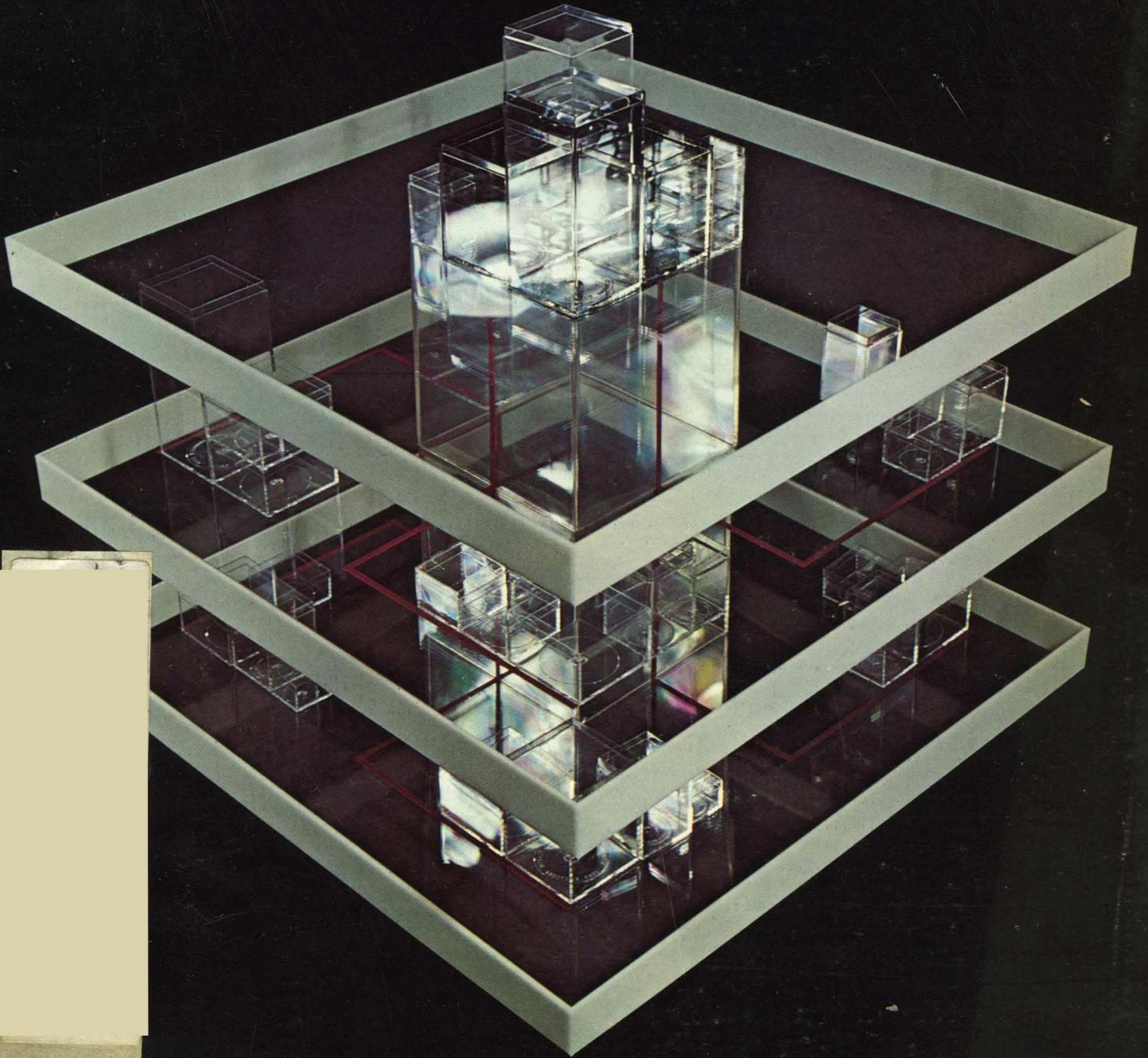
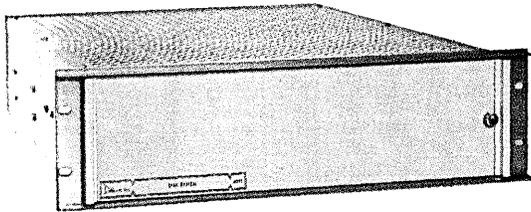
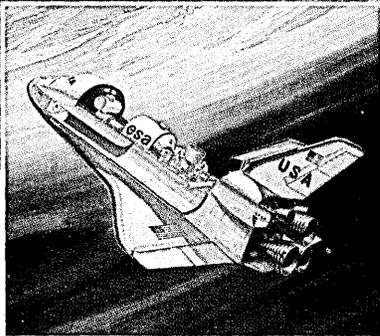
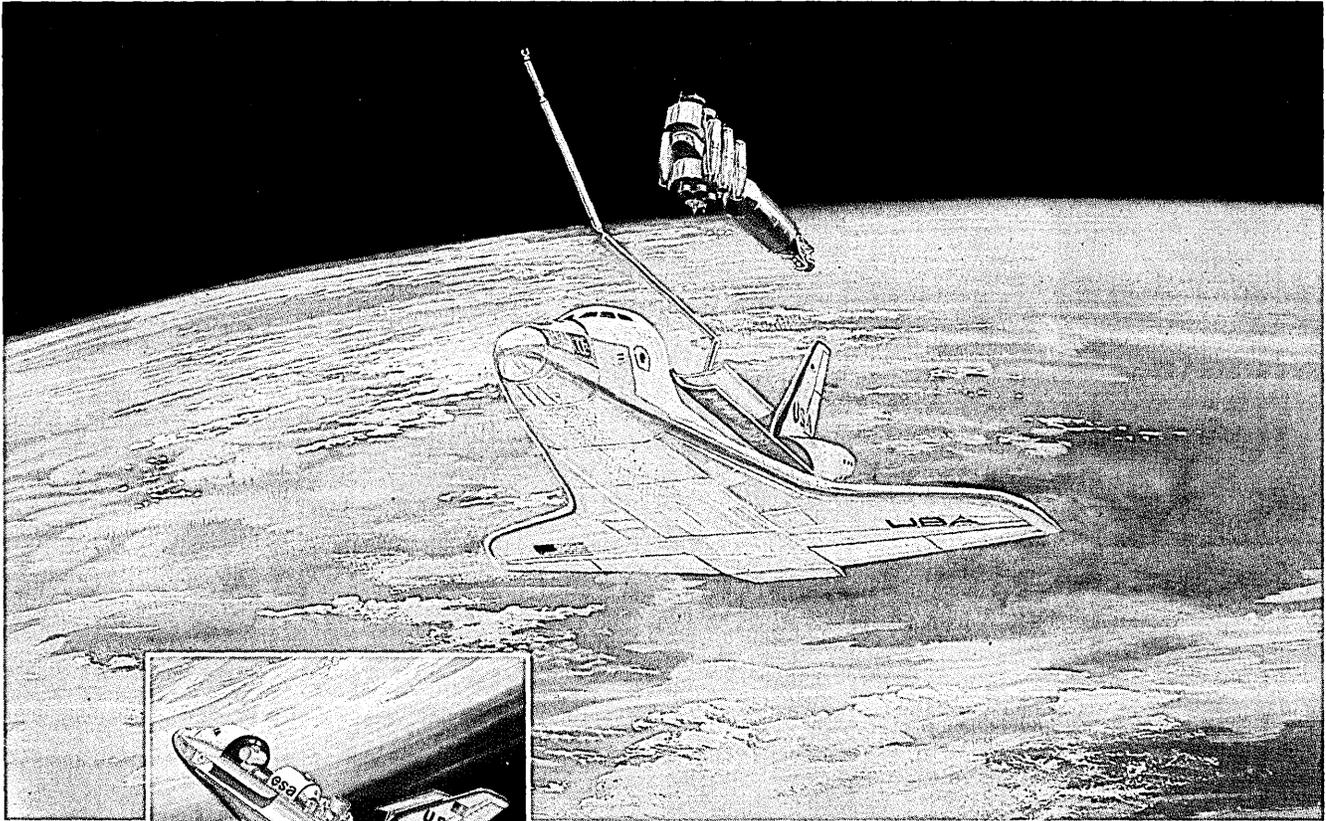


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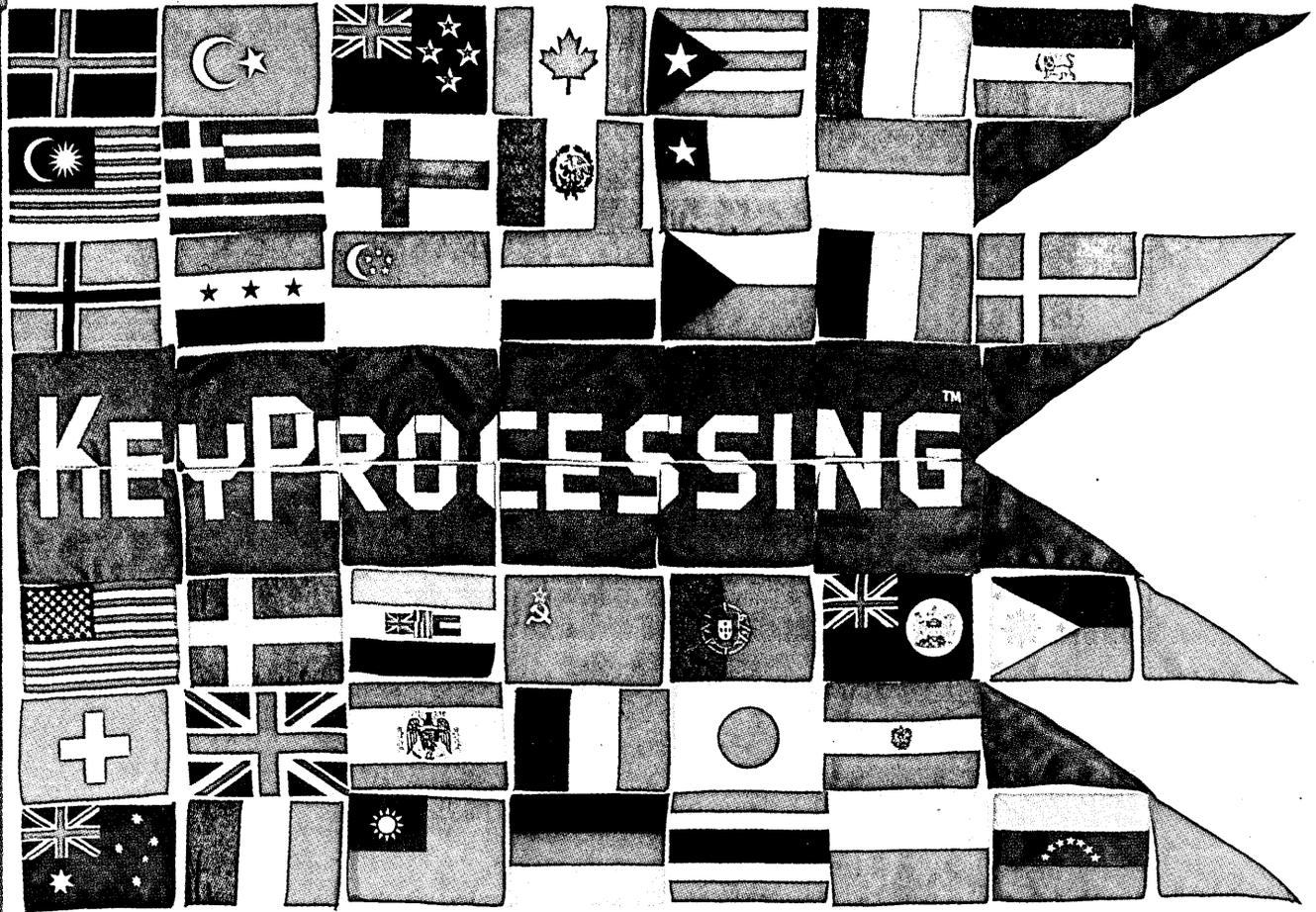
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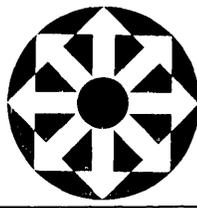
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SEPTEMBER 1975

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Health care has become the nation's largest industry. It is also thought to have the biggest backlog of computer applications, yet for years hospitals have resisted computerizing any but the most mundane business functions. Now constantly changing reporting requirements and soaring costs are forcing them to reconsider and the field is about to break wide open.



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ABOUT THE COVER For a clear view into on-line systems for hospitals, our construction was created by Barbara Benson. Photography by Andy Cominos.

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35 Mason Street, Greenwich, CT 06830
Circulation Manager Suzanne A. Ryan
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Circulation audited by Business Publications Audit



Member American Business Press, Inc.



DATAMATION is published monthly on or about the first day of every month by Technical Publishing Company, 1301 South Grove Ave., Barrington, Illinois 60010; Arthur L. Rice, Jr., Chairman of the Board; James B. Tafel, President; Gardner F. Landon, Executive Vice President. Executive, Circulation and Advertising offices, 35 Mason Street, Greenwich, CT 06830, (203) 661-5400. Editorial offices, 1801 S. La Cienega Blvd., Los Angeles, CA 90035. Published at Chicago, Ill.

DATAMATION is circulated without charge by name and title to certain qualified individuals who are employed by companies involved with automatic information handling equipment. Available to others by subscription at the rate of \$24; \$40 Air Mail annually in the U.S. and Canada. Reduced rate for qualified students, \$14. Foreign subscriptions are available for £16.80 or for the equivalent of \$40 U.S. in most West European currencies. Sole agent for all subscriptions outside the U.S.A. and Canada is J. B. Tratsart, Ltd. 154 A Greenford Road, Harrow, Middlesex HA13QT, England. No subscription agency is authorized by us to solicit or take orders for subscriptions. Controlled circulations paid at Columbus, OH and Form 3579 to be sent to Technical Publishing Company, P.O. Box 2000, Greenwich, CT 06830. © Copyright 1975 Technical Publishing Company. "Datamation" registered trademark of Technical Publishing Company. Microfilm copies of **DATAMATION** may be obtained from University Microfilms, A Xerox Company, 300 No. Zeeb Road, Ann Arbor, Michigan 48106. Printed by Beslow Associates, Inc.

DATAMATION is published monthly on or about the first day of every month by Technical Publishing Company, 1301 South Grove Ave., Barrington, Illinois 60010; Arthur L. Rice, Jr., Chairman of the Board; James B. Tafel, President; Gardner F. Landon, Executive Vice President. Executive, Circulation and Advertising offices, 35 Mason Street, Greenwich, CT 06830, (203) 661-5400. Editorial offices, 1801 S. La Cienega Blvd., Los Angeles, CA 90035. Published at Chicago, Ill.

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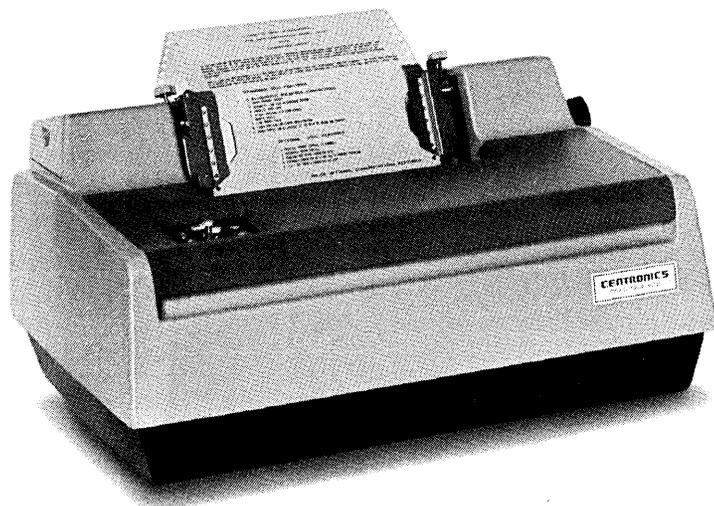


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letters

Templates or tambourines?

I read with interest the recent articles and letters concerning whether or not we programmers are part of that so-called professional fraternity. In the everyday business world, pragmatism rules, sometimes unfortunately even over morality, so let's be pragmatic in defining what a professional is.

My "rules of thumb" for a professional are:

(1) Can you send a bill to a client that says only "Services Rendered \$1,500," and get paid with no questions asked?

(2) Does your income come from a variety of sources?

(3) Are you your own boss?

(4) Does your "profession" have its own code of ethics?

(5) Do you have to qualify by some sort of test before a board of your peers much like the AMA or Bar Association before you may practice your profession?

(6) Does your loyalty rest more with your professional society than your place of employment?

If one answers "yes" to all these questions then he or she is a professional; if not, then he or she is not. The degree of advanced education or experience or level of income has, in my opinion, little or nothing to do with it.

Using my rules then the following labor categories can qualify as "professionals": medical doctors, lawyers, electricians (self-employed), carpenters (self-employed), insurance brokers, plumbers (self-employed), undertakers, certified public accountants, and gardeners. I can't think of many others that fit my definition of a "professional"; certainly most programmers do not.

We have been called high priced gypsies because we move from job to job every few years. This seems to be nearer the mark in telling it like it is.

WILLIAM A. DELANEY
President

Analysis & Computer Systems, Inc.
Burlington, Massachusetts

Make the computer fit the task

At our company, we install business systems for a variety of businesses which range from very small to quite large. We have found, as Louis B. Marienthal's article ("Small Computers for Small Businesses," June, p. 62) suggests, that small computers are a viable approach to solving business

problems. However we also utilize time-sharing companies to provide successful and economical business computer services for small companies. In some cases, we have even found batch-oriented computer centers to be the best solution to the problems very small companies have.

The key in automation for small companies is that the service organization be concerned with making the computer fit the task. Too many times the people are changed to fit the computer. It is much easier to change the computer program than the people using it.

MICHAEL ROONEY

The Boston Systems Office, Inc.
Dedham, Massachusetts

A Grosch overstatement?

Herb Grosch is a well known name in dp but his remarks (July, p. 68) must have been written on an off day, as they are both uninformed and rude. To say that "poor, dumb ICL" relies on direct government intervention is simply not true. The British government has done far less for ICL over the years than the U.S. government has done for IBM.

People . . . frequently choose ICL, not out of patriotism, obscurantism, or because we have not heard of any one else. We do so because ICL offers excellent value for money.

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P. R. DOBSON

Group EDP Adviser
Glaxo Holdings Limited
London, England

A cut at time-sharing

You went and did it again with the Glenn Hammer article, "Cutting Time-Sharing Costs" (July, p. 36).

As a modest user of time-sharing (about \$10,000 annually for the Film Dept.) I'm very pleased with my vendor and the value received. But, like all companies, large and small, promises such as "cut dp expenditures 10 to 20% simply by paying attention to them" can really turn us on. What did I find? Glenn Hammer reported that his former employer, "an electronic products manufacturer located in California" (whose name he mercifully omitted), saved "in excess of \$1 million by the end of the project." The magnitude of these savings indicates a wanton and improper use of time-shar-

ing. Yet after reading this article and seeing the wide range of use this company found for time-sharing, I'm convinced that *I'm not spending enough on this service.*

What troubles me . . . is that the uninitiated might get the impression that time-sharing is a "ripoff" loaded with excess costs.

A. M. KNEITEL
Manager

Commercial Information
E. I. du Pont de Nemours & Company
Wilmington, Delaware

We are not against time-sharing. We've even time-shared ourselves, once in awhile. And we believe that anything should be legal between consenting terminals and cpu's. Really. The whole point of the Hammer article was to encourage the reader to review his t-s spending. Apparently Mr. Kneitel did, so the article did what it was supposed to. Further, time-sharing is alive and well, as another article in that issue showed ("Changes in Computer Services," by H. A. Seidman, p. 40). Commercially offered networked information services, including time-sharing, are expected to grow from \$894 million in 1974 to \$2.4 billion by 1980, a growth rate of 18% annually. (And those figures don't include in-house t-s systems.) That growth suggests that many, many people think it's not a ripoff.

