Corp., Bethesda, Md., which calls itself the world leader in APL services, announces that it plans to offer APL application packages for the IBM 5100. Since the 5100 can be used as a terminal, it can access STSC's APL*PLUS system in more than 80 cities, which includes application programs for shared data base and network usage.

An opinion often voiced in the computer industry is that there is no need for any new programming languages and that there are too many already. It is therefore interesting to read the analyses of Intermetrics, Inc., Cambridge, Mass., to see why it rejected such common languages as PL/1, FORTRAN, ALGOL 60, and lesser ones such as JOVIAL, CLASP, SPL, and MAC for use aboard the space shuttle to be launched later this decade. Using code reliability as a major criterion, PL/1, FORTRAN, CLASP, JOVIAL, and SPL were dropped from consideration. The elimination of PL/1 was also prompted by the task of paring the language down to a desirable subset, while FORTRAN suffered because of its disregard for structured programming techniques. ALGOL's lack of character and bit string manipulation, its relatively inefficient subroutine linkages and absence of any real-time considerations were responsible for its rejection. In the end, the language chosen was a new one, HAL/S (see October 1975, p. 154), said to be a highly reliable language made up from the best features of the original eight candidates. The name HAL/S was not taken from the movie "2001: A Space Odyssey".

Software Exchange

The Computer Software Exchange is a service recently set up to help buyer and developer of software packages find each other. For developers, the service provides facilities for wide distribution of packages together with a catalog of available products, and even help in pricing the new package. For potential users, the exchange tries to represent high quality products by insisting that they be bug-free and well documented. To help with documentation requirements, a proprietary input documentation package is applied to incoming programs that generates a software abstract, system narrative, system flow diagram, program flow diagram, installation requirements, and operational instructions. Perhaps the only barrier to the service (from a developer's point of view) is the insistence that machine readable source code be supplied. A \$25 registration fee is required for each item listed with the exchange, refundable when the first

copy of the software is sold through the service. Developers can choose from a variety of fee schedules up to and including free trial periods. Potential buyers must send \$5 for the current software catalog. Entries are listed in all types of software: system (including data base systems), scientific, and commercial. THE COMPUTER SOFTWARE EXCHANGE, San Francisco, Calif.

FOR DATA CIRCLE 218 ON READER CARD

DOS Partition Balancing

Better machine utilization for IBM DOS and DOS/vs users is the function of *EQUALPRTY*. The package continually monitors programs during execution and allocates higher priorities to I/O bound programs. By dynamically modifying priorities, overall throughput improvements of up to 30% can be realized, say the developers. There is a small amount of overhead involved in *EQUALPRTY*'s performance, approximately five minutes in a 24 hour day.

software spotlight

CDC Software Aids

The Control Data 6000 series and the 7600 model don't usually draw the attention of software developers, primarily because the market (compared to IBM equipment) is relatively small, and this large class of user is known to be resourceful in developing its own software. But this vendor thinks it can help CDC users and is offering two software packages and an interesting service called the Program Optimization Service.

The optimization service is oriented specifically towards FORTRAN programs, and essentially consists of efforts to redefine and/or recode algorithms to produce the same output with substantially reduced cpu times. Equations and closed subroutines running less than two pages of listings are evaluated to see whether the service would be cost effective at no charge. For longer programs there is a \$50 evaluation charge which is credited against the fee for the service. In all cases the fee is guaranteed to be less than the cpu cost savings realized. The vendor gives as an example an optical modulation transfer function that was reduced from 225 cpu seconds to 21.

FOR DATA CIRCLE 215 ON READER CARD

CURVFIT is a general curve fitting utility offered users of the same machines. The routine is FORTRAN callable and allows unpacked matrices, solving M equations in N unknowns where M is greater than N. One equation at a time is accepted for building the matrix, and a least squares solution is performed when all rows have been processed. Iterative use of *CURVFIT* allows solution of non-linear systems through the use of partial differential equations and evaluation of the functional difference at each step. The package's basic price is \$3K. A large-matrix version, for extended core storage or disc residence, in which the user need not be concerned with the direct manipulation of intermediate storage is priced at \$4K.

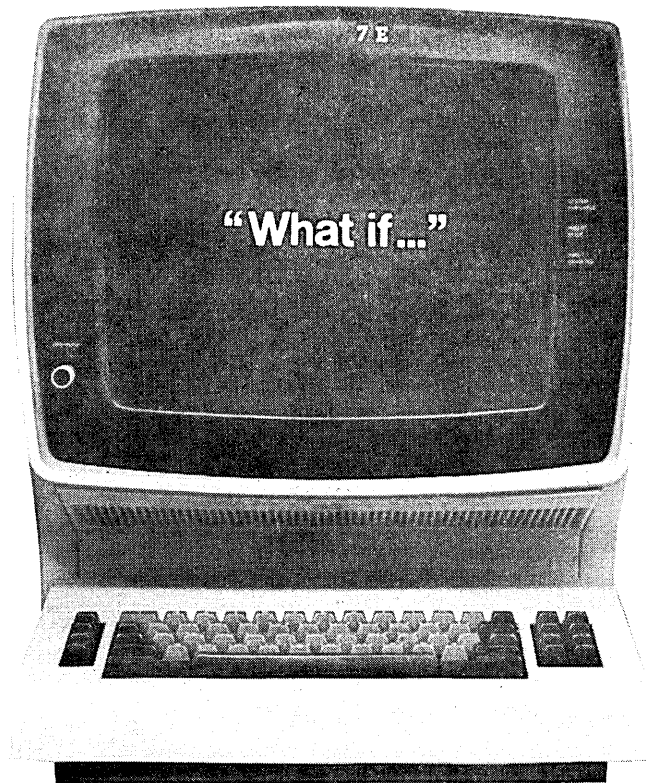
FOR DATA CIRCLE 216 ON READER CARD

SIMEQ is a simultaneous equation solver in which the Cauchy-Jordan row reduction technique has been employed in an algorithm designed especially for the CDC 6600. *SIMEQ* does not require extra buffers to allow processing of unpacked matrices. Entry point name and arguments can be modified to be compatible with existing programs. "Worst case" performance of *SIMEQ* credits the package with solving systems of 20 equations in less than 10 msec, according to the developers. The FORTRAN callable routine is priced at \$1,425. CYBER ASSOCIATES INC., Pittsburgh, Pa.

FOR DATA CIRCLE 217 ON READER CARD

asi/inquiry

The IMS DB/DC QUERY LANGUAGE



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

ASI/INQUIRY has been fully operational for over six months, and is currently installed in multiple sites here and in Europe.

In summary, ASI/INQUIRY represents the state-of-the-art product in an IMS DB/DC environment. It is the only system combining an easy to use language, complete user flexibility, and rapid response time in a single package. If you want to start answering "What if" immediately, call or write today for further information.



The Software Manufacturer

Applications Software, Inc.
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(213) 542-4381

software & services

Installation involves the cataloging of three programs and takes about 15 minutes. Operators can change the partitions to be balanced by responding with one character on the system console. EQUPLPTY is priced at \$1,995. A one month trial is available for \$100 which is applicable to the purchase price. LABYRINTH SYSTEMS LTD., New York, N.Y.

FOR DATA CIRCLE 219 ON READER CARD

S/3 Disc Eliminator

This systems house has taken advantage of an IBM design peculiarity that requires users of the "big" 5445 disc drive to also rent a smaller 5444 drive. ELIMN8 "eliminates" this requirement, however. The package resides on the 5445 drive, is said to be easy to install, and requires no OCL changes. ELIMN8 has four basic functions: it copies a 5444 pack to D1; removes a 5444 pack from D1; copies a 5444 pack to a 5445 file; and copies a 5445 file to a 5444 pack. ELIMN8 rents for \$99/month compared to the \$300/month rental IBM gets for the 5444. The first three months rental can be applied to the full

purchase price of \$2K. INFORMATICS INC., GROUP/3 DIV., Woodland Hills, Calif.