Changing dp roles

The article by D. W. Croisdale, "DP People—Who Do They Think They Are?" (July, p. 61), touches on some pertinent areas regarding the relationship of dp professionals to the "host environment." There is no question that dp'ers, host users, and company management must resolve the question of the roles of users and dp'ers as they relate to the systems development process. Some general comments regarding this:

1. The current problem with the dominance of the host user role over the dp role is that the user has yet to accept this responsibility. We are seeing in many companies a realization of this, but still it is apparent that the transition to the host user dominant role is a few years away in the majority of companies. By the way, most dp management is very much in favor of this situation. It opens many more career opportunities to the dp professional.

2. The majority of companies using automated data processing have a loosely defined systems development process. There are exceptions, but our experience indicates that the process of requirements definition, functional design, detailed design, programming specification, and implementation are "seat of pants." May I suggest that these phases must be broken down into

letters

discrete tasks and assigned as part of the systems development process?

3. Mr. Croisdale is precise in stating that dp training schemes cannot be developed without clear definition of tasks, roles, staff relationships, and responsibilities. I would like to add that all of these must be linked to the systems development process, or the training tends to be isolated from the way

Software catches up to the 18th Century

Physics is a science of measurement, so it is natural to me that its methodology can be applied to other disciplines that are sciences of measurement. Despite this, I am frequently asked, "What is a Ph.D. in Physics doing in the field of Computer Performance Measurement and Evaluation?" Kenneth Kolence's article "Software Physics" (June, p. 48) answers that question very nicely.

CONRAD S. GOLDBERG
*Computometrics Department
Grumman Data Systems Corporation
Bethpage, New York
and
Professor
Physics Department
Queens College
Flushing, New York*

For Mr. Kolence to declare his software physics a "theory" seems to me a little premature. A theory (I always thought) advances some unexplained or unknown relationship between two or more measurable quantities (such relationships commonly being called "laws"). It appears that all Mr. Kolence has done thus far is to advance a new set of terms and definitions—and *not* a new set of fundamental relationships (as, for example, some new relationship between cpu work and I/O work).

... to declare this work as a "first attempt to move performance measurement from the black arts toward the sciences" seems to ignore all of the past theoretical work done in such areas as queueing theory and analytical modelling. What *is* needed, however, are more controlled experiments and hypothesis testing.

DENNIS M. CONTI
Gaithersburg, Maryland

I heartily applaud Ken Kolence's article. However, I suggest his analytical approach is very close to the search decision rule theory developed over the past 15 years by Operations Research theorists such as W. H. Tauthert and E. S. Buffa. Their developments are extensions of the work in management

the dp department does its business. Career opportunities can be defined in this fashion.

My thanks to Mr. Croisdale for an excellent article.

EDWIN F. KERR
*Executive Vice President
Q.E.D. Information Sciences, Inc.
Wellesley, Massachusetts*

London bar codes

Bar codes are ten years older than Mr. Yasaki claims ("Bar Codes for Data

information theory which had its primary impetus in the '40s, coinciding with the development of computer systems applications to ww II logistics problems. . . .

The ultimate solution to the problem of "high-confidence" performance evaluation with some of the quantitative values which are the "software physics" objectives, could result from a marriage of the physics and OR theories. . . .

We find in our systems and information retrieval no *real active time*. This is the prime parameter of any measurement of an aggregate throughput system and of "software physics." Until this base is economically available in current information systems, the necessary analytical coefficients will be in doubt.

W. S. WILLIAMSON
*Performance Measurement and
Evaluation
Western Data Systems Center
General Dynamics Corporation
San Diego, California*

Prof. Maurice Halstead at Purdue Univ. has for several years been developing a theory of software physics, and while the theory proposed by Prof. Halstead is somewhat different from that proposed by Mr. Kolence, the objectives are identical. Any theory which purports to explain the complicated relationships among software parameters must be supported by extensive experimental data. A serious deficiency of Mr. Kolence's article is that no experimental data is presented to support his theory. Prof. Halstead on the other hand has gathered extensive data in support of his theory.

S. D. CONTE
*Head
Computer Sciences
Purdue University
West Lafayette, Indiana*

Mr. Kolence replies: Let me explicitly disassociate software physics from past efforts to apply queueing theory to performance measurements. The problem is not simply that software physics does not use queueing theory

Entry," May, p. 63). In *Electronic Engineering* (February 1958), there is a description of a system for reading an identification code from the side of London buses similar to that described as used by the Association of American Railroads. It was provisionally patented in 1957, and was used experimentally to indicate the location of individual buses in order to provide an opportunity to reroute in conditions of congestion or other unforeseen delays.

CHRIS P. BURTON
Cheshire, England

at this stage, but that there are fundamental differences of view in what constitutes a theory and in what makes a theory successful. In constituting a theory, I believe physical theories are needed before mathematical theories can be usefully applied. My criteria for a successful theory is that it be widely used.

While philosophically my position is vaguely related to that of the earliest operation researchers, I disclaim any direct lineage or influence from them. Software physics is intellectually a child of 18th and early 19th century physics. The form of the theory generally corresponds to the form of physical theories of those days, because software physics is now in its initial stages of development, as natural physics was then. I must also acknowledge my debt to Dr. Henry Margenau's book "The Nature of Physical Reality."

I should also disclaim any significant "computer science" influence. Software physics is at odds with the philosophical position of computer science on two absolutely fundamental points.

1. Only a few fundamental quantitative properties of executable software exist. All other quantitative properties can be expressed in terms of these properties, and therefore arise from combinations of these fundamental properties.

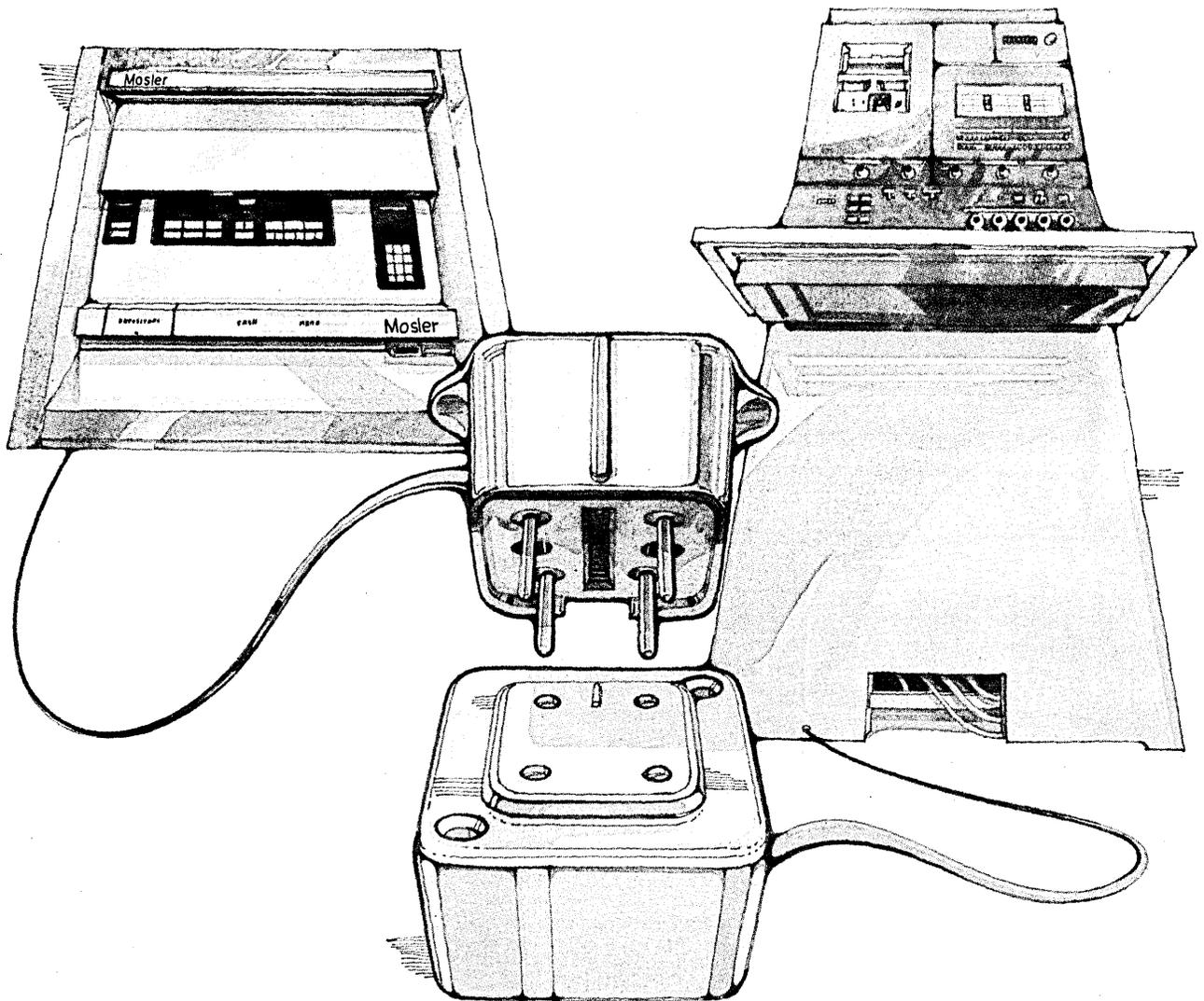
2. All properties must be measurable and all theoretical predictions must therefore be subject to quantitative verification.

Rather than reject software physics on these philosophical grounds, however, computer scientists should recognize that software physics is a powerful tool for integrating their current concepts. In the process, I would expect queueing theory to play a useful role.

Let me emphasize that software physics is intended to solve practical installation problems, especially those concerned with performance. If it does not, then the theory should be ignored. Further, the data needed—or at least approximations—should be obtainable with current measurement tools and techniques.

For practical use, the theory, the instrumentation requirements, and the applications all need to be published together. Once the full scope of the work is generally available, I have no doubt Mr. Conti will agree it is a theory. My personal concern is less with what it is called, and more that it be put to practical use.

Ed. note: A review of Mr. Kolence's two-volume work applying software physics to job costing and charging, written for the Bank Administration Inst., will appear in a future issue. *



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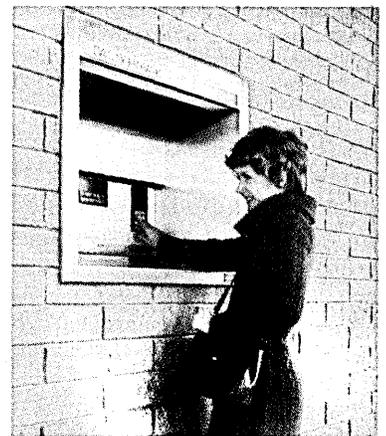
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Men of the Year ...of a Kind

Dr. Willis Ware and Dr. Donald Bitzer have two things in common. One is that they were both selected "Man of the Year" by the Data Processing Management Assn. The other is that they are pioneering technologists who are actively and constructively trying to direct the computer's use in society. After a decade of leadership in examining the privacy problem, Dr. Ware was recently named to the President's Privacy Study Commission and elected vice-chairman. After spending 16 years on development and application of the wondrous computer-assisted instruction system, PLATO, Dr. Bitzer is now determined to take the system to the inner city schools, to raise the abominably low literacy rate of their students—"a liability to society."

Dr. Willis Ware

"My concern has been and will continue to be personal privacy. In the next several years it will become the top social issue." Those are the words of a man who holds three degrees in electrical engineering and in earlier years was known best for his hardware systems work. In fact, Dr. Willis Ware ventured into the computer field in rather stellar fashion, his first job being for Dr. John von Neumann at the Institute for Advanced Study in Princeton, N.J. He was part of the original staff that designed and developed the initial scientific digital computer, the computer that launched IBM and the 701.

In 1952 Ware moved on to the Rand Corp. in Santa Monica, Calif., where he was involved in the JOHNNIAC project and large-scale computer development for the military. Dr. Ware's commitments to privacy, as well as physical and data security, began at Rand, where many of the West Coast computer intelligentsia reside and military and "automation and society" problems are often tackled in parallel. Rand's Paul Baran started the privacy fever there, writing articles, making speeches, and in 1965, testifying before Congressman Gallagher's committee on the issue. The security issue, Ware recalls, was equally popular among "the whole California crowd. It looked to us that these issues needed to surface. Someone had to get research going, get responsibility going." In 1967

Ware, by then director of the computer department, organized the first session to discuss computer security and subsequently chaired a committee under the Defense Science Board which produced a "definitive document" on the issue. (One Defense Dept. document later produced by a Ware committee remains, unfortunately and some say "unnecessarily," classified.)

In 1972, Ware turned his talent for running productive committees to the now-famous HEW Special Advisory Committee on Automated Personal Data Systems. Ware inherited a rather stumbling effort and within a year pro-



DR. WILLIS WARE
... a decade of leadership

duced the landmark report that resulted in the Privacy Law of 1974.

"The privacy commission's charter," says Ware, is "to finish the job that the HEW group started. Primarily that is to establish guidelines for the law that will govern the private sector. He restated his warnings against transferring the 1974 law (governing only federal agencies) to the private sector. "We can't assume that what is good for the government is good for the private sector. Assume nothing." Each part of the law "must be a conscious decision." For example, the prohibition against secret data bases in the government may not be right in the private sector. Although he noted that data bases such as that kept cooperatively and sub rosa by the insurance companies should not be secret, "industry has to have the option of keeping some things quiet."

Ware hopes that the Privacy Law of 1974 is not cast in concrete. "As the Act becomes enforced, there should be enough feedback to adjust its provisions. The privacy commission could be the mechanism for collecting data about experience in its application." While the commission has no mechanism to take a strong position with respect to the States, many of which are passing their own privacy laws, its members are urging the states "not to take on private industry until we've sorted it out. It could be a very expensive proposition if they do." For exam-

ple, "it remains to be determined whether data is a commodity of interstate commerce," and that decision will affect each state's laws.

While the commission develops the guidelines, monitors the current law, and interfaces with the state governments, it will have to keep an eye on another privacy problem, says Ware. That has to do with the international transfer of data, a topic of growing discussion in many countries. "It will become an important issue in a few years. Perhaps the commission will be able to turn to it late in the two-year life."

For all that the commission plans to do within the next two years, it's not (theoretically) a fulltime job for any member. Dr. Ware estimates that he'll be spending about 20-30% of his time on that, the rest on projects at Rand. But what about the fact the commission has at least two of every other animal (lawyers, politicians, etc.), but only one computer man? Ware would have preferred the support of a second computer professional, but, he smiles, "One can only be persuasive and spend long hours at it."

Ware seems to spend long hours at everything. While at the DPMA meeting in Atlanta to accept his award, he and his wife Floy took a side trip up to Charlotte, S.C., to talk to its privacy board. Charlotte is participating in a HUD-sponsored project involving five cities. Each city is developing part of a management information system and each part is supposed to be transferable to other cities. Ware, who is also "keeping an eye on transferability," got into the project to check on whether the cities were trying to do something about privacy. Some are, and "it's very rewarding to know it's not a complete desert out there."

Ware is a rewarding man to talk to, "up front" as one colleague called him. He is full of information, enthusiasm and concern. "Look at the content of data bases. They concern a lot of people who care more about food, shelter and so on. They think it's more important to have the services than privacy, so they give a great deal of information about themselves. They don't understand the complexity of the issue. Then there's a friend of mine who says 'I don't care if they have information on me. I've lived a clean life.' Unless there's a genuine reason for having information on me, clean life or not . . ." He mused, "the tricky part is to get a set of safeguards that work. There's a reasonable chance we can do it in two years."

Dr. Donald Bitzer

Perhaps that's how he funds PLATO. Master magician Donald Bitzer has little trouble stealing a dime from an

unsuspecting hand. The crew-cut professor of electrical engineering also plays handball, paddle tennis, squash, tennis, invents hardware, teaches, and runs the PLATO project, the computer-assisted-instruction system at the Univ. of Illinois that walks, talks and brings joy to children, adults and teachers. PLATO can also double as a business, scientific, interactive, information retrieval system in industry. And according to Dr. Bitzer, it can also save society from the glut of illiterate students the inner city schools are dumping on the streets.

That's Bitzer's "mission." "A rational person wouldn't pursue it. The payoff is so great though." Bitzer says now the literacy rate of the inner city students is 50%. "They've stopped giving them the national aptitude tests because the results are so embarrassing." He wants to bring PLATO into those schools, communities and homes. The cost will be enormous, but "right now the schools are an inexpensive form of babysitter and the cost of that to society in the future will be far greater than a PLATO."

Bitzer talked rapid fire about all the things that have to be done. PLATO, now in version 4, now is used at 1,000 terminals, several hundred of which are at universities, government agencies, and corporations around the U.S. and foreign countries. There are 150 courses and 6,000 hours of lesson material at all levels of education. More than a thousand teachers are using the system.

"We've probably gone through 100 steps already. We've identified a large number of places where it appears that the computer can do as good or better a job than the teacher in equal or less time." Now Bitzer's forces are trying to develop more precise measurements of CAI effectiveness to show people, to persuade them. They have started a program in which the elementary student's progress is traced over the years, comparing each succeeding year with the previous one and changing and improving the course and the methods accordingly.

Bitzer talked about deciding what must be done, what's needed scientifically and technically, what society can

afford and what it needs. Then there's getting low-cost graphic terminals into the home—the engineering step. Standard tv is not good enough for educational materials. He talked about dividing the tv channels to broadcast data at a lower cost. At the same time, education courses have to be expanded and the services vastly increased, such as putting a 2-million volume library on-line. "The Soviet Union decides it will do it and plans 10 million terminals," he states firmly. "We have to decide to do it."

While federal and state governments are the primary target for funding,



DR. DONALD BITZER
master magician

corporations have to spend more on education, asserts Bitzer. He's afraid that the flexibility of PLATO in the business world is such that "people will forget about education." Not if Bitzer has his way. What's interesting about him is that he is bit-diddler and social consciousness and educator wrapped up in one, comfortable with any topic.

Don Bitzer has been at the Univ. of Illinois a long time. He was a student there in the early '50s, when Illiac I was being installed. On the advice of a professor the electrical engineer took a course on computers, then put the Illiac I to work on his homework late at night. While aiming at his Ph.D., he did computerized radar work. "I used to fly on reconnaissance missions and process the data," he recalled. Because he was so busy he didn't attend some meetings that year, 1959, in which the use of computers in education was being discussed by university representatives. "No one could agree and the director of the engineering laboratory was about to write that to the dean. I convinced him to hold his letter for a week. In that time, then the spring of

1960, I planned PLATO 1, 2, and 3. Within a month we had a complete graphic terminal on the computer."

Bitzer explained a hundred different facets of the PLATO experience, the educational aspects, the technical ones. None of the people that have dealt with it are resistant to CAI. The teachers and students come in at 1 or 2 a.m. to get on the system; they can only use it a few hours a day. "Some of the elementary school students' parents bring them over at that hour, then they take over the terminal," he laughed. Two fifth and sixth grade students rewrote a course on the system "because they thought they could do it better." A problem learner, who couldn't sit still for more than 10 minutes, forgot his problems with the CAI terminal.

That terminal is a flat-panel plasma display. Bitzer's forces invented it, and Owens Illinois Glass bought it and perfected it. IBM had turned it down and then had to go through some shenanigans later to get a license to use the invention. Bitzer laughed at that one. That display allows rear projection under computer control; it has a touch sensitive screen, is point-by-point interactive with the computer; audio can be attached to it via a jack in the back. It costs \$8,000 for a complete terminal today. If production "reaches that of tv sets—several million a year—it will cost \$500 or less to get a complete graphic pictorial slide projecting terminal in the home."

But a system with 1,000 terminals—as it now is—isn't where Bitzer wants to stop. PLATO 4 will accommodate 1,500 terminals. Then comes PLATO 5. It will be a network of 250 systems and 4,000 terminals by the 1980s. While Bitzer works on the literacy mission, he'll be encountering some major new technical problems. The 250 systems are "the real problem"—how to establish communications (ARPANET can't handle three terminals), how to transfer data, programs and courses, how to make the network secure, how to ensure privacy. We don't want the interaction for student and teacher to be a task, using a lot of code words. We want the education analysts to get it stripped of private information.

Privacy, security, technology, education, literacy, economy, politics, local, state, federal, and foreign. Bitzer has to address all those issues to get what he wants. He'll hit the speech-making trail to get his ideas across.

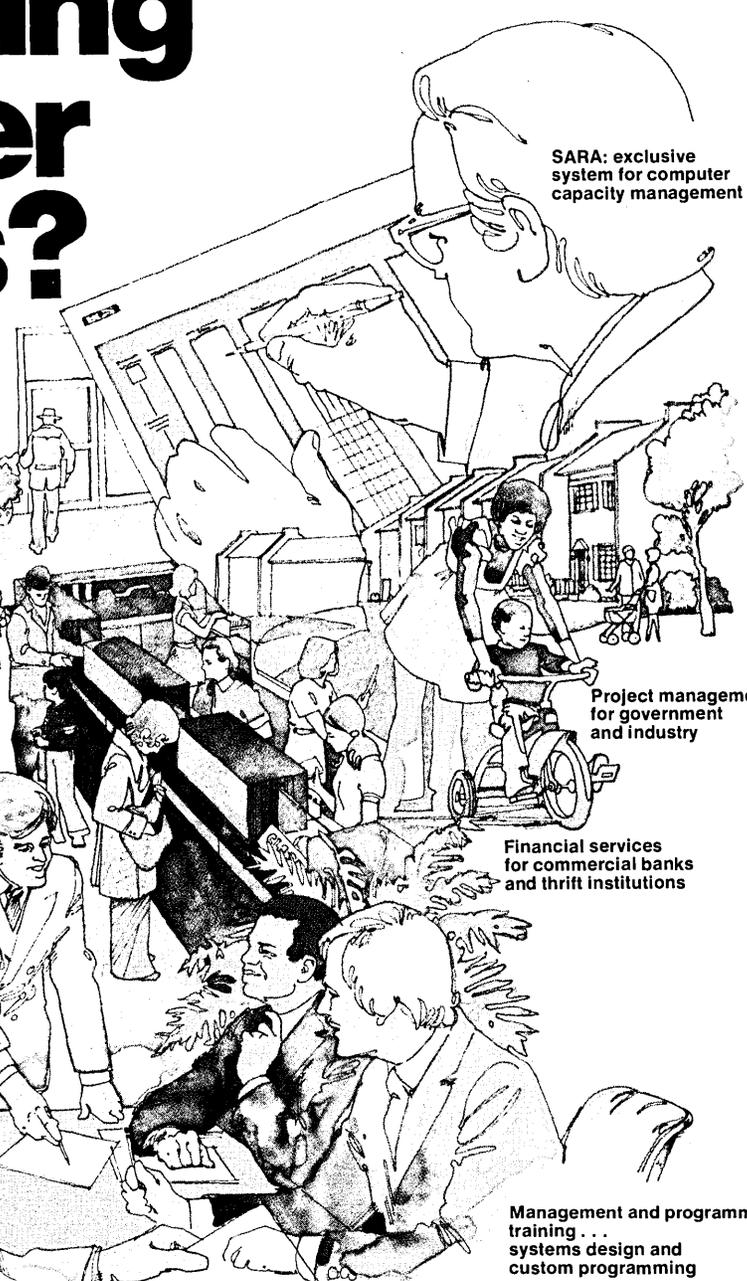
In New Posts...

JOHN KASON, executive vice president, has been named chief operating officer of University Computing Co., Dallas . . . DR. ANTHONY RALSTON was elected president of the American Federation of Information Processing Societies, Inc. (AFIPS) . . . JOE B. WYATT, director of financial systems and information technology at Harvard Univ., has assumed the presidency of EDUCOM, the Interuniversity

Communications Council, Inc. . . . The Grand Union Company appointed PAUL M. COHEN, director of computer systems . . . F. WILLIAM STAMPER was appointed vice president, product planning and program management for Mohawk Data Sciences Corp. . . . BEN WHEAT has been named senior vice president of Boeing Computer Services, Inc. *

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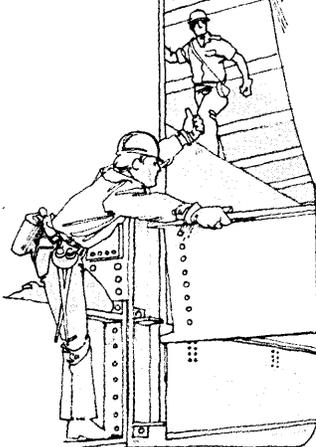


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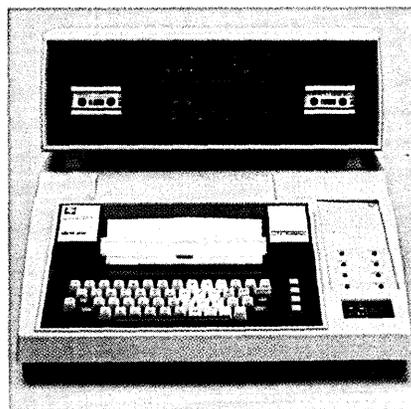
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Versatile “Silent 700” programmable data terminal offers easy operation and powerful options for many business management systems.

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Standard in each “Silent 700” programmable data terminal is the microprocessor and memory capacity to handle most user applications.

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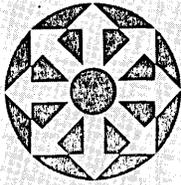
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CIRCLE 12 ON READER CARD



LOOK AHEAD

XEROX: STILL BIG AS A COMPUTER USER

Xerox Corp. may be down and out as a computer maker, but it certainly isn't down and out as a computer user. Although the company won't say how many Xerox computers it uses, it recently became the largest single customer of its service bureau--Xerox Computer Services (page 102). And now, the copier company is said to be negotiating a big oem minicomputer deal with the Digital Equipment Corp., probably for PDP-11s. If DEC has a bigger oem deal with another customer, we haven't heard of it.

CYNICAL OPINION ON ANTITRUST CASE

William Rodgers, the author of Think--the unauthorized story of IBM and the Watsons--believes not much will come of the Justice Dept.'s current antitrust suit against IBM. And it's not because Rodgers, a longtime IBM watcher, thinks IBM is innocent either. Rodgers, who admits to being cynical about the whole affair, writes in the Washington Watch newsletter:

"While it may possibly have been intended as a serious prosecution in 1969, the present antitrust case against IBM, especially after the legacy left by the Nixon Administration, is a charade. The outcome is sufficiently predictable in general terms that it might as well be written off as a foregone conclusion...Nobody is going to get punished..."

The trial is scheduled to continue Sept. 22 after a summer recess.

DEC'S COMPETITORS MIGHT BE CUSTOMERS

On the basis of what's perking behind Digital Equipment Corp.'s R&D walls, there should be a flood of product announcements in the coming months. Any day now, the firm should be bowing in with a medium speed printer, possibly to be unveiled at Wescon, the electronics trade show in San Francisco this month. The 180 cps printer should sell for less than \$4,000 in single unit quantities and should be available for customer shipment before the year is out.

That, no doubt, will eliminate most of the printer companies from that segment of DEC's business. And DEC may throw a few more curves along with the announcement: the firm is understood to be considering selling the machine on an oem basis to competitors. DEC has never done that before, but insiders insist the firm is seriously considering the move.

DEC's internal development program of its 3330-type disc drive isn't faring as well. Announcement date for the device has been postponed, but work on the project continues. Don't look for any product announcement until next year, though.

THE PRICE OF INSURANCE

Association for Computing Machinery (ACM) member Robert M. Van Slyke of Brooklyn, didn't like the broadness of a release he was asked to sign to get insurance through an ACM program and he said so. In a letter to the Communications of the ACM, Van Slyke complained that the firm advised him that any information he provided about himself or that the insurance carrier could find out about him, could be passed freely about to any other insurance company that was interested through the auspices of the Medical Information Bureau.

In another part of the form, he said, "I was supposed to authorize any licensed physician, medical practitioner, hospital, clinic or other medical or medically related facility, insurance company, the

LOOK AHEAD

Medical Information Bureau or other organization, institution, or person that has any records or knowledge of me, my dependents, or our health," to give that information to the insurance carrier. In an answering letter, Thomas H. Sternau, administrator of the ACM insurance program, promised a "concerted effort" to modify wording which might be objectionable to ACM members. In a later statement he said "it may not be all that we want but we have made some progress."

KERONIX ARSON CHARGES STILL SMOULDER

Update: Keronix, Inc., the memory firm, says it's recovered satisfactorily from a fire that destroyed its Santa Monica, Calif., plant 20 months ago. President Laszlo Keresztury said the company's '75 FY sales of \$3 million were below the previous year's \$3.5 million, but attributes this to unfavorable conditions in the memory market, not to the effects of the Jan. 3, 1973, fire which it has claimed in a celebrated civil suit was set by agents of minicomputer maker Data General (which has filed a countersuit). The Keronix suit, filed late last year, charged also that DG agents used its telephone records to intimidate DG customers who purchased add-on memories from Keronix.

Early this summer, the U.S. attorney's office in Los Angeles dropped an investigation of the charges and turned the case over to the Los Angeles district attorney's office. Meantime, in pretrial interrogatories in the civil suit in Santa Monica Superior Court, Data General is said to have claimed the telephone records were procured to investigate whether Keronix was ever in telephone contact with DG employees, and not to intimidate its customers.

THAT'S THE WAY THE LASER BEAMS

Four years after Frank Marchuk and his Laser Computer Corp. promised to unveil the CG-100 laser computer and didn't, Laser Computer Corp. is still listed in the Orange County, Calif., phone directory. The number is answered "hello." But, at least 1,500 lbs. of the company's assets are stored in the Anaheim branch of Beverly Hills Transfer and Storage Co. Selection of this storage company could have something to do with the fact that Marchuk has a law suit going against a competitor, Bekins Moving & Storage. Bekins is co-defendant in a \$75,000 suit brought by Marchuk against Flick-Reedy Corp. of Orange County. Flick-Reedy sold Marchuk a diagnostic service it owned, called Health Enhancement Institute. The Reedy people contend Marchuk didn't fulfill his part of the sales contract and they repossessed the institute's equipment. Bekins handled the removal. Marchuk claims "highly valuable" proprietary material was confiscated in the course of the removal. Trial is scheduled for February 1976. Marchuk, meanwhile, is pursuing other interests. He has formed a drinking water company called Aqua King which has, coincidentally, the same phone number as that listed for Laser Computer Corp.

A MINI FROM A SEMICONDUCTOR HOUSE

As minicomputer makers introduce larger and larger systems, their semiconductor suppliers invade the smaller traditional end of that business. First product of recently-formed MMI Systems, a division of Monolithic Memories of Sunnyvale, Calif., is a 16-bit minicomputer which will run Data General Nova software. The 300 system, as it's called, incorporates the company's 6701 microprocessor, has a load

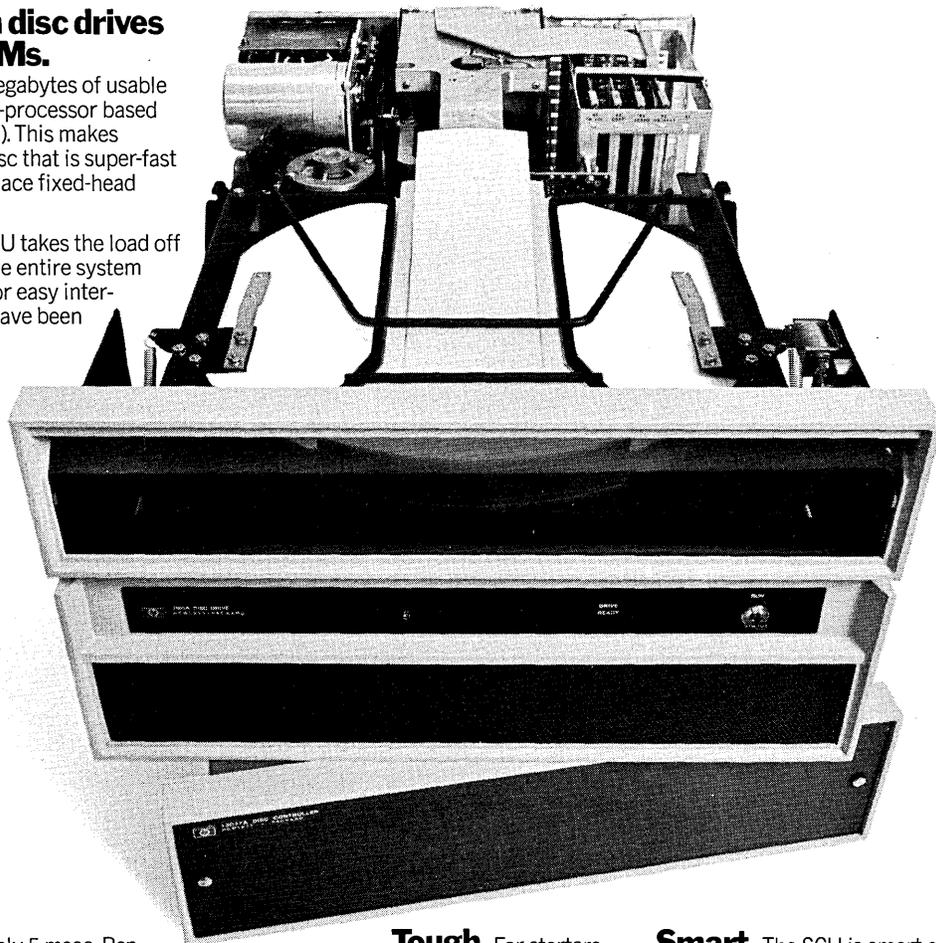
(continued on page 128)

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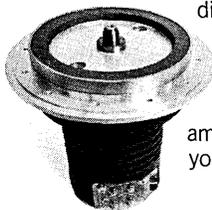
A new concept in disc drives especially for OEMs.

DISCU/15 combines 15 megabytes of usable disc capacity with a micro-processor based Storage Control Unit (SCU). This makes possible a moving head disc that is super-fast and rugged enough to replace fixed-head discs and drums.

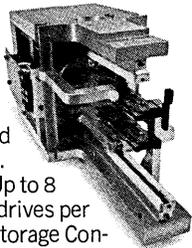
And it's smart. The SCU takes the load off your processor to make the entire system faster. Plus it's designed for easy interfacing, something OEMs have been waiting for.



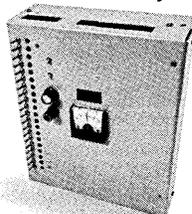
Fast. Track to track in only 5 msec. Random average is 25 msec. The only 3600 RPM cartridge drive. Transfer rate is 937 kilobytes. More capacity in a cartridge: 10 megabytes of removeable storage and 5 megabytes on the fixed disc.



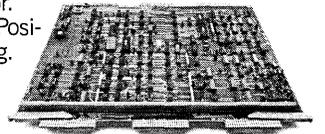
Up to 8 drives per Storage Control Unit give you ample capacity when you need it.



Tough. For starters, a rigid, precision-milled 40 lb. casting really stands up. An integrated spindle and DC Motor eliminates belts and pulleys. And it's designed for use on the open manufacturing floor. A separate blower keeps contaminants out even during cartridge change. The only cartridge disc using track following technology for outstanding reliability. The result: DISCU/15 guarantees interchangeability within the most severe environmental specs available in commercial discs. Easy service too. Even major sub-assemblies are modular for easy replacement. The only equipment you need for major servicing (including head alignment) is a compact Disc Service Unit.



Smart. The SCU is smart enough to be called a minicomputer. Here's what it gives you: multi-CPU capability. Error correction for up to 32 bits per sector. Track switching transparent to processor. Rotational Position Sensing. Command Retry. Plus, a high level interface for quick integration. That means you save time, money and headaches. For all the details, call your nearby HP field sales office.



HP Discs.
They work for a living.

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Sales and service from 172 offices in 65 countries.
1501 Page Mill Road, Palo Alto, California 94304

If Snow White looks like Black Beauty, it's time to go on-line.

Smack in the middle of Japan's biggest industrial belt lies Kawasaki City. Controlling pollution used to be a big problem there. That is, until they asked us to help stop it at source.

We built them an on-line system covering the



MAIN PRODUCTS Electronic Computers & Peripheral Equipment (FACOM) Telegraph & Data Communication Equipment Remote Control &

1,000,000 people city from corner to corner, constantly monitoring the air for any sign of pollution. When a safety limit is crossed, it tells them immediately, and even pinpoints the offender.

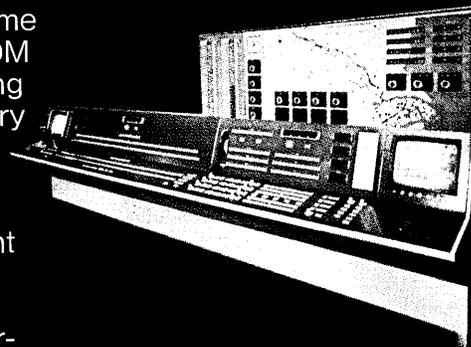
Why us?

Because Fujitsu has the muscle and technology and organization to solve just about any data communications problem.

We're a leading main frame maker whose line of FACOM computers spans everything from mini computers to very large scale computers.

We're one of the world's biggest suppliers of telecommunications equipment of all kinds. And we're uniquely experienced in meshing the two into tailor-made data communications systems.

That's our line for reliable, cost effective on-line.



FUJITSU LIMITED
Communications and Electronics
Marunouchi, Tokyo, Japan



CIRCLE 45 ON READER CARD

Telemetering Equipment Telephone Exchange Equipment Carrier Transmission Equipment Radio Communication Equipment Space Electronics Systems Electronic Components

calendar

OCTOBER

Telecom 75, Oct. 2-8, Geneva. This is the second world telecommunication exhibition sponsored by the International Telecommunication Union, a United Nations agency, and will be combined with a technical symposium sponsored by the IEEE, ITU, and national engineering societies. Topics include world telecommunication networks, optical communications, computer and data communication, satellite developments, and radio communication. Fee and registration information: Caroline Gregory, Place des Nations, 1211 Geneva 20, Switzerland, or William Bazy, 610 Washington St., Dedham, Mass. 02026.

7th Annual Int'l. Micrographic Congress, Oct. 5-10, Sydney, Australia. Discussions and workshops on the latest micrographic techniques and developments are planned, along with tutorials on special applications, such as insurance, government, medical, and finance/banking. More than 35 major exhibitors will display microfilm equipment. U.S. and Canadian attendees may book group flights. Fee: approx. \$152. Contact: Gustav Bujkovsky, IMC, P.O. Box 484, Del Mar, Calif. 92014, (714) 453-8112.

NCF/75 and NEC/75, Oct. 6-8, Chicago. The National Communications Forum and National Electronics Conference will attract more than 5,000 people to a variety of technical sessions and new technology seminars. The current state of communications technology will be highlighted, along with two panel discussions, the "Future of Digital Electronic Switching" and "Improving Programming Productivity." Electronic and communication equipment will be displayed. Contact: NEC, Suite 103, 1301 W. 22nd St., Oak Brook, Ill. 60521, (312) 325-5700.

9th Annual Instrumentation and Computer Fair, Oct. 7-8, Washington, D.C. More than 300 manufacturers will exhibit instrumentation products, computers, data acquisition and analysis equipment, and computer peripherals. Application workshops and seminars will be available at no cost to the expected audience of 3,500 engineers, program directors, technicians, and dp personnel from government and industry. Contact: Instrumentation Fair, Inc., 5012 Herzal Pl., Beltsville, Md. 20705, (301) 937-7177.

International Security Conference, Oct. 19-22, New York. Protection of the computer is one of the major topics for this meeting, designed to provide information and advice on preventing loss of information, ideas, and merchandise. No charge for exhibit attendance; \$15 and up fee for seminars. Contact: Arthur Lilienthal, Int'l. Security Conference, 2639 S. La Cienega Blvd., Los Angeles, Calif. 90034, (213) 836-5000.