FOR DATA CIRCLE 220 ON READER CARD

Data Base Management

DMS-170 is described as an integrated family of new and existing CDC software products which has been modified and enhanced into a modular structure that gives users a host of options in implementing data bases. Two of the four components; the Data Description Language and Query Update modules are updates, while the Cyber Record Manager is a part of the SCOPE 3.4 operating system, and the Cyber Database Control System is a new product. All the modules will soon be available under CDC's Network Operating System (NOS) and NOS/BE (Batch Environment) by early 1976.

Perhaps the nicest feature of CDC's new data base management emphasis is that it allows users to move gradually to a data base environment while continuing to run existing applications alone or in parallel with converted applications. Another major feature is the use of multiple indexing techniques for creating relationships between data records for integration of desired information. This method of data structuring is said to incorporate some of the concepts of relational data bases.

Since data bases are maintained separately from programs, converted programs can access the same files as unconverted programs. The new module, Database Control System, monitors and controls access to the data base, provides independence of data from the COBOL programs that access or manipulate it, performs data validation, encode/decode, derived items, logging, and provides data base utilities for restart/recovery. The modules are separately priced. The Data Description Language is \$150/month; the Query Update module is \$500/month; and the Database Control system is \$1K/month. Paid-up licenses are priced at \$5,510, \$18,110, and \$36,500, respectively. CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 221 ON READER CARD

Report Generators

Three report generator packages are offered IBM 360 and 370 users and users of the Honeywell 6000 series line. Called "High-IQ," "Average-IQ," and "Low-IQ," the two lower packages are upward compatible. "High-IQ" features matrix reporting capability, table lookup capability, multi-file input processing, Occurs Clause (repeating intra-record segment) capability, and file outputting. "Average-IQ" has all the power of "High-IQ" except for the

The IDMS user's group keeps you right at the leading edge. It's database state-of-the-art plus a step beyond.

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And do we listen! Because through listening we've made IDMS the most advanced system in the industry. As far back as 1971, when IDMS was first conceived, it was done in compliance with the recommendations of a user-oriented group—the CODASYL committee.

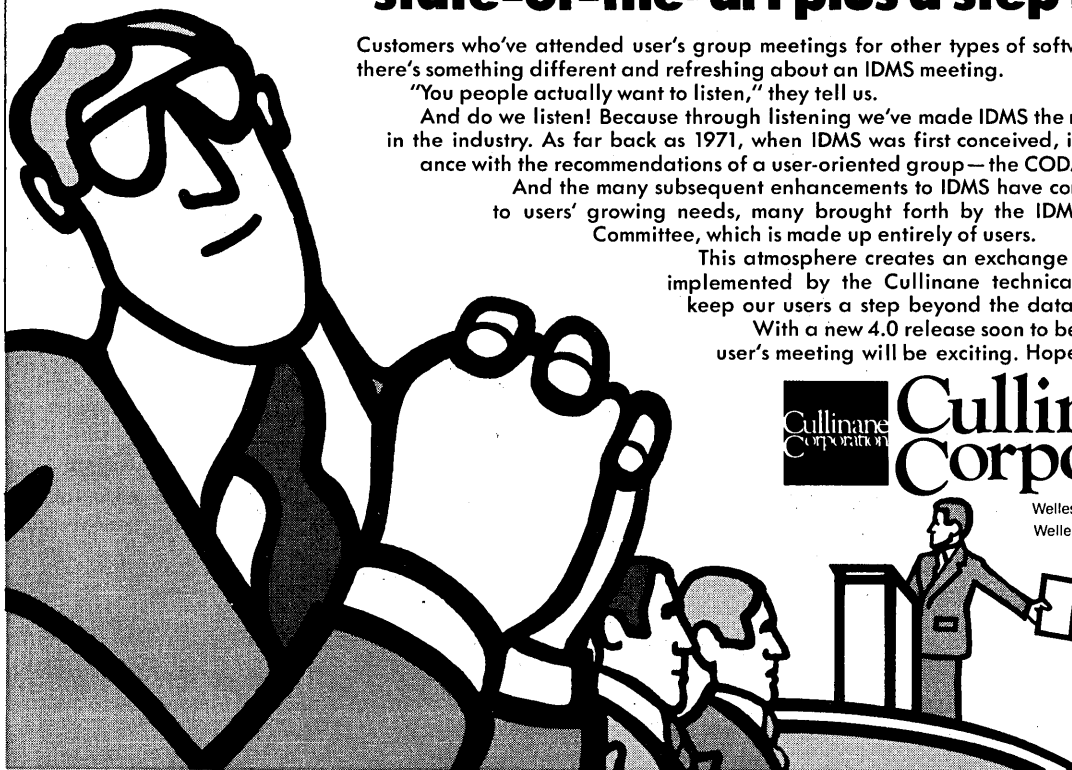
And the many subsequent enhancements to IDMS have come from our attention to users' growing needs, many brought forth by the IDMS Technical Advisory Committee, which is made up entirely of users.

This atmosphere creates an exchange of ideas which, when implemented by the Cullinane technical staff, does in fact keep our users a step beyond the database state-of-the-art.

With a new 4.0 release soon to be announced, the next user's meeting will be exciting. Hope you'll be there!

 **Cullinane Corporation**

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CIRCLE 84 ON READER CARD

Your real time software is no place for INSECTUS-PROGRAMMA.

Insectus Programma, more commonly referred to as software bugs, can cost you money. These pests eat away at your profits and productivity by causing program development delays and costly system down-time. Not to mention the inconvenience.

The only known cure for Insectus Programma is time. Over a period of years, virtually all bugs can be removed from a software system; but how can you afford to wait that long?

When we designed the new SEL 32 minicomputers, we included the most extensive, reliable line of software available...software originally developed for the SYSTEMS 85/86 computers.

What does that mean to you? Plenty!

It means that you'll see big cost savings, through quicker application implementation and increased programmer efficiency. That's because our software

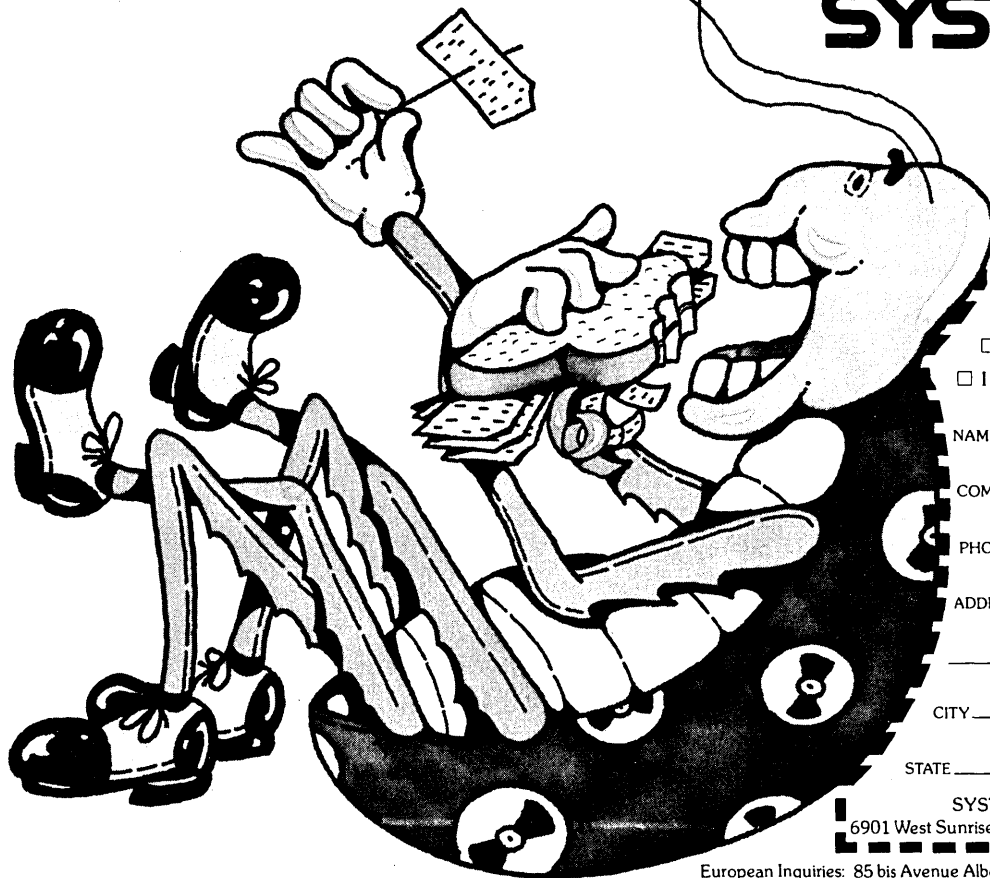
is virtually bug-free, completely documented, and fully supported. It got that way through five tough years in the field in hundreds of applications.