Association for Computing Machinery, Annual Conference, Oct. 20-22, Minneapolis. "Computers and the Quality of Life" is the theme to be explored through panels, workshops, and discussions. More than 2,000 computer scientists, programmers, systems analysts, and dp managers will attend

sessions on microprocessors, computing networks, finance and banking, as well as special student and tutorial meetings. Fee: \$55, members; \$80, nonmembers; \$10, students. Contact: Earl C. Joseph, ACM '75, P.O. Box 658, Hopkins, Minn. 55343.

43rd Management Conference, ADAPSO, Oct. 22-24, San Diego. A case study in the formation and operation of a hypothetical time-sharing company is a major session of this conference, which will also include presentations on mini-computers, systems and data security, software, capital opportunities, marketing of computer services, and electronic funds transfer systems. Fee: \$150, members; \$250, nonmembers. Contact: ADAPSO, 210 Summit Ave., Montvale, N.J. 07645, (201) 391-0870.

Data Communications and Peripheral Equipment Exhibition, Oct. 20-23, Paris; Systems '75, Oct. 27-31, Munich. The U.S. Dept. of Commerce sponsors the Paris show at the U.S. Trade Center, and the American section at Systems '75, the biennial international show. Western Europe represents 23% of worldwide computer installations, and is a sizable market for U.S. industry. Contact: Charles Whitley, U.S. Dept. of Commerce, Washington, D.C. 20230, (202) 967-5381.

18th Annual Conference, American Production and Inventory Control Society, Oct. 22-24, San Diego. "Managing Inventories" is one of the major topics to be presented, with discussions of forecasting, inventory turns, and expediting. Fee: \$150, members; \$180, nonmembers. Contact: APICS, Suite 504, 2600 Virginia Ave., N.W., Washington, D.C. 20037, (202) 333-1660.

NOVEMBER

5th Annual Conference, Society for Computer Medicine, Nov. 12-14, Chicago. Hospital administrators, dp managers, educators, and computer professionals will attend this three day conference focusing on patient centered health systems. Fee: approx. \$100. Contact: Dr. M. A. Jenkin, SCM, 5100 Edina Industrial Blvd., Suite 205, Edina, Minn. 55435, (612) 831-5055.

CALL FOR PAPERS

1976 Int'l. Symposium on Information Theory, June 21-24, 1976, Ronneby, Sweden. The IEEE solicits papers in the areas of coding theory, communications systems, computer communications, pattern recognition, stochastic processes, and computational complexity, among others. Complete manuscripts and summaries for either 15 or 30 minute presentations should be submitted by Nov. 15 to Jack Salz, Bell Laboratories, Room 1G-509, Holmdel, New Jersey 07733.

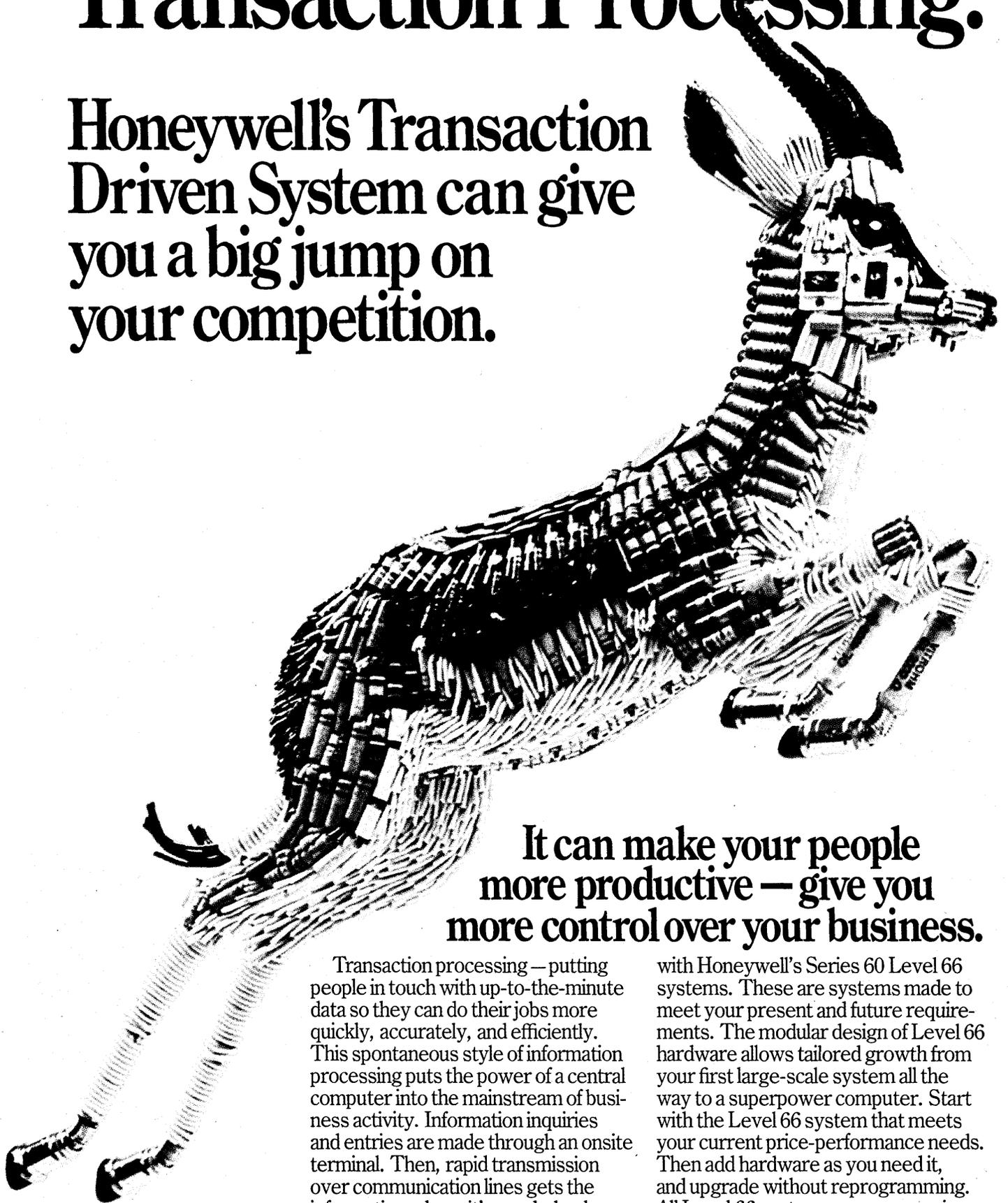
ON THE AGENDA . . .

16th Annual Symposium, Foundations of Computer Science, Oct. 13-15, Berkeley; 7th Annual Meeting, Project Management Institute, Oct. 19-22, San Francisco; Educom Fall 1975 Conference, Oct. 23-25, Portland, Ore.; Semicon/Europa 75, Nov. 3-5, Zurich.

Conferences are generally listed only once. Please check recent issues of DATAMATION for additional meetings scheduled during these months.

Transaction Processing:

Honeywell's Transaction Driven System can give you a big jump on your competition.



It can make your people more productive — give you more control over your business.

Transaction processing — putting people in touch with up-to-the-minute data so they can do their jobs more quickly, accurately, and efficiently. This spontaneous style of information processing puts the power of a central computer into the mainstream of business activity. Information inquiries and entries are made through an onsite terminal. Then, rapid transmission over communication lines gets the information where it's needed, when it's needed — for decision making, cost control, better customer service.

Transaction processing is one of the many computing dimensions available

with Honeywell's Series 60 Level 66 systems. These are systems made to meet your present and future requirements. The modular design of Level 66 hardware allows tailored growth from your first large-scale system all the way to a superpower computer. Start with the Level 66 system that meets your current price-performance needs. Then add hardware as you need it, and upgrade without reprogramming. All Level 66 systems use one version of Honeywell's General Comprehensive Operating Supervisor (GCOS). All user software and data files are compatible on all Level 66 systems.

TDS - our newest interactive software

Honeywell's newest software for interactive processing is the Transaction Driven System (TDS). Operating within the GCOS operating software, TDS offers advantages in processing and implementation:

Timeliness - Information is current. Each transaction triggers immediate updating of the online data base.

Responsiveness - Transactions are processed as they occur, in direct response to the sender's inquiry or instructions.

Protection - Stored data is guarded against erroneous updating, or loss, through Honeywell's data base management system, Integrated Data Store.

Flexibility - TDS can run concurrently with local batch processing, remote job entry, and time sharing. The user provides the variables to tailor the system, and TDS supplies a COBOL-like language to simplify the programming.

Speed - Separate management of the network and the central system expedites processing. Honeywell's Network Processing Supervisor and DATANET Front-End Network Processor handle all communications between terminals and the central system. GCOS and the Level 66 central system handle the information processing.

Simplicity - It's quick and easy for anyone familiar with a keyboard or terminal to learn how to retrieve and update information with TDS.

Economy - Design and implementation costs are reduced by easy-to-use interfaces for the whole system - operating system software, data base management, and terminals.

How TDS is used

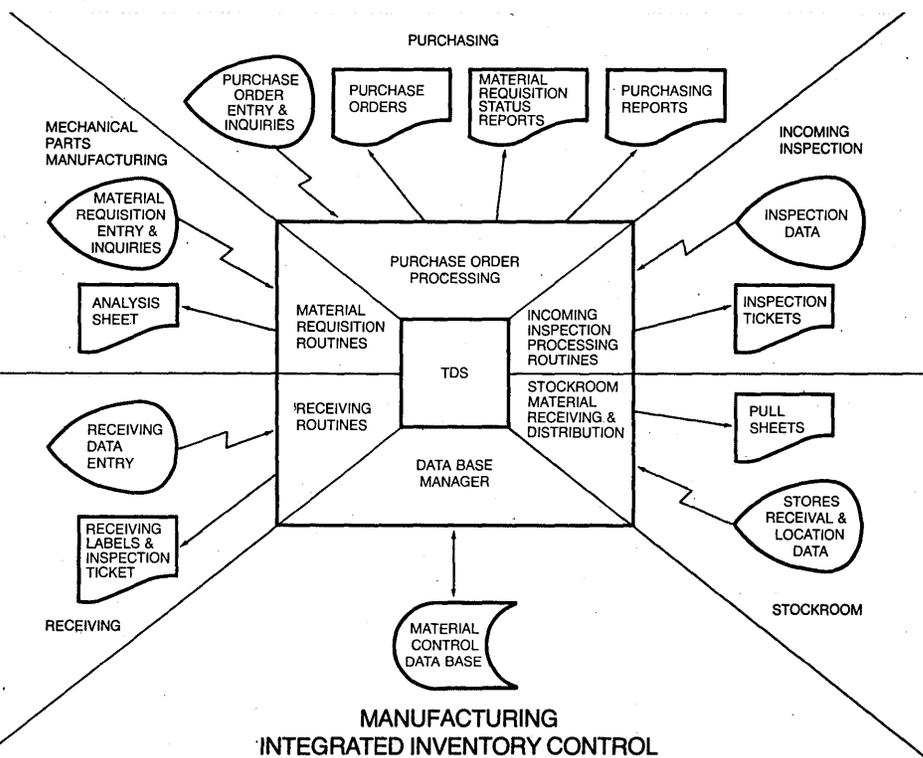
When your business requires quick response - in order processing, inventory control, or manage-



ment-oriented inquiries - TDS is an efficient tool to meet that requirement.

Insurance companies, hospitals, brokerage firms and airlines are typical industries that need to maintain the high quality of customer service and operational efficiency that TDS can provide.

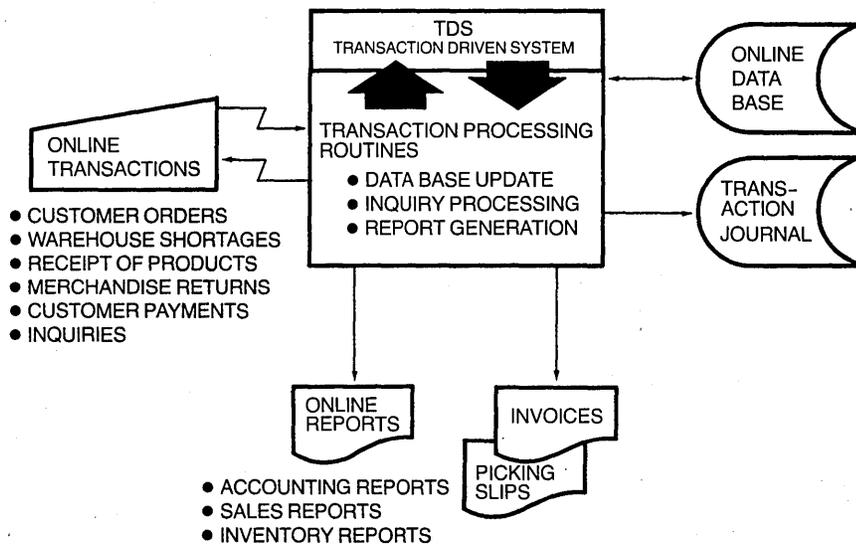
Manufacturers and distributors use TDS to improve inventory management and online order entry. Banks use TDS to speed teller operations and tie their remote locations into the central computer.



...In Manufacturing

A high-technology electronics equipment manufacturer uses TDS to organize and control manufacturing inventories. By integrating and managing critical functions in the inventory cycle, such as controlling backorders, issuing work authorizations, and generating internal purchase orders, TDS helps minimize the problems surrounding the flow of materials.

At work stations throughout the company — purchasing, incoming inspection, receiving — employees enter data at visual display terminals. All input data is edited as it is entered. Errors can be detected and corrected immediately by the originator. Once information has been entered into the data base, it is immediately accessible to all the work stations. As a result, backorders can be monitored more closely, work authorizations are easy to trace, and purchase orders can be printed automatically.



PHARMACEUTICAL DISTRIBUTION ONLINE ORDER PROCESSING

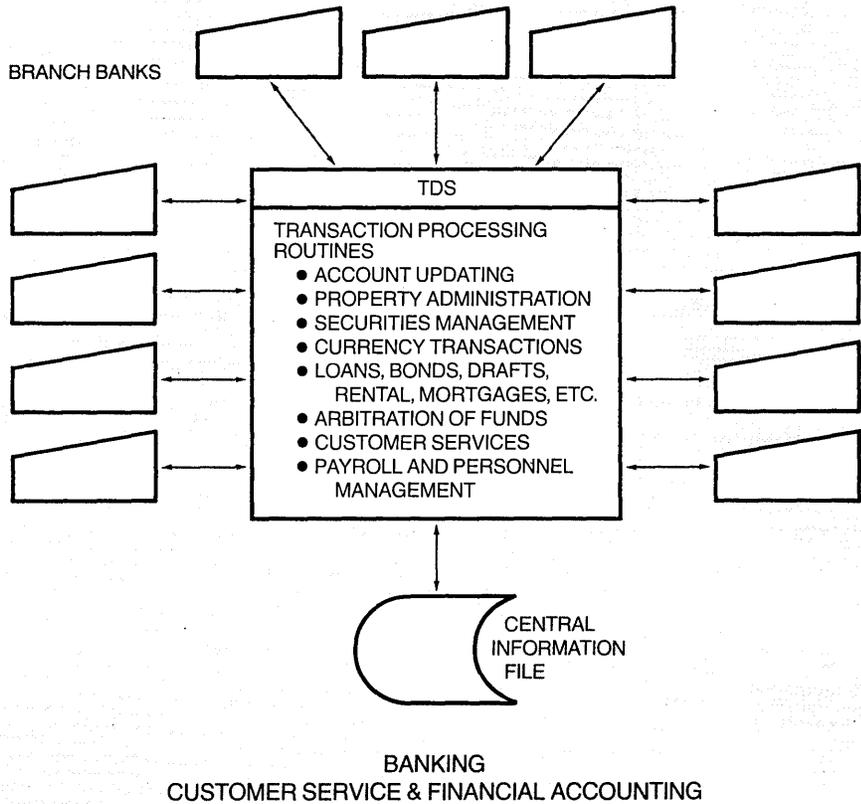
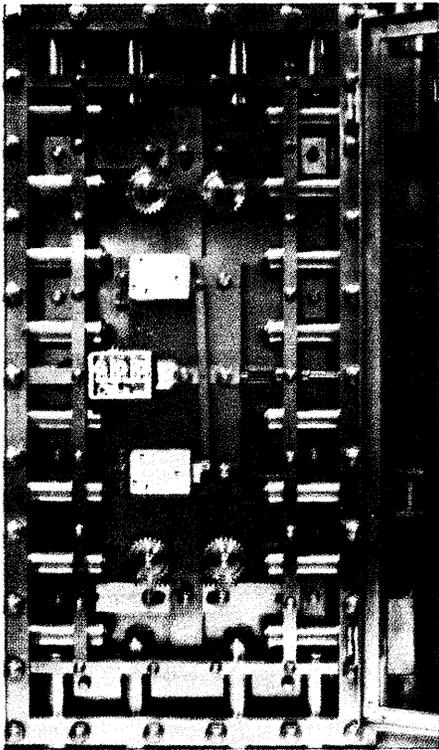
...In Distribution

A large regional drug distributor uses TDS for online order entry and accounts receivable. Visual display terminals at key points in the distribution cycle gather the information at its source.

Input begins with customer orders, written or by telephone. Operators enter the orders on terminal keyboards. TDS automatically verifies and checks product item and quantity-on-hand. Discounts, due dates, and bonuses are established, and the customer is advised of any promotional offerings.

TDS follows up through the order processing activities, immediately updating online the product and customer files, automatically preparing backorders, purchase orders, and shelf-replenishment orders, and accumulating order data for analysis.





...In Banking

A major commercial bank uses TDS for account updating and currency and bond transactions, as well as for loan and mortgage accounting. TDS speeds file inquiries and such complex calculations as securities evaluations, financial ratio analysis, and amortizations. The system links an online central computer to a network serving nearly 200 terminals, 1100 employees, and 33 branch offices.

TDS helps the bank keep its document production, circulation, and inquiries to a minimum, giving employees more time to do their jobs. And since the network shares a common data base, all personnel can obtain necessary information quickly and economically.

Transaction processing plays an important role at the teller windows. TDS enables tellers to record customer account transactions easily and update the data base. The teller or operator simply types in a message to begin processing a transaction. Service operations — check approvals, holds, or stop payments — are also handled by TDS. In a typical check transaction, the check is accepted or rejected immediately on the basis of the account status.

TDS and Level 66 Can Help You Improve Your Business, Too.

Get more for your investment. Let Honeywell's TDS and multi-

dimensional computer power improve information management and apply new and advanced techniques. Level 66 systems have all the general purpose capabilities of any large system, *plus* local batch, remote job entry, time sharing, and transaction processing.

Level 66 systems with TDS make online transaction processing practical for a wide variety of industries and applications. Flexibility, very high performance, fast recovery and restart capabilities, efficient terminal and data base management, and easy-to-use concepts make TDS one of the most advanced systems for transaction processing in the industry today.

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

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Company _____

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City _____ State _____

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The Other Computer Company:
Honeywell

CIRCLE 6 ON READER CARD.

source data

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



Medical Computers

Sales of medical computers will approach \$380 million in 1979, up from \$156 million in 1974 (of which \$98 million was spent for computers used for accounting systems). Growth rates in areas of hospital communication and information systems, patient monitoring, electrocardiogram analysis, and clinical laboratory automation systems are expected to be much higher now that initial resistance due to early failures, high costs, and lack of full understanding, is disappearing. So finds *The Medical Computer Industry*, a 66-page report which covers the market (including time-shared services), the technology, the competition, and specific problems of this industry. Available as part of CSI's Industry Analysis Service, or separately at \$495. CREATIVE STRATEGIES, INC., San Jose, Calif.

FOR DATA CIRCLE 221 ON READER CARD

Brand Preference Study

What manufacturer do you consider when planning purchases? The *1975 Brand Preference Study of the Electronic Data Processing Industry*, a 156-page report, presents the answers given to this question by persons in the oem and end user markets. The answers also include the order in which the manufacturers would be considered. This comprehensive study has been expanded from previous ones to include preference scores for products in the areas of: computers; peripherals and memory; calculators; terminals; software; services; auxiliary equipment, supplies, and accessories; special purpose systems; and communications equipment. Price: \$45. Marketing Research Dept., DATAMATION, 35 Mason St., Greenwich, Conn. 06830.

Batch Data Entry in Europe

A \$513 million market in 1974 for batch data entry equipment in Europe will grow to \$648 million by 1983, for total sales over the 10 year period of

\$6.1 billion. Germany, England, France, and Italy will account for 80% of the sales. And underlying this growth is a projected increase in installations of medium and large scale, general purpose computers. These and other facts are presented in the report, *Batch Data Entry in Western Europe*. Price: \$495. FROST & SULLIVAN, INC., New York, N. Y.

FOR DATA CIRCLE 265 ON READER CARD

Software Directory

More than 3,000 proprietary software products produced by more than 800 vendors are described in the latest semiannual, two-volume *ICP Software Directory*. The first volume (338 pp.) is on systems software, and the second (614 pp.) covers applications software. There are over 2,000 product updates in this version, plus 600 new product listings. Price: \$100/yr. by subscription, or \$60 for two volumes on a one-time basis. INTERNATIONAL COMPUTER PROGRAMS, INC., 1119 Keystone Way, Carmel, Indiana 46032.

Data Collection Equipment

A broad range of data entry hardware used in environments other than computer data preparation areas is the sub-

ject of *All About Data Collection Equipment*, a 20 page June supplement to *Datapro 70*. From hand-held tape recorders to multi-terminal systems, 45 specialized data collection devices and systems from 31 manufacturers are described. Detailed comparison charts and summaries of users' experience with the most popular systems are included. Price: \$10. DATAPRO RESEARCH CORP., 1805 Underwood Blvd., Delran, N.J. 08075.

Computer Printers

The characteristics of 298 systems produced by 96 manufacturers of printers are described in a 1,000 page analysis and evaluation. Impact and non-impact printers are evaluated by type and printing technique. Features compared are number of copies, speed, paper feed, inking systems, buffers, interfaces, price, reliability, etc. Price: \$495. S. P. DAVIS & CO., Los Altos, Calif.

FOR DATA CIRCLE 222 ON READER CARD

Computer Reports

A recent NTIS *Weekly Government Abstracts: Computers, Control & Information Theory* presents summaries of some useful dp reports which are low priced government publications. Among the reports are *Computers and the Soviet Economy* by D. Chevignard (JPRS-64479 \$3.25); *Automatic Data Processing Strategy Study: Vol. 1. A Summary of the Findings* (PB-240 903/5WC \$4.75) and *Vol. 2. Technology, History, and Evaluation* (PB-

WORD PROCESSING

The Market

In the mid '60s it cost \$2 to produce a business letter; today it costs \$3.80. This among other reasons will account for the seven-fold increase in the installed base of the text editing equipment by 1984 to nearly \$1.5 billion annually. The 190-page report, *Word Processing in the USA*, is a market forecast for dictation equipment, individual tank units, central systems, and typewriters. Price: \$595. FROST & SULLIVAN, INC., New York, N.Y.

FOR DATA CIRCLE 220 ON READER CARD

Tutorial and Overview

All About Automatic Typing Equipment, jointly produced by I.W.P. and Datapro, presents a tutorial on automatic typing systems plus a survey of available automatic typewriters and text editing equipment in chart form. The 120-page report also details facts about 20 of the most popular products. Price: \$30.

A complete overview of word processing systems and advanced computer applications is given in

the *Compendium of Computer-based Word Processing Systems*, which in 50-plus pages includes charts and diagrams. Price: \$20 (\$10 to members of I.W.P.). INTERNATIONAL WORD PROCESSING ASSN., Maryland Rd., Willow Grove, Penn. 19090.

DP Department's Influence

The involvement of the dp department in the recommendation and selection of word processing hardware such as standalone text editors, computer printout copier/reducers, microfilm reader/printers, facsimile transceivers, and PABX, is measured in the 48-page report, *Integrating the Data Processing and Word Processing Function: The Expanding Role of the EDP Department*. Responses to questionnaires detail plans to purchase, 1975 projected year-end use, and the percentage of dp departments using or influencing acquisition of these units. Price: \$15. Marketing Research Dept., DATAMATION, 35 Mason St., Greenwich, Conn. 06830.

source data

240 904/3WC \$7.00) by Decisions and Designs, Inc.; and *A Survey of Computer-Aided Electronic Circuit Analysis Programs* by Soo Young Shin (AD-A009 185/OWC \$4.75). NATIONAL TECHNICAL INFORMATION SERVICE, U.S. Dept. of Commerce, 5285 Port Royal Road, Springfield, Va. 22161.



Hospital Computer Systems

Morris F. Collen, ed.
Wiley & Sons, 1974
768 pp. \$28.50

If you want your dope from the horse's mouth, this book is for you. Dr. Collen at the Kaiser-Permanente Hospital, Oakland, has been in the business of hospital computer systems longer than anybody else, and has seen, if not experienced, every success and probably every failure common to this very difficult computer applications area. He has now recorded that experience. His contributions, along with those of several other well-chosen authors, have created in this book the outstanding, primary reference in the field.

I call it a reference because of the amount of information it contains, and because the book is well indexed. However, it was probably intended as a review of problems to be solved in attempting to bridge the chasm between an aerospace technology and a highly complex manual record-keeping system designed in the eighteenth century. In any case, the book has long been needed; it is too bad that it could not have been written 10 years ago, prior to several subsequent expensive hospital system experiments which did not work out so well.

This book is not about the diagnostic problem, nor even medical patient management. Nor is it concerned with accounting, patient billing, or inventory. Dr. Collen's problems begin and end with medical data: how to capture it in the medical environment, how to organize it, and how to display it in a meaningful medical context. Section I of the book consists of 15 chapters by as many authors on general topics concerned with implementing hospital computer systems, and the six chapters of Section II are fairly detailed descriptions of six successful, operational systems written by persons responsible for their implementation.

Most of the chapters are highly readable accounts of various problems

and how their solutions were implemented. Probably my biggest gripe about the book is that it includes no chapters on the systems that have failed and why they failed. The horizon of this field is heaped with expensive rejects, and it would be well not to repeat mistakes, since a new operational system, acceptable or not, costs not less than 200 man-years.

Of the first 15 chapters, ten derive from the Kaiser-Permanente experience. They cover various aspects of hospital information systems, including a chapter on evaluation which presents some of the best analytical work I have seen in this field. The remaining five chapters in Section I are by men who essentially invented the specialty on which they write: Williams on clinical laboratory systems, Robinson on the pathology subsystem, Lodwick on the radiology subsystem, Flagle on operations research in a medical setting, and Lindberg on medical education uses of hospital information systems.

There are also some omissions—for example, not covered (except superficially) is the problem of privacy of information.

The chapters on the medical data base, the administrative systems, and the automated multiphasic health testing are especially well done, giving chapter and verse on current systems as well as on the Kaiser-Permanente systems. The chapter on the King's College system (London) in Section II also includes the history of its development, with errors of judgment as well as successes displayed—a history worth reading.

One is struck with the differences among the systems, each unique to its location, which raises the question again of why such operational systems are not generally exportable or transferable. They can expand geographically to include more patients and local institutions; ideas and even modules can be exported; but owing to extensive tailoring and "tender loving care" required in a new location, extensive hospital information systems have not thrived when transplanted.

If these systems are so difficult to implement, why, one might well ask, do the designers persist so tenaciously? One reason I believe is the secret dream that someday they will truly have an information machine, and another is the conviction that they will at least be financially vindicated. There is considerable basis for the latter expectation, since it can be shown that 30% of the money paid for a hospital stay is for information handling—that is, \$60 per day in a \$200 per day room (projected 1978 cost). Surely an operational hospital computer system can reduce this cost.

Though the book is technical where required, and hence useful to system designers, I also recommend it to hospital administrators because considerable space and emphasis is properly devoted to the recurrent problems of integration of the computer into on-going hospital operations.

—Edward C. DeLand

Dr. DeLand is professor of surgery, Dept. of Health Sciences, UCLA. He was formerly a senior mathematician at the Rand Corp. His current interests include the mathematical simulation of biological subsystems, control theory in biology, and application of mathematics in medicine.

The reader is referred to the articles on hospital information systems in this issue.

BOOK BRIEFS . . .

Computers in Business

by Donald H. Sanders
McGraw-Hill, 3rd ed., 1975
657 pp. \$13.95

This comprehensive text is designed as an introductory course in computer data processing, with no mathematical or dp background required, and no specific machinery featured. The book seems to be well-organized and is attractively printed and illustrated. Each of the five sections has an introductory essay and describes the relationship of individual chapters to the book's objectives, defined as providing an introduction to dp development, general orientation to the computer, and discussions of the impact computers and information processing have on the business environment. A study guide to accompany the book is available for an additional \$5.95.

Minicomputer Systems: Organization and Programming

by Richard H. Eckhouse, Jr.
Prentice-Hall, 1975
343 pp. \$15.95

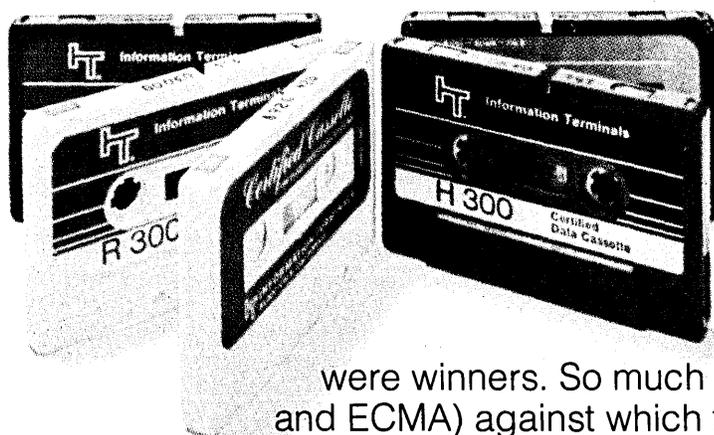
Enthusiasm for the minicomputer results in this text's well-organized approach to teaching computer fundamentals and programming, using the PDP-11 and FORTRAN. The book contains a number of examples, problems, and exercises designed to provide basic skills, and appendices include a number systems primer, logic operation primer, character sets, conversion tables, and specific PDP-11 guides and descriptions.

Computer-Aided Experimentation: Interfacing to Minicomputers

by Jules Finkel
Wiley & Sons, 1975
422 pp. \$24.95

The stated purpose of this book is to describe for scientists, programmers, lab technicians, experimenters, and instrumentation engineers the concepts and techniques necessary to specify,

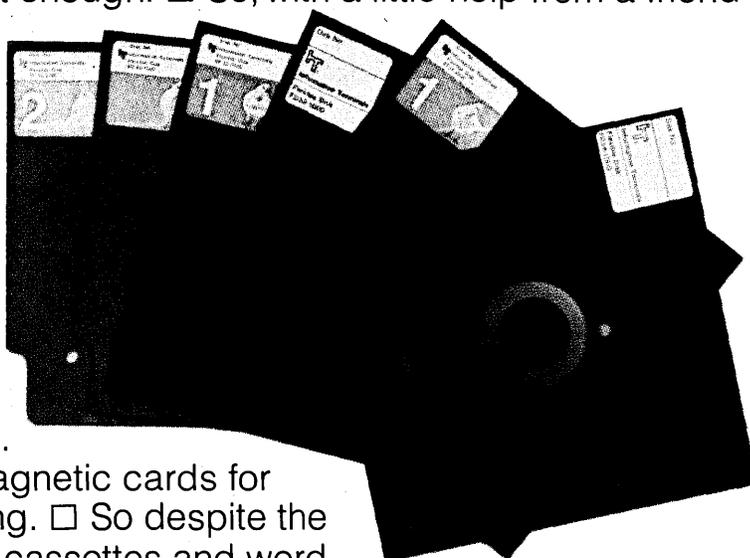
How we got ahead of the pack in data storage media.



Six short years ago, we weren't number one in digital cassettes. We weren't industry innovators in floppy disks. We weren't first in certified word processing cassettes. Fact is. We weren't. Period. But then a lot can happen in six short years. Our first digital cassettes

were winners. So much so that they set the standards (ANSI and ECMA) against which the performance of all other cassettes are measured. Comforting, but not enough. So, with a little help from a friend

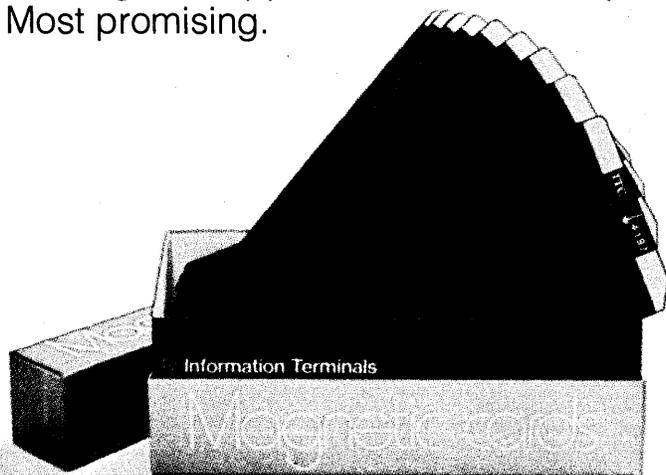
named Gus we found and filled still another customer need—certified flexible disks. Certified flexible disks with the same stringent dedication to quality as our data cassettes.



And then we became the first company to introduce the "flippy", the world's first two-sided, double-capacity flexible disk initialized on both sides. Even more comforting but still not enough.

We've just announced a line of magnetic cards for the growing world of word processing. So despite the fact that we're number one in digital cassettes and word processing cassettes ... and the innovators in floppy/flippy disks, we're still seeking new opportunities for our expertise. The next six years?

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Information Terminals Corporation
323 Soquel Way, Sunnyvale, CA 94086
(408) 245-4400

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 Don't send, just call me.

Name _____

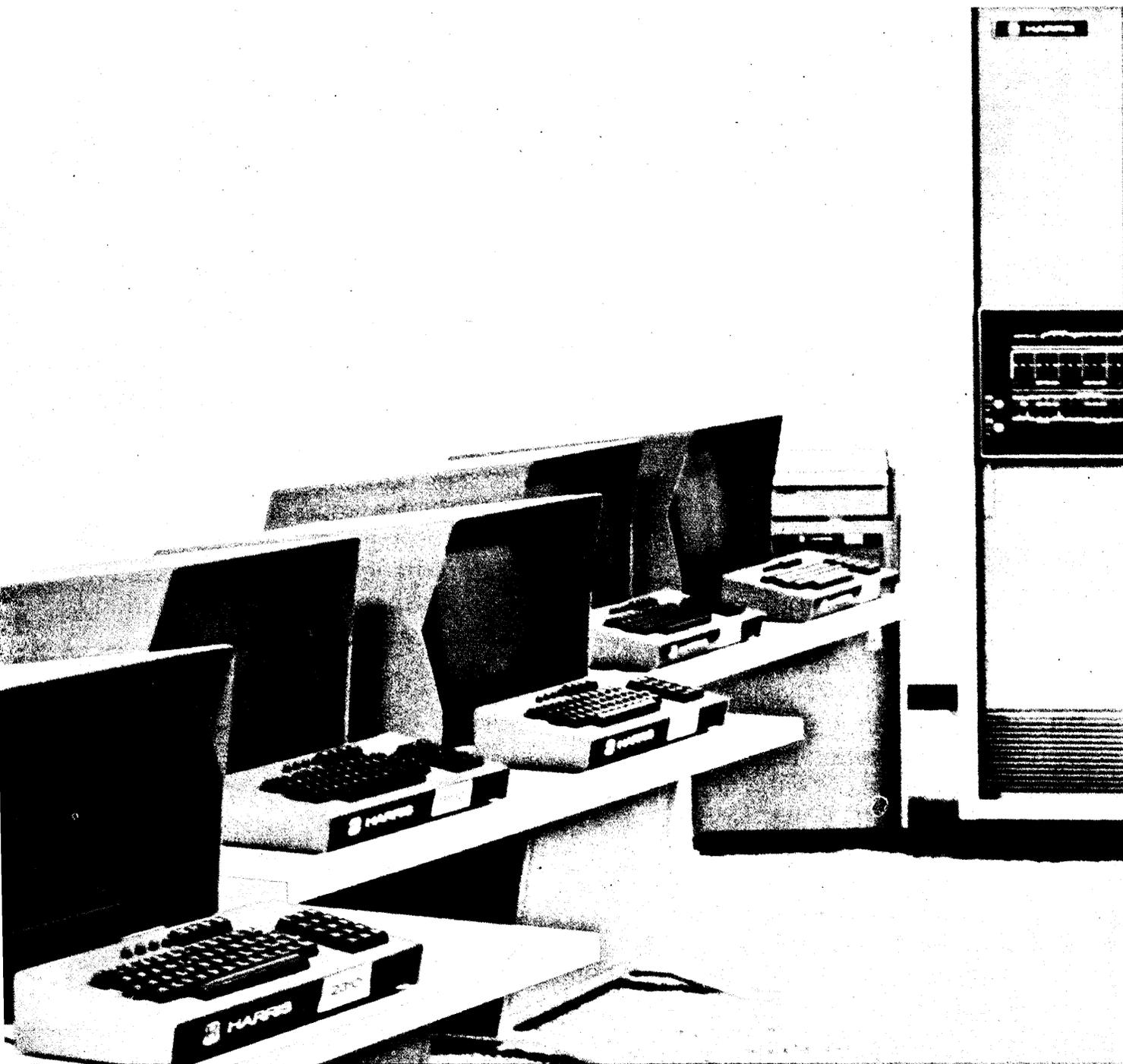
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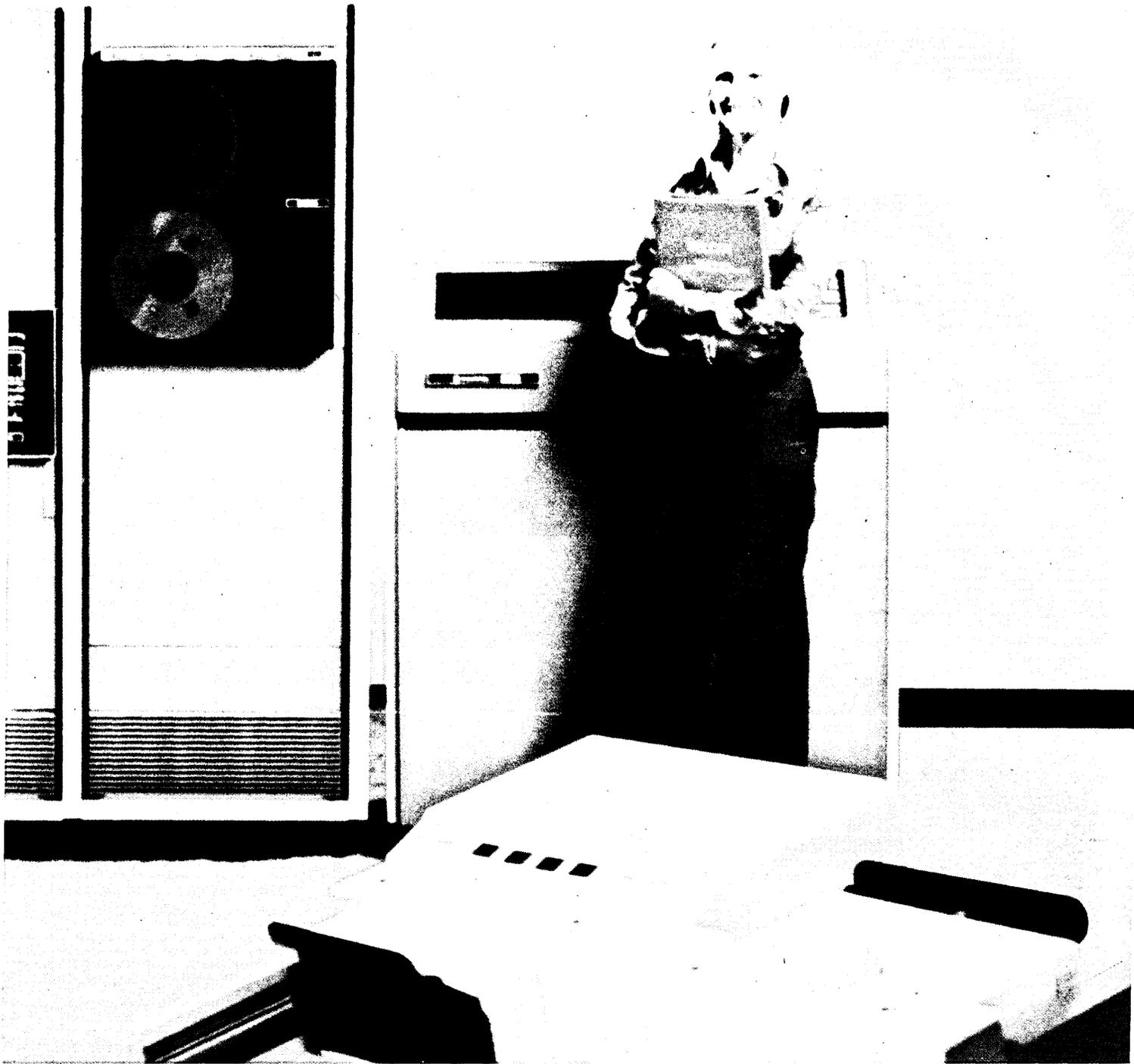
City _____ State _____ Zip _____





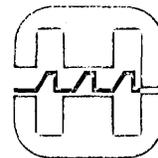
“We were looking for a fast system with field-proven, working software that we wouldn’t have to modify; a powerful system that could perform a specific function. Our programs are written in FORTRAN exclusively and require a lot of computer time.