It means you don't have to worry about obsolescence. That's because SYSTEMS 32 software has a true 32 bit heritage, flexible enough to meet your future needs. The nucleus of our flexibility is provided by our powerful, disc-based Real-Time Monitor, a true multi-programming operating system.

Whatever your needs, we have the solution, like the extended FORTRAN IV Compiler, Process Control Executive...and a Terminal Support System that provides comprehensive services for multiple terminal users.

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software & services

matrix reporting, table lookup, and Occurs Clause capabilities. "Low-IQ" is your basic report generator. The packages are priced at \$15K, \$12K, and \$9K, respectively.

Extensive defaults permit nonprogrammers to learn and use the system easily. Headings and columns are automatically set up, so users do not have to concern themselves with report layout and specific field locations. Detail or summary reports can be produced by all systems. The two higher-priced systems can interface with a specific data base application running under IMS or TOTAL relatively easily, it's claimed. THE MANAGEMENT GROUP, INC., Waltham, Mass.

FOR DATA CIRCLE 222 ON READER CARD

Personnel Administration

Nearly every company has recently been forced to collect, maintain and report employee related data through governmental legislation such as EEO and ERISA. This firm offers a system called PASS, Personnel Administration and Skills Search, that should keep the Feds at bay if your firm has never had

to do this type of record keeping before. PASS is offered both as a service and as a complete package for sale. The system reports (either automatically or on demand) various items including personnel status and history records of each employee, salary review notices, employee benefits, EEO, absentee accounting, budgeting reports, wage analysis reports, staffing control, and others. A report writer makes it possible to access the data base whenever special information is needed. Representative costs on an average monthly cost basis range between \$300 for a small (200 employee) firm, up to \$10,200/month for a 20,000 employee company. At that rate it would probably behoove the user to purchase the system for \$22K. PASS runs on IBM 370 equipment. CURTISS-WRIGHT CORP., Wood-Ridge, N.J. FOR DATA CIRCLE 223 ON READER CARD

Text Editing

The Management Information and Text Systems 1 (MITS 1) package expands the text editing and source data manipulation capabilities of IBM's ATS (Administrative Terminal System) and related ATMS systems to include overview capabilities. On-line sorting and formatting capabilities are featured, as well as user-definable commands designed to automate cumbersome com-

mand sequences and simplify the job of the terminal operator. On-line accounting information is also generated to allow users to more effectively control the text processing function. The package interfaces directly with OS, VS1, or VS2 operating systems, eliminating the need for a communications interface such as CICS. Command chaining is used instead of stepped sequential processing. Also included in MITS 1 is an RJE/RJO interface to HASP that doesn't require permanent allocation of tape drives. Other features include on-line debugging facilities; a roll-in switch routine to ease operator number reassignment; an extended roll-out program that allows the operator to specify exactly which documents are to be rolled out; and a permanent storage system that allows the operations manager to automatically delete documents not accessed since a specific date. The system will support 10,000 users and 1,000 output queues, it's claimed. Typically a 30-terminal OS version would require 100K bytes of memory. The price is \$50K including training and installation, or \$1K/month on a perpetual lease (not including installation and training.) H & B COMPUTING INC., Fullerton, Calif. (Also available in Canada through ALPHATEX LTD., Ottawa, Canada.)

FOR DATA CIRCLE 224 ON READER CARD *

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CIRCLE 112 ON READER CARD

Even Webster's Knows About QUEST

QUEST (kwest). v. 1. To make a search; to go on a quest.

QUEST SYSTEMS, INC. n. 1. A corporation founded in 1968. 2. The largest professional recruitment firm in the U.S. functioning solely in the computer sciences; its client companies pay all employment fees, interviewing and relocation expenses. Quest is known for its deep personal commitment to relate to each candidate as an individual with individual goals. 3. Its professional staff averages over 6 years of experience in EDP recruiting (additionally, staff members have direct hands-on experience in programming, systems, hardware sales, etc.) 4. Quest is presently searching for programmers and analysts (commercial, scientific, systems software) for over 3,500 client companies in the U.S. Quest has openings in over 700 U.S. towns and cities. 5. Methodology — see Questsystem.

QUESTSYSTEM (kwest sis'tern). n. 1. Discussing with an individual what he would like to be doing in light of what he has been doing. 2. Analyzing the realities of his objectives as they relate to the current job marketplace. 3. Contacting client companies and other Quest staff personnel to identify positions of possible interest. 4. Introducing the job candidate to his prospective employers by providing complete details to each about the other, ensuring the efficacious use of everyone's time. 5. Arranging interviews. 6. If employment offers are extended, Quest assists in evaluating the responsibilities, compensation and opportunities (and relates those to the initially stated objectives). The Questsystem has been working for thousands of professionals at no expense, whatsoever. Ask your friends of their past dealings with Quest. Then, put the Questsystem to work for you. For additional information on this subject, please inquire directly to Quest Systems, Inc. (All inquiries/resumes received will be responded to immediately and in confidence.)



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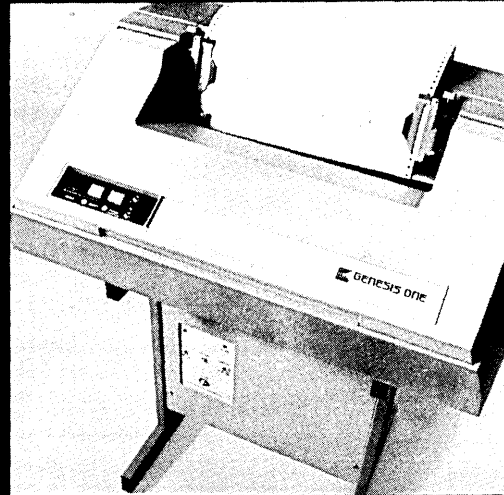
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- Dr. Dixon R. Doll, President of DMW Telecommunications Corp.
- Philip H. Dorn, President of Dorn Computer Consultants, Inc.
- Dr. Philip H. Enslow, Jr., Professor, Georgia Institute of Technology
- Phil Hirsch, Editor of DATA CHANNELS
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	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00	
MONDAY	Keynote	DataComm School #1: Fundamentals for Managers			DataComm School #2: Comm Services & Interfaces			Applications: Banking, Securities, Insurance, Manufacturing, and Process Industries		
	Network Planning: Objectives, Justification, Budgeting, and Staffing			Data Base and Comm Software			Network Implementation: Design, Vendor Selection, Installation, and Maintenance			
	Hosts, Front Ends, and Minis					Couplers, Modems, and Multiplexers		Transmission Services		
	Who's Ahead in Transmission Services						Worldwide Nets Require Diplomacy			
							We're Going to Point of Transaction			
							Consultant's Corner			
EXHIBITS OPEN 10:30-5:30										
TUESDAY	Applications: Retailing, Wholesaling, Transportation, Distribution, Service Industries, Computer Services			DataComm School #3: Comm Processors and Software			DataComm School #4: Terminals and Terminal Systems			
	Network Management: Involvement, Accountability, Playback and Expansion			Network Implementation (Repeat Session)			Hosts, Front Ends and Minis (Repeat Session)			
	Network Planning (Repeat Session)			Data Base and Comm Software (Repeat Session)			DataComm Software Needs Standards Management			
	CRT's and Teleprinters		Remote Batch, Data Entry, and Satellite Systems			DataComm Software Needs Standards Management			Consultant's Corner	
	Protocols or Promises for Productivity						Terminals Grow into Minis Via Micros			
	Data Base Management Decentralizes Again						Consultant's Corner			
EXHIBITS OPEN 10:00-5:00										
WEDNESDAY	Applications: Utilities, Government, Law Enforcement, Health Care and Education			Applications: Government, Law Enforcement, Health Care, Education (Repeat Session)			Maintenance Managing with Distributed Computing			
	Applications: Retailing, Service Industries, Transportation, Distribution, Computer Services (Repeat Session)			Common Carrier Interconnect Policy Update			CRT's and Teleprinters (Repeat Session)		Remote Batch, Data Entry, and Satellite Systems (Repeat Session)	
	Network Management (Repeat Session)						Carriers Are Offering Package Deals			
	Couplers, Modems, and Multiplexers (RS)		Transmission Services (RS)			Five-Year Planning for Data Comm			Consultant's Corner	
	Keys to Privacy in DataComm						Data Entry is Still in Transition			
							Consultant's Corner			
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thorough understanding of the role that specific products and services play in data communications along with advice on evaluation and selection.

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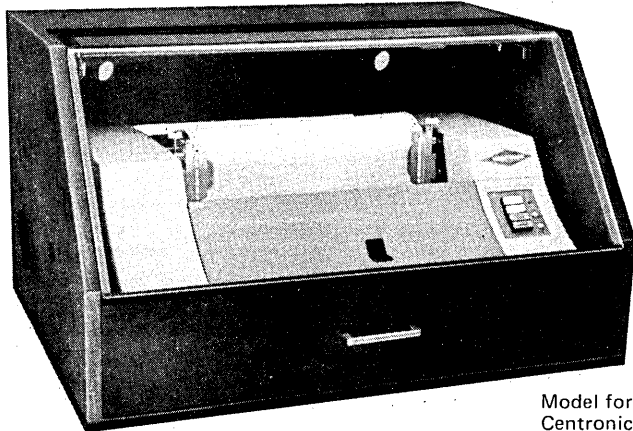
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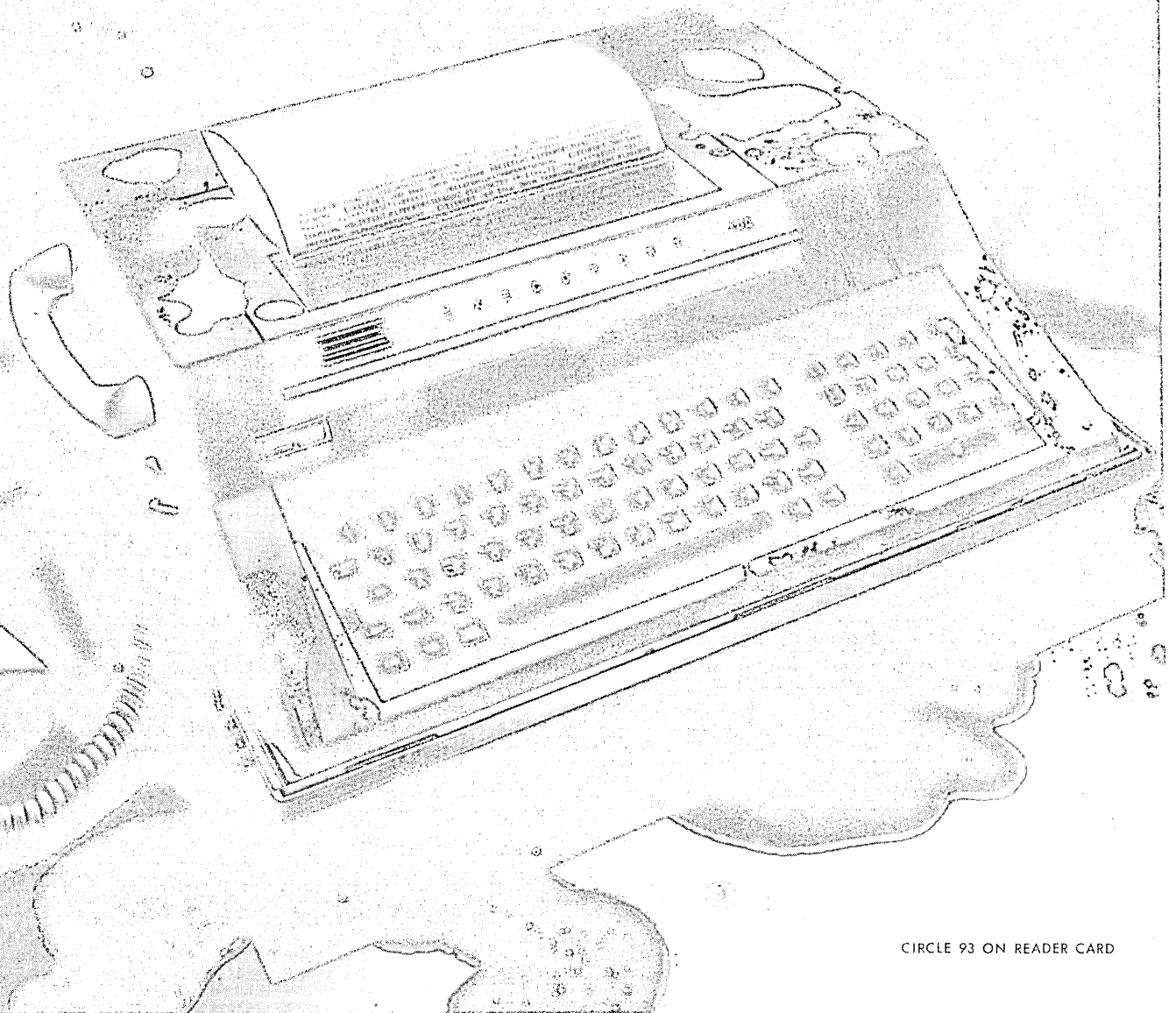
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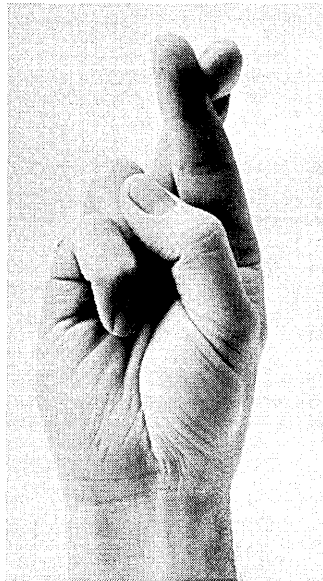
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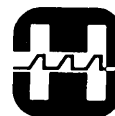
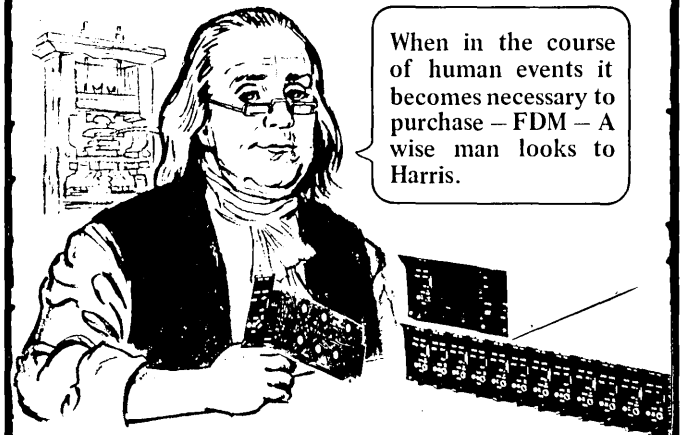
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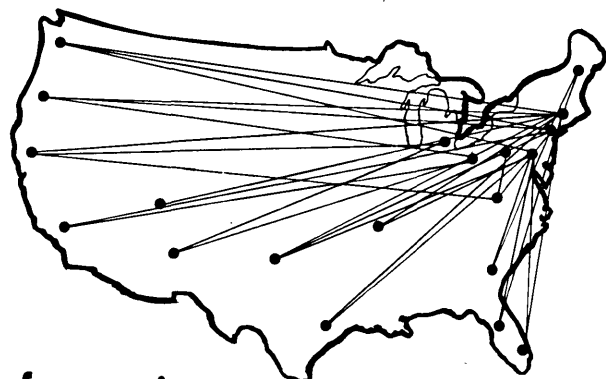
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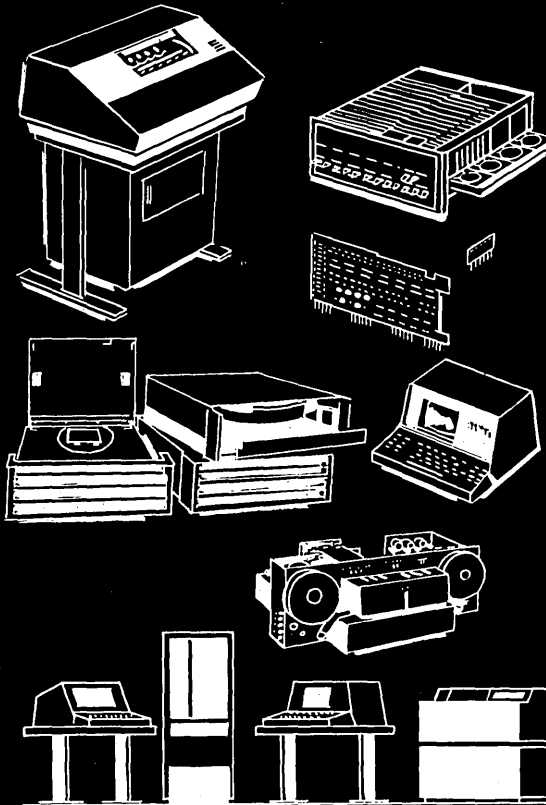
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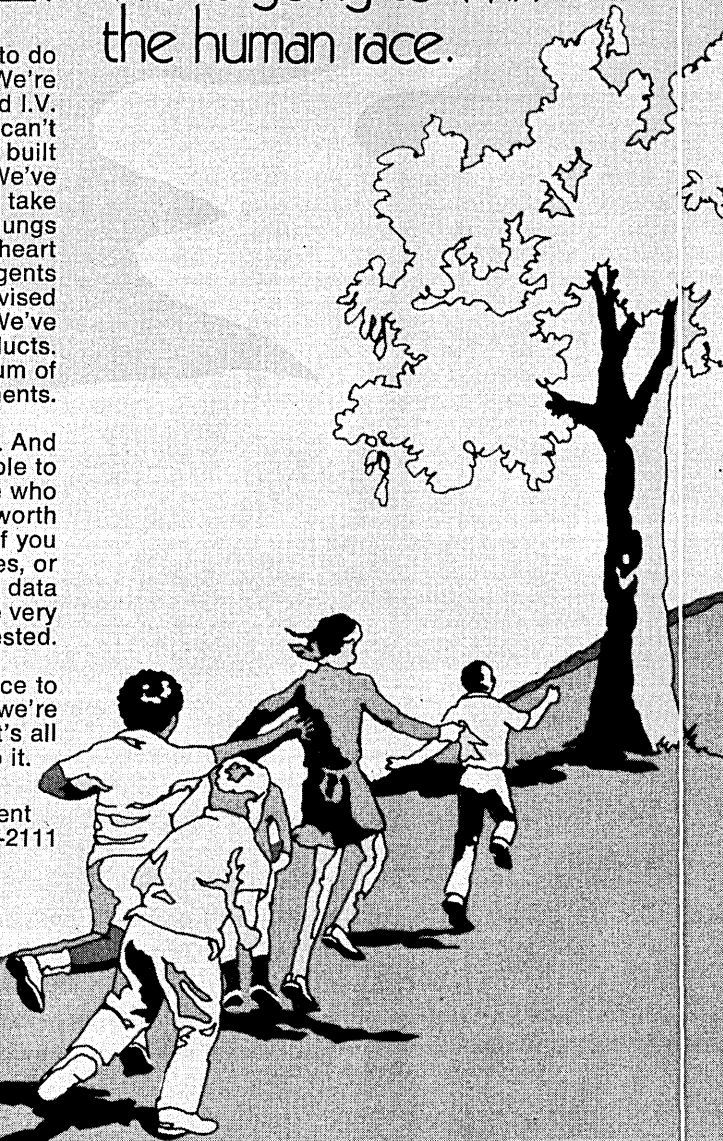
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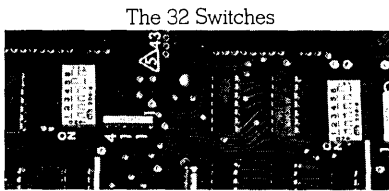
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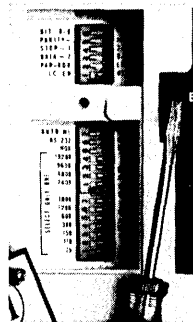
Take the 20 switches under the LSI name plate, for example. Among them, 11 communication rate positive action switches that let you select bauds from 19200 to 75. Also an RS232 interface extension port switch. It allows you to connect the DUMB TERMINAL to all kinds of clever devices — to recorders, printers and smarter terminals. And switches for odd-even parity. Optional upper and lower case (the complete set of 128 USASCII characters) — plus a lot more.