Actuarial research is predominately a



number crunching operation and requires massive amounts of data with rapid response time. Our HARRIS computer system with its VULCAN operating system is just what we needed.”

The HARRIS S100 & S200 series systems: Operates in real time, interactively or multi-batch. Concurrently and in any combination. Configured to meet your needs today and expandable for tomorrow. From less than \$90,000. Harris Computer Systems, 1200 Gateway Drive, Ft. Lauderdale, FL 33309 Europe: Techmation N.V., Gebouw 105/106 Schiphol-Oost, Netherlands



HARRIS
COMMUNICATIONS AND
INFORMATION HANDLING

CIRCLE 42 ON READER CARD

source data

design, and use minicomputers in a real-time environment. Chapters seem to be comprehensive independent entities which can be utilized as technical "minibooks," such as how to connect scientific instruments and experiments to computers, and discussions of programming techniques.

Computers and Creativity

by Carole Spearin McCauley
Praeger Publ., 1974
160 pp. \$7.50

Creative, inventive people find ways to work with what is available. The com-

puter has been used now for more than 25 years to create graphics, poetry, music, choreography, and other art forms, and this deceptively breezy volume explores the challenges and possibilities inherent in combining machine technology with the human brain and spirit. A group of related references and source materials is provided.

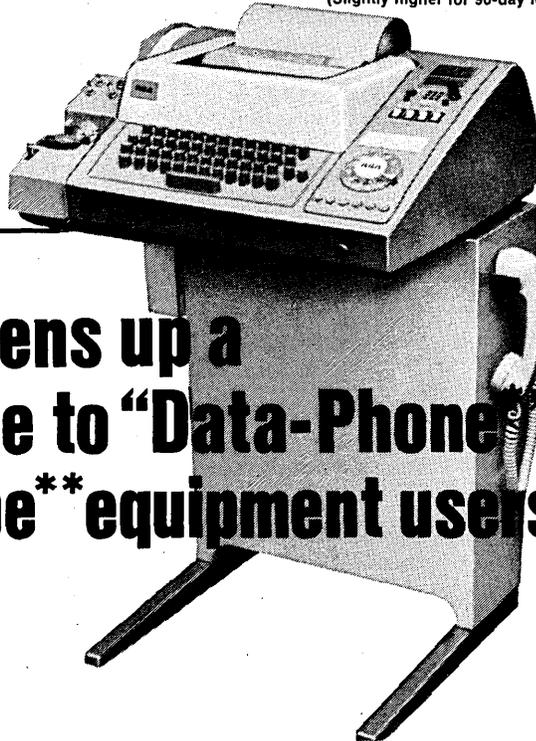
Stretching Man's Mind: A History of Data Processing

by Margaret Harmon
Mason/Charter Publ., Inc., 1975
239 pp. \$8.95

This book traces the history of computer technology from developers of

the Greek and Roman abacus through early inventors of the calculating machines to the sophisticated designers of fourth generation computing equipment. The author uses a biographical approach in discussing pioneers of the field and their underlying philosophies, acknowledging that as the industry gained momentum, new designs were more often the result of teamwork than the work of a lone mathematician or inventor. Thumbnail sketches of people like John Napier, Blaise Pascal, George Boole, Charles Babbage, and Herman Hollerith, among others, plus a bibliography and brief glossary make this book most useful as a general view of the field, or as a springboard to more detailed reading and discussion.

Model 33ASR with dial-up set and complete maintenance service for \$85 per month on 1-year lease. (Slightly higher for 90-day lease.)



RCA opens up a new line to "Data-Phone" Teletype** equipment users

Now — lease Teletype equipment from RCA for just \$45 per month on 1-year lease (send/receive model 33KSR) including maintenance. With dial up set, only 90¢ a day more! (Slightly higher for 90-day lease.)

- Prompt installation and maintenance services by RCA technicians based in over 140 cities.
- Delivery through our coast-to-coast warehouse network
- Automatic unattended operation
- Built-in dial capability
- Alternate voice communications
- Friction or sprocket (pin) feed
- Interfaces with Bell System 1001B (CBT), 1001D (CBT) and 1001A (CBS) or Western Union TAA for TWX use.

For full details and rates call or write:
RCA Service Company, A Division of RCA,
Technical Services, Bldg. 204-2, Camden, N.J. 08101.
Phone: (609) 779-4129

*Registered service mark of AT&T Co.

**Registered Trademark of Teletype Corp.

RCA

Computer/Aided Information Retrieval

by Andrew E. Wessel
Wiley & Sons, 1975
176 pp. \$14.95

Using technology to solve "information explosion" problems created by the use of other technology is the premise of this volume, which offers advice on how to handle retrieval of the massive amounts of data currently in existence and promised for the future. Illustrations and examples support the techniques suggested for automation of information retrieval processes. Such processes center on people supported by computers rather than a computer-dominated approach.

The Design of Real Time Applications

by Maurice Blackman
Wiley & Sons, 1975
265 pp. \$22

The author appears to have made a conscientious effort to explain where to start and how to proceed in designing an application using the real-time mode of processing. Following introductory chapters and a sample program, the book discusses software techniques, documentation, system design, and testing methods. Charts and worked examples illustrate the text.

vendor
literature

Hybrid Computing

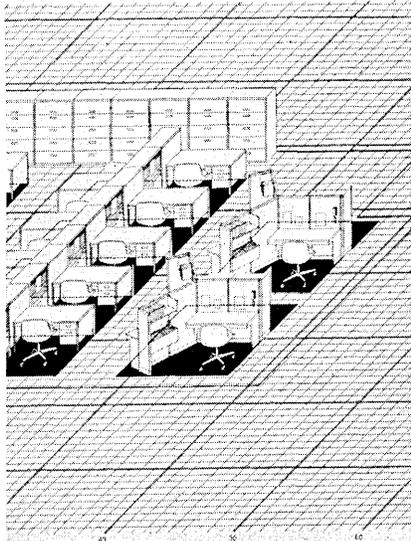
An eight-page bulletin from one of the leaders in the field describes recent developments in hybrid computer hardware and programming. In addition to a summary of EAI products and services, mini articles in the tabloid format describe improvements in programming, peripherals, terminals, dig-

itally controlled high-speed analog computing modules, etc. ELECTRONIC ASSOCIATES, INC., West Long Branch, N.J.

FOR COPY CIRCLE 223 ON READER CARD

Office Planning

Mobiles—open office systems furniture assembled from various combinations of lateral files, desks, and two-inch movable walls—are the subject of this 98-page office planning guide. The well



organized brochure presents 28 work station ideas and even suggests which job functions they work best with. The functions include accounting, clerical, data and word processing, engineering, purchasing, etc., and include considerations for privacy, storage and filing, noise control, display and special equipment. Also included is a planning grid allowing accurate floor plans to be quickly and easily generated. STEEL-CASE INC., Grand Rapids, Mich.

FOR COPY CIRCLE 225 ON READER CARD

DP Services

A management report entitled *How To Automate Recordkeeping Without Incurring Overhead* would seem to be of primary interest to companies on the verge of outgrowing their manual bookkeeping procedures. Case histories are given for seven widely diversified firms that "improved their operating efficiency and financial health" by using the vendor's outside dp services. All of the companies had explored alternative ways of automation before opting for ADP—which is claimed to be the nation's largest data processing services company. AUTOMATIC DATA PROCESSING INC., Clifton, N.J.

FOR COPY CIRCLE 227 ON READER CARD

Performance Monitor

A booklet describes this vendor's Capacity Meter, a console-top computer performance monitor, and how to use

it. The Capacity Meter has four scales, one of which displays "capacity usage" as a function of the other parameters monitored. COMPUTER RESOURCES, INC., Cleveland, Ohio.

FOR COPY CIRCLE 224 ON READER CARD

Data Communications

What Mother Never Told You About DDS is the subject of the first of a new monthly series of brochures that will reportedly contain money-saving ideas and inside technical data for users involved with on-line data communication networks. Mother, of course, is Ma Bell, and the first edition will examine the "problems and pitfalls" of

Bell's Digital Dataphone Service. INTERTEL, Burlington, Mass.

FOR COPY CIRCLE 226 ON READER CARD

Oem Catalog

Nearly 100 of H-P's oem computer products are described in a new 26-page catalog complete with photos and an explanation of oem purchase conditions. Recently introduced peripherals and minicomputer operating systems are included, as are the popular 21 MX and HP 3000cx minicomputer systems. Discs, plotters, magnetic tape, card readers, I/O extenders, general and data communications interfaces, software and distributed systems are also

(Continued on page 158)

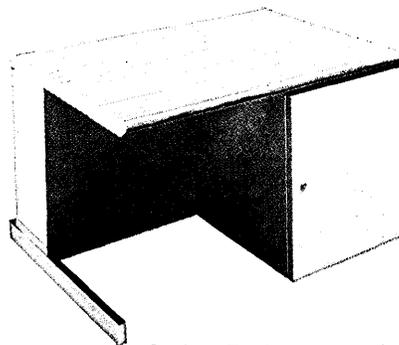
**OptimaDesk...
the data console
with the one thing you've
been waiting for.**

Everything.

Every feature you'll ever conceivably want, including the ones that cost extra in other data consoles (rolled front edge, chrome legs and the like.) Every color from Burnt Orange to Sky Blue to Black; fourteen standard colors in all. Standard widths are 24", 45" and 66", each in a choice of keyboard or desk heights. And the two styles you see here are just the beginning.

Above all, the OptimaDesk is the finest quality furniture ever built for electronic instruments. And the price is right. The 45" model is around \$239, for instance.

Write to us for complete information.



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CIRCLE 111 ON READER CARD

THE NEW SYCOR 440



Clustered data entry and concurrent processing with shared files...\$677 a month.

The Sycor 440 System: the newest addition to our family of compatible intelligent terminals.

Our new distributed processing system lets you perform data entry and inquiry/response concurrent with background processing. So you don't need multiple systems to do multiple jobs. At \$677 a month (for four keyboards, communications, cassette, and a five mb disk on a three year lease, with maintenance) you can perform all these functions—plus many more you never thought possible at such a low price.

Intelligent data entry.

You can save time and money by catching operator errors as they happen, prior to transmission to the central computer site. And reduced errors mean greater operator productivity, lower communication costs and reduced mainframe processing.

Field editing. As soon as you get the system, you can implement our basic data entry package. Without any fancy programming.

TAL II. To extend the 440's power, use our new data entry language, TAL II. This easy-to-use, high-level language lets you customize data entry programs. Instructions are also provided for arithmetic operations, conditional data entry, range checking, table look-up, equal/compare and a host of other intelligent features.

Shared file access.

The 440 system lets you share and access files locally, reducing investments in telephone communications and central CPU resources.

Data entry made easy. Now

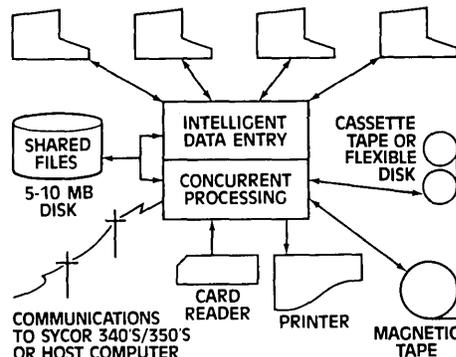
each operator, at her own display, can make use of current data in shared files to support data entry functions. For reduced keystrokes and lower error rates.

Inquiry/Response. File look-up is made simple with up-to-date information on-site, using the 440's own file management and disk storage capabilities.

System modularity.

Design your own system with a variety of options and peripherals.

Supports from 1 to 8 displays. Each is controlled by the Sycor processor and is capable of performing tasks independent of other displays.



Choice of 5 and 10mb disks.

Store and retrieve programs, shared files, and data at remote locations.

Wide variety of peripherals.

And to complete our system configuration, choose from matrix and line printers, computer-compatible tape drives, card readers, and a variety of communications options.

Compatibility.

There's full software compatibility with our Model 340 and 350 stand-alone terminals. Keyboards are also compatible.

Programming. One program fits three different systems—340, 350 and 440.

Communications. Communicate with the mainframe, emulating IBM 2770, 2780 or 3780 protocols. Or use the 440 as a polling station at your central computer site to receive and transmit data to remote 340s, 350s, and 440s.

Concurrent processing.

And best of all, while data entry is being performed in the foreground, you can be doing other jobs concurrently in the background. Jobs that can save you time and money. Jobs like:

Remote job entry. Use the 440 with its card reader and 300 LPM printer for large-scale remote job entry. And since the system contains a CRT and a keyboard, you don't pay extra for them.

Multi-terminal printer support. Each display can interleave print data to one printer as the data is being entered. So, you don't need a separate printer for each display.

Report generation. Sycor-provided programs let you produce all sorts of management reports—sales analysis, inventory, or billing—at the same time as you are performing data entry.

File maintenance. And the Sycor 440 allows you to do editing, sorting, updating, and file transfer in a background operation.

The lowest-priced distributed processing system.

When you consider all the advantages of our 440 system, and then consider its low monthly cost, we think you'll agree: it's the best system in the industry.

For more information on the new Sycor 440, or any of our other intelligent terminal systems, contact your Sycor representative, or write our corporate offices.

SYCOR

...applying intelligence to remote processing.

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You can own your own Fortran number cruncher for less than \$40,000.



out incredibly efficient, fast-executing programs. Because the compiler globally optimizes the code.

If you want interactive computational support with BASIC, you can start out as low as \$6,100. Or get a system for \$12,750 that can be expanded to support 32 separate time-sharing users.

And no matter what language you decide to work in, you won't have to change the way you work. Our computers will adapt to you. Which means you can go single or multi-user, batch or interactive, local or remote, or with dual operations, any two of the above.

And if you have lots of numbers to crunch, what you'll need is one of our Eclipse™ computers. They've already out-benchmarked computers the likes of the Xerox Sigma 9, IBM 370/155 and Univac 1108. And have out price/performed every large scale computer they've come up against.

So if you'd like to do your computation on your own computer, send in the coupon.

We'll show you why you can't afford to buy from anyone else.

Send me the brochure that shows how Data General computers are being dedicated to computational support.

Send me technical literature on your computational systems.

Send me a sales engineer.

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The problem with most FORTRAN computational systems is that they're so expensive only a few companies can afford to own them.

So Data General makes a complete FORTRAN IV system that you can own for only \$36,300.

You get a lot of computer system for the money. A Nova® 2/10 with 64K bytes of core, a CRT, 2.5 megabyte disc, 150 cpm card reader, 165 cps printer. Which should be enough to get anybody started.

If you're planning to do a lot of one-shot jobs, you'll want to use FORTRAN IV. Because it compiles as fast as it executes. But if you're going to be running the same job over and over, you may want to spend some more and get a FORTRAN 5 system. Our FORTRAN 5 puts

DataGeneral

Data General, Route 9, Southboro, Mass. 01772 (617) 485-9100. Data General (Canada) Ltd., Ontario, Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361/Sydney (02) 908-1366.

How WTC Serves America and the World: By Air, Rail, Water, Road...

And By INCOTERM.®



WTC is a pioneer in customized transportation, marketing and leasing services. In less than 20 years, it has grown from a small air freight forwarder into a broadly integrated, \$80,000,000, worldwide business. Well over 10,000 customers regularly rely on WTC to deliver their shipments with speed, efficiency and cost-effectiveness—across the country or around the globe.

WTC INFORMATION SERVICES (WIS) maintains DATA-COMM, a broad-based, up-to-the-minute communication system for use by all of the company's operating divisions. These include an air freight forwarder, two rail freight forwarders, a truck and equipment leasing supplier, and a specialized warehousing and distribution group.

The DATA-COMM system operates on a nationwide network of INCOTERM Intelligent Display Terminals and Printers.

Through the INCOTERM equipment, DATA-COMM integrates the activities of all WTC operating divisions, providing a total transportation service. It traces shipments, displays schedules, prints waybills, computes rates. It provides

shippers with a powerful tool for advance planning.

Soon, this same system will handle on-line administrative and operational processing for all WTC divisions. Such as telling the leasing division the precise location, condition and availability of all equipment; and providing inventory, computer-controlled routing, warehousing and freight flow services.

These are just some of the good things that can happen when two pioneers get together.

INCOTERM: More Power To Your Terminal.



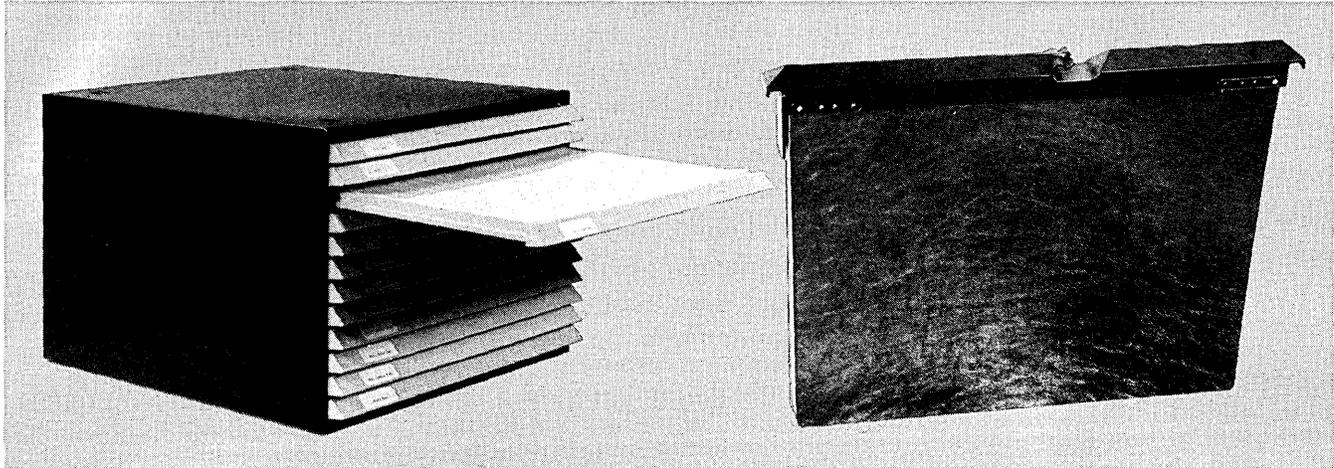
6 Strathmore Road
Natick, Massachusetts 01760
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Sales and customer service offices in major cities throughout the United States and abroad.