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The 32 Switches

The 12 switches in the rear, on the PC board.



The 20 switches under the front name plate.

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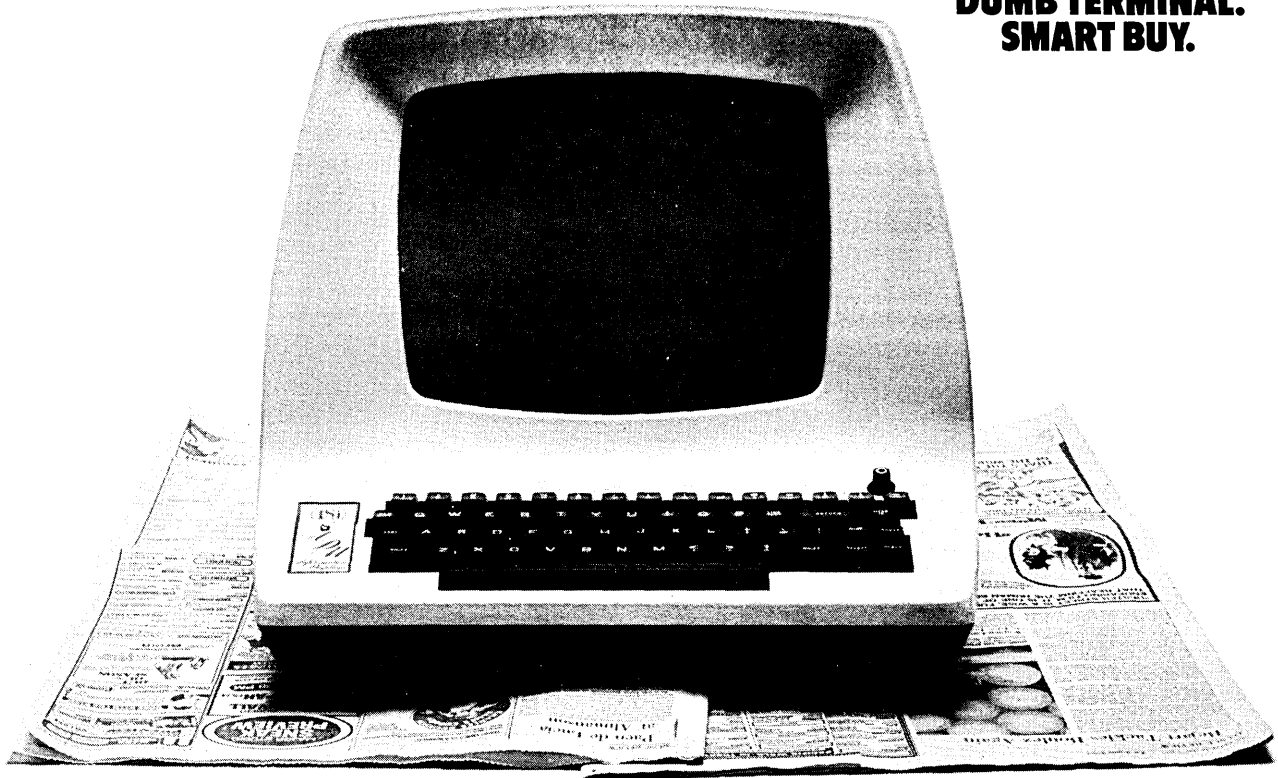
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What's Right About Computing?

It is lots of fun to point out the sins, errors, and blunders that computer people have made over the years. But this approach has recently become too popular a sport, to the point where whole books are devoted to listing the horror stories of the things that computer people have done wrong. There must be a positive side. Considering that the total computing power of the United States is now about 50,000 mips,* the sheer bulk suggests that we must be doing something right. The speed with which computers are being injected into our society implies that some group of people—a group with money and decision-making power—is pleased with computers and intends to have more of them.

I submit that there is a fine list of things we can point to with pride. Every curve of activity still shows positive dynamic growth: speeds keep increasing; hardware costs keep falling; and new machines are installed at a furious rate. The only curve that goes in the wrong direction is the cost of software.

But that's my first point. For the first time, we are putting our finger on things like the actual cost (per line) of software, and finding rational explanations for that negative growth rate (analyzed in the landmark article "The Mythical Man-Month," by Fred Brooks, Dec. 1974, p. 44). We are beginning—just beginning—to analyze what computing is all about, where the inefficiencies lie, and what constitutes cost/effectiveness. These are signs that computing as a discipline is getting its house in order.

We have learned, I think, that a doubling of the internal cpu speed of a machine does not double the throughput, and that no amount of speed can mask improper program design. We are beginning to analyze and study systematically what the masters at computing have done intuitively all along, so that newcomers can be guided rapidly into the right way of thinking. Things like programming style and programmer efficiency are coming into the spotlight. It is no longer sufficient to ask "Does it work?"—we are starting to insist that it not only work, but keep working under inevitable change. It just may be that we are truly coming of age. Many of our outstanding blunders were committed long ago, when the industry was still groping in the dark; it isn't quite fair to hang ancient indictments on today's practitioners.

*That figure is a guess, and even if it's correct, its half life as a good statistic is probably less than three months, so don't perpetuate it. That's one of the things *wrong* with our industry; we are short on metrics.

Personal preferences (such as the controversy over the relative merits of flowcharts vs. pseudocode as devices to facilitate coding) are yielding to acknowledgment of the broader question, which is that of intelligent program design. It seems to me that we are now making rapid progress by pinpointing where the true costs lie, and concentrating on how to improve the costliest areas. All the hoorah over structured programming (and the fuss is itself a sign of growing maturity) reduces, as Robert White of Informatics pointed out, to "Structured programming won't make good programmers out of klutzes, but it will help prevent good programmers from doing the klutzy things."

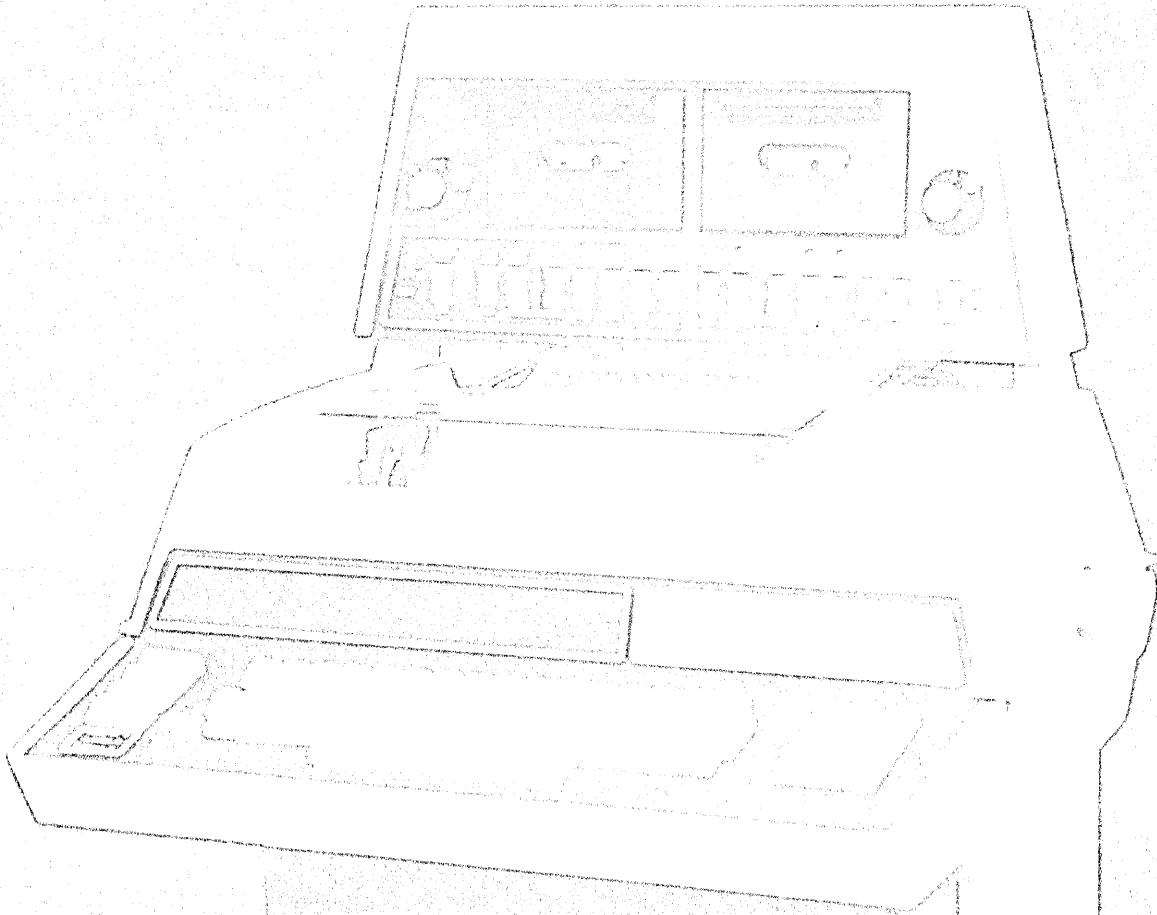
We have also made it possible for the newcomers to build on an orderly, cohesive body of knowledge; they need not repeat the 20 years of fumbling that led today's old experts into becoming experts. Harlan Mills puts it this way:

In any new area of human activity, it is difficult to foresee latent human capabilities. We have many examples of such capabilities: touch typing, speed writing, and 70-year-old grandmothers who drive down our highways at 70 miles an hour. Back in 1900 it was possible to foresee cars going 70 miles an hour, but the drivers were imagined as daredevils rather than as grandmothers. The moral is that in any new human activity, one generation hardly scratches the surface of its capabilities. So it will be in programming as well.