Introducing the Wright Line Computer Printout System

new ideas in printout filing and referencing

Here are two brand new ideas from Wright Line to help you in the efficient filing and referencing of computer printout.



THE CPS CUBE SYSTEM

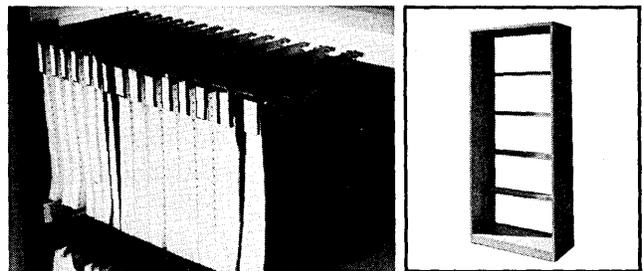
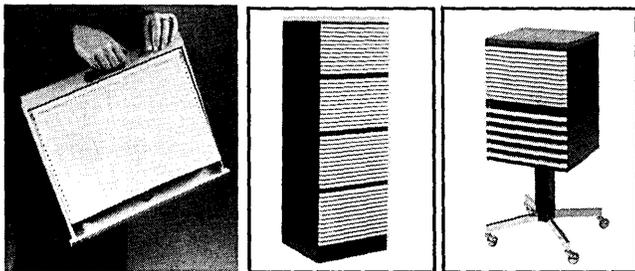
A time and money saving alternative to binding, the CPS Cube System consists of the basic cube module which will hold up to twelve plastic sliding trays. The trays are equipped with a binding mechanism so that reports can be either bound in or filed loosely. The trays can be extended from the cube for referencing or completely removed and carried by the built-in handle. The basic cube will hold twelve 1/2" reports and can also accommodate larger reports up to 2" using fewer trays. Cubes can be stacked up to four high, placed on a desk or table or used as components in Optimedia Cabinets.

Optional equipment includes mobile base, plastic laminate top and stationary base.

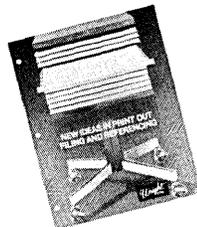
THE CPS HANGING SYSTEM

Here's the new approach to printout filing you've been waiting for. The CPS Hanging System features reusable Cartridges with a revolutionary center hook design that provides maximum filing capacity and ease of filing. The Cartridges which are available in three sizes for reports up to 1" thick also have end hooks for drop filing and large highly visible label areas. Bound reports can be converted to the hanging system using CPS Adaptors that also combine the center hook and end hooks.

The complete CPS Hanging System includes Cartridges, covers, library units for high density filing of reports and hanger bar components for use in Optimedia cabinets and work stations.



Complete details on the new CPS Computer Printout System are contained in our new brochure. For your copy circle the readers' service number or write today. Wright Line, a division of Barry Wright Corporation, 160 Gold Star Boulevard, Worcester, Massachusetts 01606



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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.

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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.

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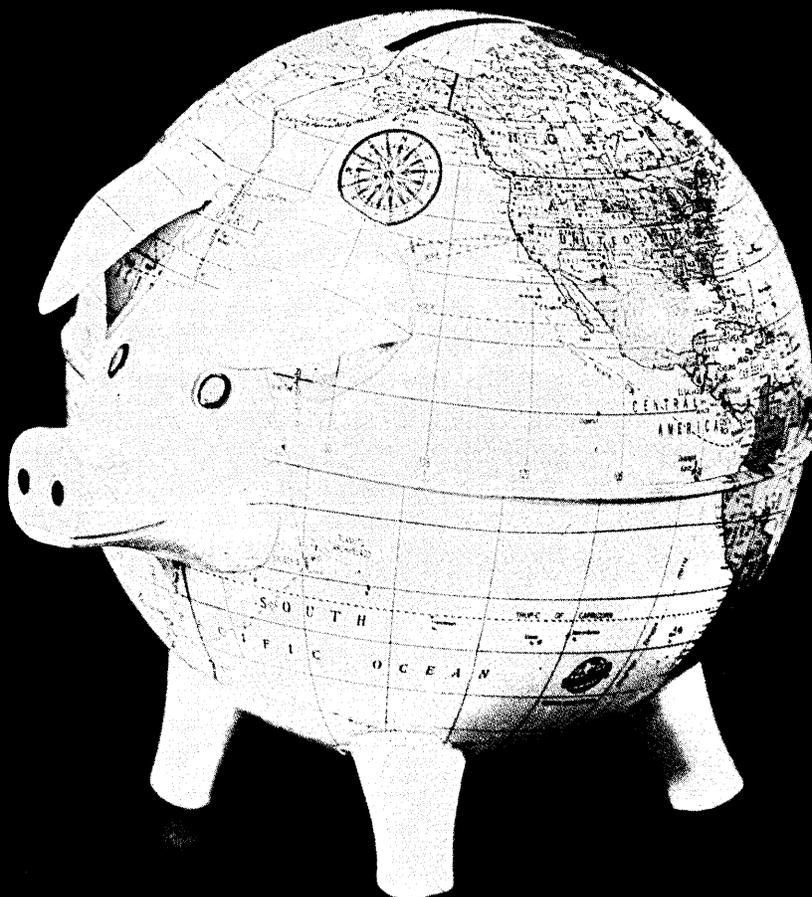
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Introducing "First Freight." United's new priority air freight service.

- Always the first freight loaded in our planes. The big "1" on every piece makes sure of that.

- Segregated all the way—in our terminals and in the air.

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Just call United at least 6 hours before departure of the flight you need.

We'll reserve space, and as long as your shipment arrives at our freight terminal 90 minutes before flight time, we'll make sure it's the "First Freight" loaded.

Just say, "First Freight."

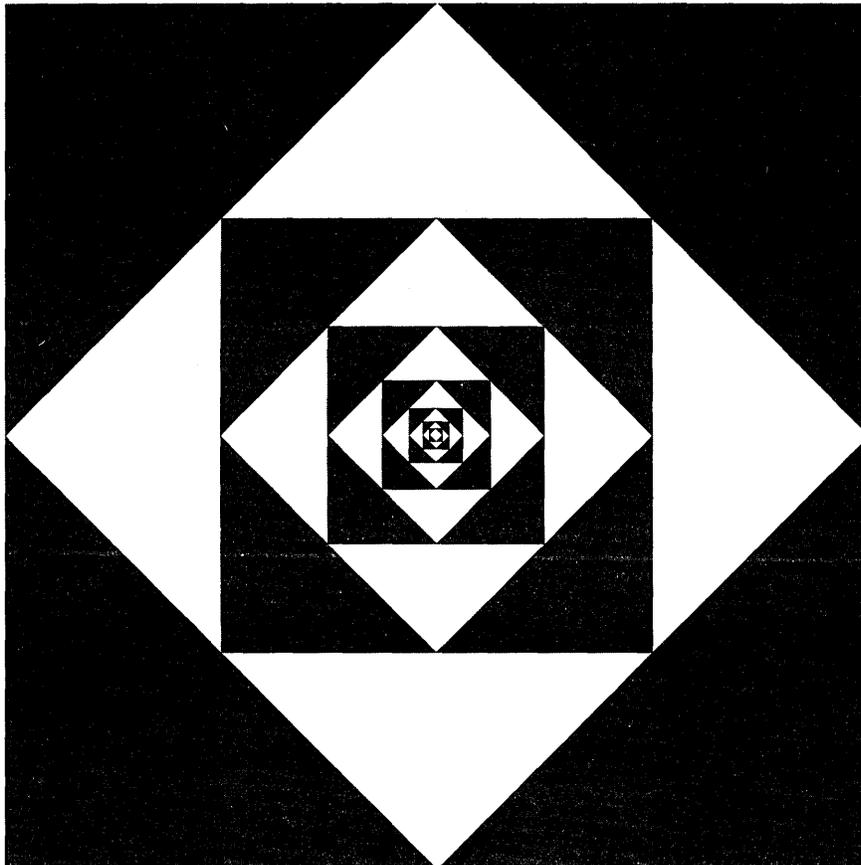
When that shipment has to be there, call United or your freight forwarder. Yours can be the "First Freight" there—to any of our 113 cities.

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 **UNITED AIRLINES CARGO**

DP Dialogue

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



This graphic design depicting the outward progression of squares and triangles symbolizes the continuing evolution of System/370.

System/370: The Continuing Evolution

In June 1970, IBM announced the System/370. Since then, a wealth of new products have continually extended the versatility and productivity of the system. Thousands of users now have a proven 370 base for their future growth.

Recently, DP Dialogue asked Gale Aguilar, a key systems marketing executive in the IBM Data Processing Division, to put the System/370 in historical perspective. We asked him:

Now that the 370 is entering the fifth year of product life, can we make

any analogy with the 360 five years after its introduction?

"From a hardware standpoint, the 370 is in a similar position to the 360 back in 1968, in that they are now solidly installed. We are now entering that period where users are just beginning to exploit the full potential of the 370's new architectural base. New and improved 370 software systems are being added to this base at an ever-increasing rate. This expansion involves far more complex systems in response to the growing need for communica-

tions. By that I mean the ability to retain vast amounts of valid business data and to have this data available to all appropriate users within that business for immediate decisions."

What are some of the benefits a user can gain from this new architecture?

"Compatibility is the foundation. Thousands of our customers are now in a position to take advantage of new technologies and subsystems with a minimum impact on their present applications, operations and programming. For instance, these customers can add new tape drives, new terminals, even new CPU's without losing their already-existing programming investment."

Wasn't this kind of compatibility important to the 360, too?

"It was. But it's fundamental to the 370. We now have a systems base that may support many generations of devices. With this architecture, users can keep pace with technology that appears to be developing faster than ever before in every area of data processing."

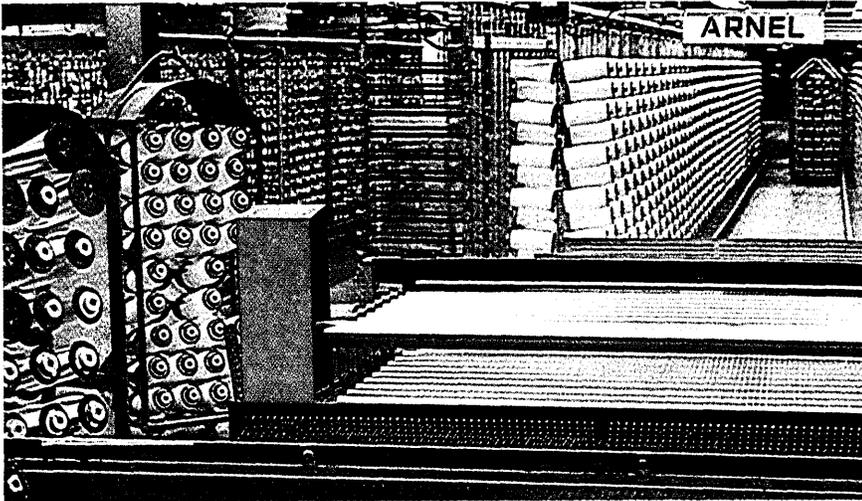
Why is it so vital to keep up with the new technology?

"Because the latest technology offers continually higher productivity benefits. This is especially important when you consider that almost two thirds of data processing costs these days are represented by people investment. Our new product announcements are geared to the concept of across-the-board productivity improvements. Virtual storage, an integral part of System/370, is itself the best example. The 3850 mass storage system and the new 3800 printer are also good examples of this."

We've been talking about the System/370 as a base for tomorrow's growth. But what about the day after tomorrow?

"It seems we will see more overlapping of computer systems than in the past. The 360 represented a huge technical leap forward, since it carried over so little from the pre-360 era. But the 370 began an evolutionary trend since it incorporated major portions of 360 technology. This overlapping trend

(Continued on fourth page)



Celanese, a major producer of manmade fibers, retrained over 200 employees using computer-based training techniques.

Teaching New Skills with the Interactive Training System

One of the toughest jobs DP managers face today is education. As new applications are introduced in end-user departments, they must find efficient ways to train all kinds of personnel in an organization to communicate through terminals directly with the computer.

Learning to use terminals as a replacement for manual methods often requires detailed instructions. Now these instructions can be provided, at both central sites and remote locations, through an IBM Program Product called the Interactive Training System.

The Program Product can be used for any kind of training. However, the system is particularly useful in teaching those skills that involve new uses of terminals—for instance, a new online order entry application. People can be taught at times convenient to their work schedules and at their own pace, reducing or eliminating travel and classroom expenses.

The system can also conduct tests and keep records of the student's progress. And any company employee who knows a subject well can become the author of an Interactive Training System course. No programming experience is necessary.

At Celanese Corporation, for example, a new IBM data communications network made it necessary for terminal operators at 45 locations across the country to learn some radically different procedures. In just three weeks, all 200 operators had completed their computer-based courses and were productively employing their new skills.

"Other than the Interactive Training System, there was no practical way

for us to train so many widely separated people in so short a time," says Harry Venable, corporate director of telecommunications services for Celanese at Charlotte, N.C. "The IBM 3275 terminals used for daily operations also access courses stored on our System/370 Model 165."

At the Shell Oil Company, twelve Interactive Training System courses used by the Shell Credit Card Center in Tulsa, Oklahoma were written by senior analyst Genevieve Moffat.

"Students are generally helped by the question-and-answer dialogues in the courses themselves," points out Ms. Moffat. "Those who run into difficulty can key in their own questions at their

terminals. The questions then appear on my terminal and I enter answers which are transmitted back to the students." Some 300 employees have been trained at 222 terminals linked to a Model 158 at Tulsa.

Still another advantage of the system is the assurance that all students, at all locations, are being taught methods that are both current and uniform.

"Because our procedures change frequently, we found it difficult to keep an up-to-date procedure manual at all of our 16 Shell Chemical sales offices," says E. H. Covington, projects manager in Shell's Information Systems Department in Houston. "Now, with the Interactive Training System, we revise our courses as soon as changes occur, so they always reflect today's conditions."

With three Model 168s and one Model 158 at Houston, in addition to two System/370s at Tulsa, Information and Computer Services of Shell has responsibility for all of Shell's far-flung data processing operations. Dallas R. Wolf, general manager, sees the Interactive Training System as an important aid in implementing and maintaining online computer systems. He cites the instruction of oil and chemical personnel at 72 Shell locations nationwide.

"One of our major objectives is to give all Shell departments the greatest possible control over the entering, editing and accessing of their own data," he says. "We have found the Interactive Training System to be invaluable in teaching computer-oriented techniques at the same remote terminals employed for business operations.

"Both new and seasoned employees are benefiting from this versatile teaching aid. We will be making increasing use of it."



On-the-job training at the Shell Credit Card Center. Employees take Interactive Training System courses at the same IBM 3277 terminals they use for credit card transactions.



Tank cars at the Olin plant in Charleston, Tenn. are loaded with chlorine.

Simulating Strategies With a New Interactive Retrieval System

Should the new plant be located in Texas or Maine? How many employees are needed to establish a branch office? How price-sensitive is the demand for chlorine?

Making effective business decisions depends on the ability to use large masses of information quickly and efficiently. A new IBM retrieval and formatting system, the Interactive Query and Report Processor (IQRP) can accomplish this objective with minimum effort. IQRP enables users to communicate directly and rapidly with the data files they need — using either typewriters or display terminals.

At the Chemicals Group of Olin Corporation in Stamford, Conn., for example, the use of IQRP is particularly valuable in the marketing area. William Rossiter, vice president for marketing, relates a recent decision: "Several months ago, we experienced an imbalance in demand for chlorine and its co-product, caustic soda, two of our major products. We needed to know the optimum production rate to satisfy these two fluctuating demands and the related inventory capabilities.

"Determining the optimal production tradeoff required a thorough analysis of the twenty industries which buy the two chemicals most heavily. In an effort to predict demand, we created a data base, from our own research information, which is stored

in our System/370 Model 145. It indicates, by customer and by industry, how much of each chemical is purchased and what estimated share of that comes from us," explains Rossiter. "We also break out the information by geographic area."

That data base is now linked, through 3270 display terminals running under CICS/VS, to IQRP (an IBM Installed User Program). By using IQRP's flexible set of English-like commands, members of the marketing department can request the information they need from the available data files. The information can then be organized and displayed by IQRP in whatever form is desired. If the result of the first search is not adequate, the request can be modified repeatedly until the most relevant data is selected. Finally, a marketing strategy can be formulated.

IQRP's capabilities include ordering numerical data in ascending or descending order, performing a wide range of arithmetic operations and protecting file security with a password sign-on feature. Hard-copy reports can be obtained by routing the output to a high-speed printer.

"We have no doubt that IQRP will bring our users much closer to their own data," comments Martin Muller, director of information systems. "So far, we have several online data bases,

all in the marketing area. These include the breakout of chlorine and caustic soda customers by state; a similar but larger file for sulfuric acid; and another file ranking customers according to the number of employees at each of their plants. In addition, we plan to set up an online credit status file for accounts receivable."

It was extremely important to Olin that its existing files and access methods be made compatible with IQRP with a minimum of time and money. "All we did was set up data description tables and define the fields and terms used to make requests. From then on, the system has worked quite smoothly," says Bill McMorris, manager of systems development.

"The ability to customize our inquiries through IQRP instead of having to wait for a formal weekly or monthly report is extremely useful," notes Alex Budd of the marketing services group. "In addition to indicating general trends, it helps us pinpoint exceptional cases more readily."

"We expect IQRP to play an increasingly important role in long-range planning by helping us simulate a wide range of marketing situations," adds Rossiter. "Our sales force is a very important resource. We want to assign our men to areas that will yield the highest profits per account. We believe IQRP can help us do that."



At an IBM 3277 terminal, an operator corrects a handprinted number which was previously rejected as unreadable by a 3886 optical character reader.

Union Mutual Accelerates Claims and Benefits Processing

"Now we can entirely bypass time-consuming key punching for data entry and error correction," says George Thomas as he talks of claims and benefits processing for group health and life insurance, as well as Medicare, at the Union Mutual Life Insurance Company in Portland, Maine.

Thomas is director of the company's computer center services. He

points out that once a group or Medicare claim or benefit document reaches his division, it is processed that same day. This has been achieved without adding extra staff, even though Medicare transactions have grown by 50 percent and group insurance by 20 percent during the past two years.

The key to this accelerated claims processing speed at Union Mutual is an

IBM 3886 optical character reader with the new "video collect" capability. The 3886 reads data from source documents directly to tape, thereby eliminating rekeying — one of the biggest workflow bottlenecks in data entry. What's more, with video collect, indistinct characters that the machine cannot read can be displayed for instant correction on a specially equipped 3277 terminal.

Thomas explains that source information is recorded on machine-readable documents, in Union Mutual field offices and at their Portland headquarters, in a combination of handprinted numbers and typed OCR-A font. The 3886 scans these documents and records the information on an IBM 3410 tape unit for later processing on a System/370 Model 145 running under DOS/VS.

If the 3886 cannot read a handprinted or typed character, the document is directed through the transport system to a special stacker. Later that day, all rejected documents are run through the 3886 again and displayed on the 3277. The operator corrects unreadable characters by keying the data to tape.

"Before we had the video collect capability," says systems analyst Peter Rutherford, "these corrections had to be key punched, and as a result they couldn't get into that night's processing cycle. This affected about 20 percent of our Medicare documents and some 10 percent of group transactions. Now we can be sure everything gets into the cycle the same day."

With the new method, Union Mutual has eliminated backlogs in both group and Medicare claims and benefits processing. As an example of this improvement in processing time, Thomas says, "Doctors and senior citizens in Maine are now receiving their Medicare checks three days sooner than before."

System/370: The Continuing Evolution

(Continued from first page)

is now even stronger, and any revolutionary new system will be evolutionary from the user's point of view. Undoubtedly, System/370 will play a central role in the continuing evolution of data processing.