The next generation of programmers will be much more competent than the first one. They will have to be. Just as it was easier to get into college in the "good old days," it was also easier to get by as a programmer in the "good old days." For this new generation, a programmer will need to be capable of a level of precision and productivity never dreamed of in years gone by.**

To turn to something tangible, consider some instances in which the computer has changed the world for the better. The outstanding example is the area of computer-aided design. Take, for example, the design of electric motors. Less than 25 years ago, someone considering making a product that required an electric motor had two choices. He could design his product around a motor that was listed in a catalog, or he could call for a new motor design. In the

**From the Foreword of *Programming Proverbs* by Henry F. Ledgard, Hayden Books, 1975.



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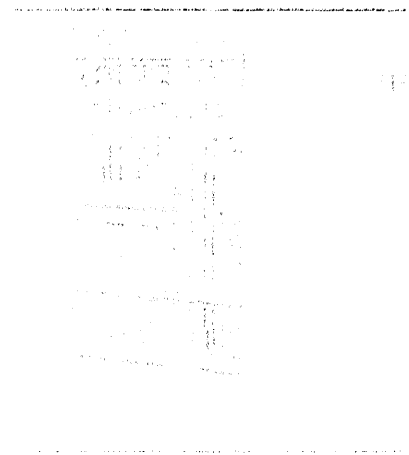
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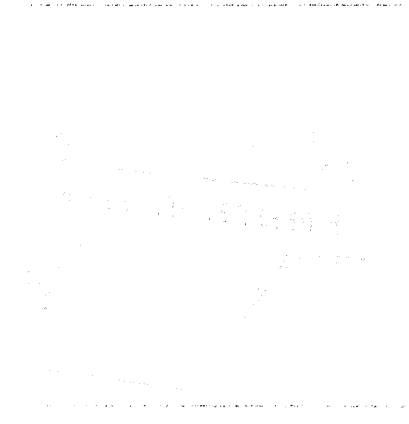
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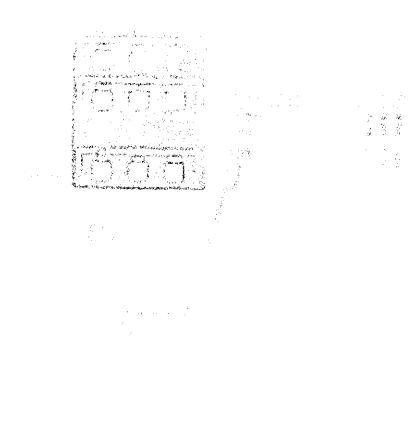
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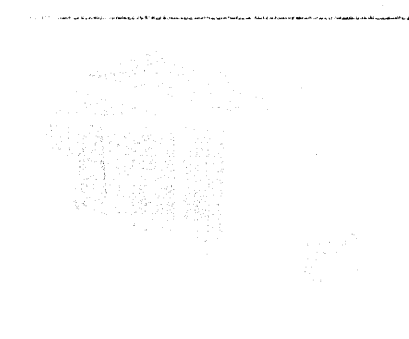


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latter case, he would have a minimum lead time of nine months to a year just for that phase of the project, plus a whopping bill to pay for the design work which would have to be spread out over a great many items. There are many parameters that affect the design of an electric motor, such as:

What size (horsepower) should it be?

Will it be battery operated, or run from the power line, and if the latter, what voltage and frequency? What will be its duty cycle? A motor for a swimming pool filter must run under load for 12 hours a day or more. A refrigerator motor runs intermittently and starts under load. The motor for an electric pencil sharpener may run less than 15 seconds in a day. Except for clocks, few motors run continuously.

What is its life expectancy? Should it be built to last 25 years, or two years?

What environment will it run in? Indoors, or outdoors? Buried in the handle of something?

... and so on. A few experts could juggle these parameters (and their cost limitations) and come up with the design of a new motor, perhaps twice per year per expert.

The computer has changed all that, and we can see the results all around us; a typical home has as many as 50 motors in it, all different. The lead time on the design phase is measured in hours. The number of motor designers is either zero or hundreds, depending on how you look at it. The computer has enabled us to solve that problem once and for all. The parameters and constraints can be changed, and a program will output a design on demand, complete

with directions for producing it.

Many similar design problems have been solved, and entire professions thereby been wiped out. In 1950, for example, there were about 12 lens designers in the world. The lead time on a new camera lens was two years, and few people except professional photographers and rich eccentrics could own a good camera.

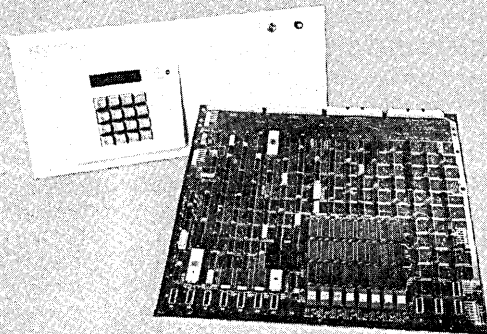
The lens design problem is made to order for computerization. The end result can be seen in newspaper ads: a movie camera with an f1.7 lens, power zoom (using one of those specialized motors mentioned above), with through-the-lens focusing and electric eye exposure control, sells at the local drug store for \$80. Tourists by the thousands carry still cameras with fantastic lenses. The computer has wiped out the profession of lens design, and at the same time created a very large industry.

A highly visible effect of the introduction of computers to our society is the automation of paperwork. Some aspects of this revolution have already gone berserk, to be sure. A retail transaction that used to take 20 seconds (you paid the dollar; they rang it up and gave you a cash register receipt) now takes several minutes and concludes with a 4-part form that is undecipherable by the customer. But the net effect is still good, since tedious paper work has been relegated to a machine that does it well.

What is new about it is the opportunity to arrive at a correct procedure and make sure that it applies to each customer in precisely the same way. If a logical error is uncovered and is corrected, the correction maintains indefinitely. For example, if a billing procedure for a department store is faulty (say, a payment is made on the same day that monthly interest charges are figured, and the service charge is applied *before* the payment is subtracted), then when that error is corrected, every customer benefits. Again, we can chalk up an improvement in society that is

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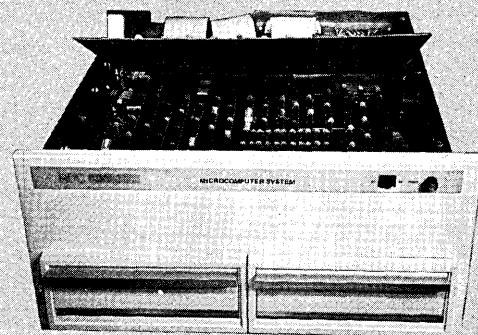
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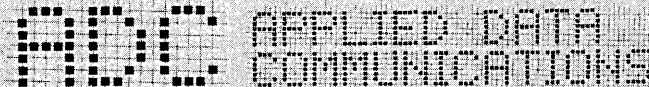
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We will soon have a full-blown computer (perhaps several of them) on board every automobile, and I suspect that it will turn out to be cheaper to have each of them full size general purpose machines (98% idle even when the car is running) rather than to have special purpose machines designed for the function. The potential for this single application (eight million installations per year) is enormous, not only to perform the control chores of the car, but for other purposes as yet unthought of. Computers are soon going to impact everyday living directly, and I think that such applications will largely count on the "good" side.

We in the industry have said for years that the computer is simply a tool, but we went right on fostering the belief that this tool has a mystique that is revealed only to the few. Now the marketplace is forcing us to swallow our own words. Not every user of computers wants to be a computer scientist; he just wants to get his work done, and he'll buy a turnkey system that guarantees to do it.

The mini and micro machines are moving the computer to the problem, reversing a 20-year trend of tyranny that had us all adjusting our lives to moving the problems to the computer. A fairly large proportion of what we used to regard as the domain of the computer now can be done on a pocket programmable calculator (with a purchase price currently at the \$100 level), and the monster machines are having their work loads shifted over to monster problems, which is as it should be.

Little has been said about it, but we are coming to the end of the fourth generation of machines and are about to find

out what the fifth generation will be, and what it will do to as well as for us. The characteristic of the fourth generation (namely, moving the logical control of the machine from hard wires to a program on a floppy disc) has made it possible to have many units of a machine model operating identically in the field—something that was never feasible with hard wired controls. Thus, software that works at the factory will work in the field, and programs can be run at different installations with confidence of identical results.

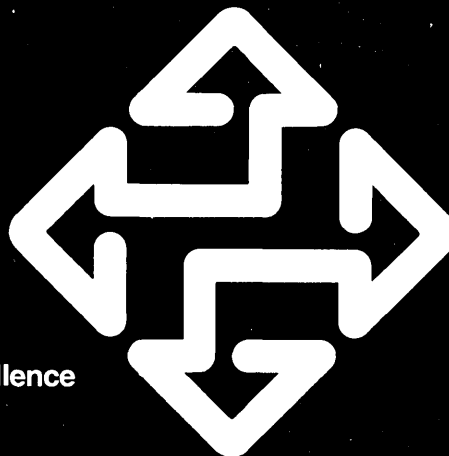
The fact that this shift in architecture was introduced for a totally different reason is irrelevant. The big question is, how will the industry react to the upcoming fifth generation? Will the users rush to replace their fourth generation machines (which have not yet been fully exploited, and which can function efficiently for many more years), or will they, for once, move cautiously toward new equipment, rather than panic into it? I'd like to believe that some of the maturity that now characterizes other parts of our field will evidence itself also in this area. If it does, then we can point to still another "good."

I may be too optimistic. I see computing as a healthy and flourishing industry, even while keeping aware of its weaknesses and its rampant idiocy. The idiotic things get all the publicity, but the things that we do right certainly dominate our activities. Those who publicize the faults of computer people—and thereby do us all a service—should take into account that we do correct our errors; that we do learn from our mistakes, and sometimes even from the mistakes of others; and that the computer can be a force for good. On balance, it seems to me, the net effect is highly positive.

—Fred Gruenberger

Mr. Gruenberger is the publisher of "Popular Computing," a periodical for the computer hobbyist, and a professor of computer science at Calif. State Univ. at Northridge. He has been in the field of "machine computation," as he describes it, since 1943.

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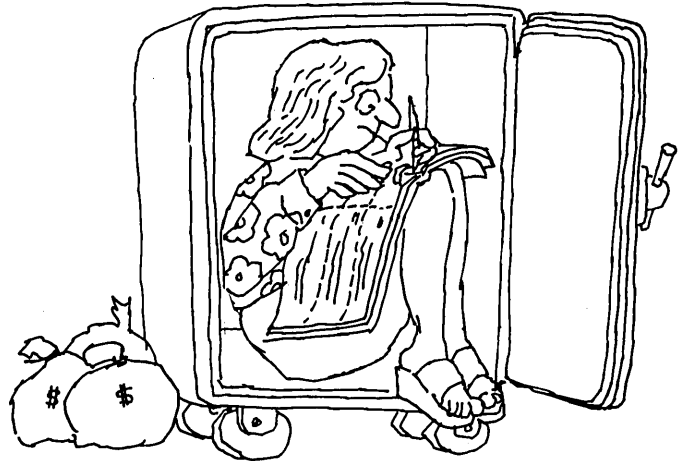
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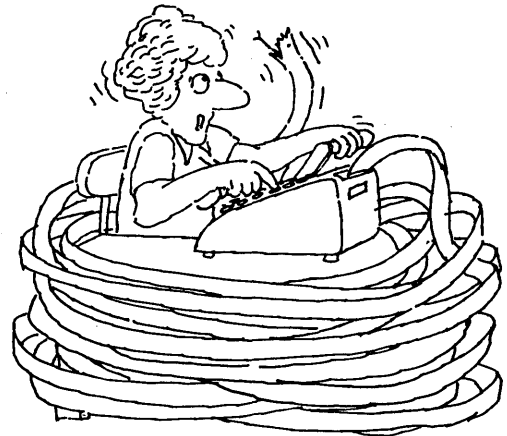
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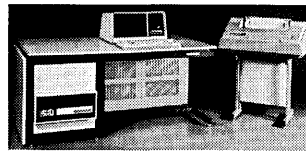
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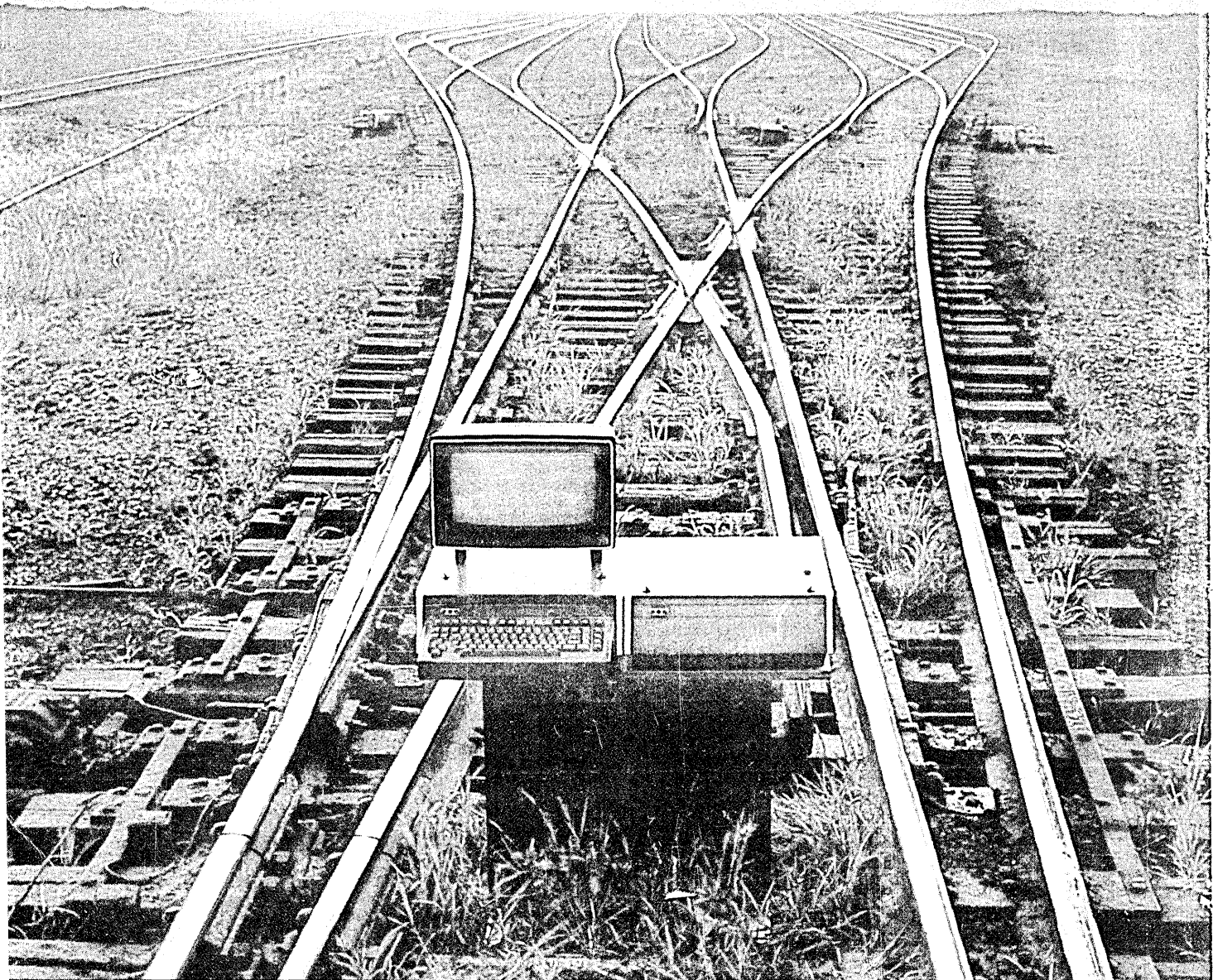
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