"A lot of time and effort has been and will continue to be spent by IBM in developing systems and systems products that will allow our customers to expand their use of data processing with minimum disruptive activity and reprogramming. I believe we must offer

our customers the flexibility to choose their optimum systems approach free of the limitation of device support, geographic restrictions and programming talent. While much more complex systems will be a fact of life, those systems must manage that complexity effectively and make it as transparent to the user as possible. Systems to be successful will have to continue to provide service while building the function base for new capability and service to the end user."

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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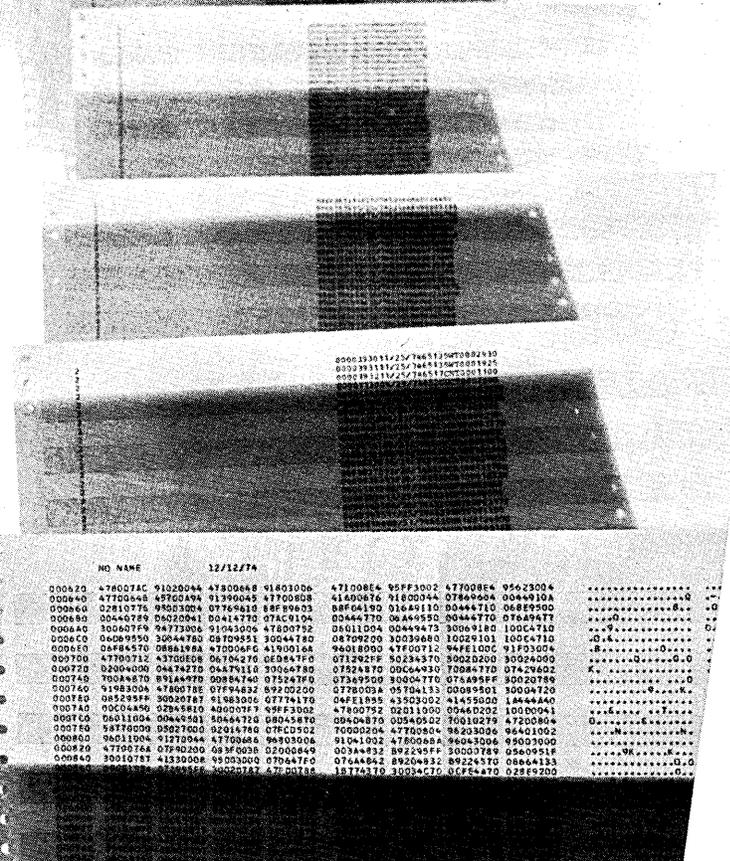
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FEATURES	1200	16/12-8
SPEED	1200 NS	1200 NS
TOTAL SLOTS	7	8
+5V POWER	12A	35A
PRICE		
CPU W 16K	7550	5200
CPU W 32K	11,050	7900
CPU W 64K	N/A	13,300
FEATURES	2/10	16/10-10
SPEED	1000 NS	1000 NS
TOTAL SLOTS	10	10
+5V POWER	28A	35A
PRICE		
CPU W 32K	10,000	7,950
CPU W 64K	N/A	13,350
FEATURES	830	16/10-17
SPEED	1000 NS	1000 NS
TOTAL SLOTS	17	17
+5V POWER	36A	50A
PRICE		
CPU W 32K	14,150	9,900
CPU W 64K	23,150	15,300
FEATURES	800	16/8-17
SPEED	800 NS	800 NS
TOTAL SLOTS	17	17
+5V POWER	36A	50A
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CPU W 32K	19,630	12,500
CPU W 64K	35,730	20,500

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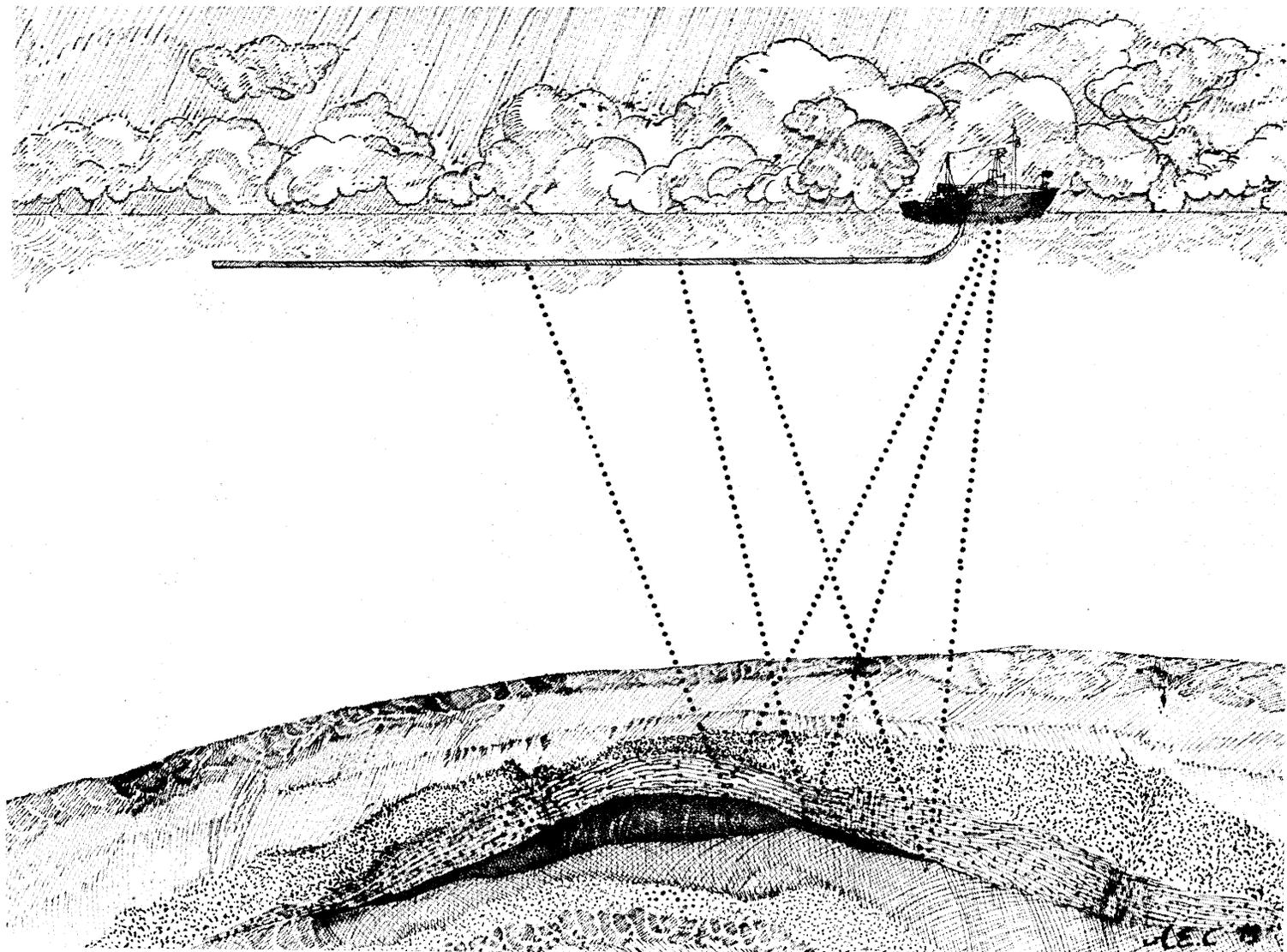
on many similar data streams or high-speed searches of many similar file records.

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Automating Hospital Information

Spectra Medical announces a new on-line real-time Medical Information System built around a dedicated minicomputer.

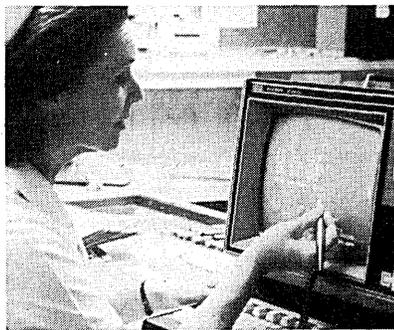
Five years ago, a team of medical specialists and computer technologists pooled their talents at Spectra Medical Systems to help solve the growing problems of hospital communications and record-keeping.

The design and programming are done. A 350-bed hospital has installed the system, called the Spectra 2000. We thought you'd be interested in hearing what it does and how.

What the Spectra 2000 does

Working with a lightpen at 4-color CRT interactive terminals, hospital personnel handle much of the patient record-keeping that used to be done on paper. The Spectra 2000 also electronically stores, sorts and reformats all patient information in its memory. Admit, discharge, transfer. Medical order entry. Medication scheduling. Medication charting. Permanent chart document preparation. Nurse scheduling. Current census. Patient drug profiles. Staff requirement reports. Utilization review reports. Charge capture. And the system software contains an extensive drug interaction library that doctors and pharmacists find useful.

The Spectra 2000 is secure. It is accessed by a six-character



password at the data station keyboard. Only a valid password gains access to the system. And users are limited to information appropriate to their code.

Printed orders are automatically generated for confirmation at the station where they are entered. The system simultaneously transmits requisitions to all appropriate ancillary services. Information entered into the system is automatically entered into scheduled reports (medication schedules, bed availability, nurse staffing, utilization review, patient drug profile, etc.) in *real time* and is printed automatically or at the request of authorized users. And complete capture of cost information allows all patient charges to be passed easily to the hospital business office system.

System components

The Spectra 2000 MIS is built around a Data General Nova 840 CPU with up to 128K (word) memory. It interfaces with Century Data 2314-type disc drives, Alpha Data 4M-byte fixed-head disc drives, Wangco tape drives, and 50 kbit/sec Computer Communications, Inc. multiplexers. It uses 4-color CRT with lightpen and keyboard plus a Versatec electrostatic 600 line/min printer at nursing stations and appropriate ancillaries. All information is communicated clearly, without delay.

More information?

The Spectra 2000 is a large system. We can't give you all the details here. But we describe it thoroughly in our publication, *First Considerations in Selecting a Computerized Medical Information System*. If you would like a copy, just ask. It's free.

Seeing is believing.

If you're involved with hospital information and would like to observe the system in action, please give us a call or write Frank Parrish, Spectra Medical Systems, Inc., 1121 San Antonio Road, Palo Alto, CA 94303. Phone: (415) 964-4630. We'll be happy to arrange a demonstration for you.

Spectra Medical Systems Inc

Editor's Readout

John L. Kirkley, Editor

Psychosis in Computerland

Manic-depressive.

That's the kind of financial environment that computer companies have been living in over the last decade according to DATAMATION author George Potts.*

Euphoria was the name of the game in the middle and late 1960s. Whisper the word "computer" in the ear of any venture capitalist and he'd immediately hand you \$1 million. And that was just to debug your coffee vending machines and decorate the main lobby.

Back in those days, Scientific Data Systems not only had an attractive lobby, but solid business concentrated mainly in time-sharing, government, and real-time applications.

Palevsky sold SDS to Xerox in 1969. A year later the industry's manic phase came to an end; the inevitable depression that followed claimed scores of hopeful startups, among them the mainframe efforts of RCA, GE, and finally Xerox.

The implications of this latest withdrawal are legion. For example, it now seems even more obvious that to succeed in our industry, corporate management cannot be distracted by copiers, turbines, or tv sets. It's a tough marketplace - one that demands a total concentration of resources and capabilities.

There's bound to be some impact on the lethargic IBM antitrust trial which lurches ahead again this month. The effect, however, will probably be minimal: the trial seems to have its own ponderous logic and, at the rate things are going, the Xerox withdrawal will be muffled with the same layer of time-deposited dust that now covers the headstones marking the GE and RCA computer operations.

Even less effect will be felt on Xerox's determined move toward the automated office. Insiders at their Palo Alto Research Lab state that the corporation is firmly committed and point out that the Xerox concept does not depend on large mainframes. In fact, even more capital should now be available for this effort.

What the Xerox failure does illuminate is a major unsolved problem for the general purpose systems industry in the 1970s. It's called money.

Just to get into the game, the ante is now over \$1 billion. And once you've come up with a line of cpu's, systems and applications software, peripherals, maintenance, and consulting services, you still have to go into the rental business. Finally, once the cash flow starts, the return on rental income will be, to use Potts' euphemism, "extremely modest." In other words, you'll have one hell of a time making a buck.

And you'll have to compete with IBM.

No wonder venture capitalists beat a hasty exit out the rear door when they see a hungry-looking, would-be computer entrepreneur coming in the front. As long as we have the drawback of leasing with an unrewarding return on investment, the fiction that systems software must be given away, and the enormous economies of scale required to compete, the money-men will continue to turn a deaf ear to the refrain of "buddy can you spare a dime."

But the industry has not yet lapsed into catatonia. One possible solution is underway right now and bears watching. This is the joint venture. Good examples are the ventures formed by Control Data with Honeywell and NCR. The two companies, Computer Peripherals, Inc. and Magnetic Peripherals, Inc., are, after IBM, thought to be the world's largest manufacturers in their product categories. Significant economies of scale for both manufacturing and R&D costs are being realized without all the messy business of a merger.

And Univac, with joint ventures already working in Sweden, Spain and Japan, has made it clear that they are willing to undertake more . . . and in a minority position.

With this and other creative approaches to the marketplace, the industry will hopefully put its depressed phase behind it.

Not that we're wishing for a reversion to that glassy-eyed manic state again. We've had enough shock therapy. All that we'd like to see now, to use the jargon of transactional analysis, is an industry able to say to itself and all its members, "I'm O.K., you're O.K." *

*"Competing for Capital," March 1975, p. 45.

Computers: Prescription for Hospital Ills

by Marion J. Ball

Under great financial pressure from inflation and increasing government regulation, hospitals turn to computerized information systems for help.

Hospitals are plagued by rapidly escalating workloads and costs. A larger and better informed public expects high quality medical care, and existing institutions cannot supply enough specialists to meet this need. At the same time, the cost of delivering high quality care is becoming formidable for hospitals and patient alike.

The computer, the tool that has revolutionized the industrial and business world, is about to begin realizing its full potential in the field of medicine and related health sciences. In the fall of 1975, computers in medical care are no longer a choice but a necessity, not just to meet the needs for better patient care but for meeting the government regulations imposed by utilization review requirements, Professional Standards Review Organizations, and the inevitable National Health Insurance legislation. The very conservative health care industry can linger no more.

Hospital information systems are seen by many leaders in the medical computer field and by health professionals as a solution to at least some of the major management problems in today's health care systems. American hospitals spend between \$7 and \$10 billion annually to acquire and communicate information, a sum that represents between 24% and 33% of the total hospital budget. Estimates indicate that over half of this spending is for functions which can be automated, notably in the areas of patient care, medical auditing, and financial management.

A total hospital information system would automate data receiving, storing, processing, and displaying all of the information useful to hospital personnel, as suggested by Fig. 1. Although such a total system does not presently exist, the beginning of a comprehensive system with an integrated flow of processing is being explored. This system will cover:

1. the collection of data at its source;
2. the transmission of information through terminals and/or other communication links to a central computer or network;
3. the establishment of a mechanism

for immediate access to patient information;

4. the development of computerized management information to be used for decision making and administering the patient's hospital stay;
5. the ability of all on the health care team to converse easily and reliably with the on-line system.

(Not included here are the functions of the dedicated, specialty clinical systems such as lab, pharmacy, and radiology systems, even though in the ideal case these would interface to, and become part of, what will be a total hospital information system. The concern here is with information systems, not clinical systems.)

Present systems available

There are two basic sophistication levels of hospital information systems operational in the U.S. today: Level I and Level II systems.

Level I systems primarily offer data collection and message switching capability. They transmit orders, capture the charges for one day, prepare a census, may be used for reporting lab results or time-clocking employees, and can be interrogated regarding current charges. However, because they do not maintain an electronic patient medical record file, they cannot meet all the specified requirements for a total information system.

Level II systems, on the other hand,

maintain a complete computerized patient medical record during the patient's hospital stay, and are programmed to handle clinical information as well as requisitions. Level I systems cost approximately \$1 to \$2 per patient-day, while Level II systems are in the range of \$2.50 to \$9 per patient-day. Studies now being carried out indicate that more than these amounts can be saved or recovered by the efficient use of hospital information systems.

Dr. Stanley E. Jacobs, former director for the division of computer systems of the American Hospital Assn., has predicted: "By 1980 I anticipate that at least 50% of all short term general hospitals over 200 beds will have installed at least a level I hospital information system. By 1985, I expect the majority of these hospitals will have Level II..."

Things seem to be going that way. Of the 5,912 hospitals participating in a recent AHA study, over 60% have accepted some form of computerization in health care or financial applications as the only means for survival in an era of rapidly ascending costs and increasingly complex demands.

Not all of these 60% have their own in-house system. Only roughly 24% of the 5,912 do. Some 57% use either remote batch shared services such as those provided by Technicon, Shared Medical Systems, McDonnell Douglas, or—in descending order of popularity—local service bureaus, multiple hospital computer sharing, or time-sharing. Each of these alternatives could in some way be involved with facilities management, too. (The total adds to more than 60% because some installations are counted in both camps.)

Whatever the alternative studied, computers in health care are sparking a great deal of interest. Specialized societies, such as SCM (Society for Computer Medicine), SAMS (Society for the Advancement of Medical Systems), and SIGBIO (a subgroup of the ACM), have emerged in the past five or six years. The interest is actually international, as worldwide health and computer conferences reveal by devoting special sessions to computer applications in medicine. MEDINFO 74 in

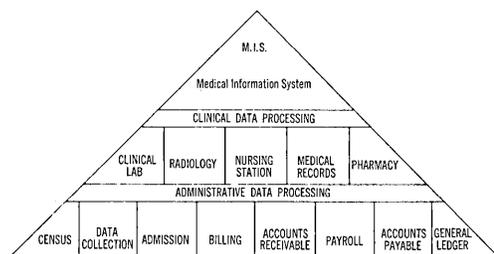


Fig. 1. The objective of a comprehensive information system is to consolidate all medical, financial, and administrative functions. The hospital information system structure is represented in pyramid form because most health care institutions have historically implemented information systems from a base of financial files. A communications and management system can then be superimposed on the structure.

Funding the operation

by Philip H. Dorn, Contributing Editor

Although dp has long been solidly and permanently entrenched in most industries, the health care field until now has held out against the computerization of manual functions. However, the dramatic rise in labor costs during the past decade has made the lack of data processing systems an increasingly critical weakness in most health institutions. Hospitals are extremely labor-intensive; typically well over 50% of the budget is invested in direct personnel costs exclusive of physician's fees. As costs soar ever higher, the absence of data processing is ever more obvious to those responsible for institutional financing.

While dp professionals in hospital computing are in general agreement on the specifications for a total hospital information system, probably less than 1% of the 7,000 members of the American Hospital Assn. have implemented information systems. Most hospitals use computers, on-site or outside, merely to handle such conventional commercial applications as accounts payable, general ledger or payroll.

Therefore, while most hospitals spend 2-3% of their budget on data processing, they receive little but financial reports. The operational costs for a total hospital information system would appear to require but another 2-4%. The payoff for these not inconsiderable expenditures must come directly from personnel reductions as suggested in the example. If costs are to be contained, they must be attacked on a broad front, including in the medical departments, but the point of primary attention should be the expanding clerical operations of the business office, admissions and statistical reporting. Ward clerks, expensive, hard to find, and harder to hold, are the first target in the medical departments. The secondary medical targets are the technicians in the laboratory and the pharmacy; using computers to do the paperwork not only cuts the head count but also allows technicians to do their work without getting bogged down in paper.

It's difficult to assess the value to the ultimate receiver of hospital services, the patient, of a total information system. If a nurse spends less time with paper and more time with patients, this is clearly a posi-

tive step albeit almost totally unmeasurable. Accurate, almost instantaneous receipt of a medication order in the pharmacy can save time and ease patient discomfort but assigning a cash value to this act is impossible. It appears safe to conclude that any step to recover the clerical burden from highly-trained medical personnel is a good one and must in some manner contribute to increased productivity.

A hospital is a business. When labor was cheap and equipment expensive, it was possible to have an oversized payroll in the non-medical categories. Today this is no longer economically viable; cost containment must begin to chop down the payrolls. If not, private and public health care institutions alike will find their operations in danger. Administrators, medical personnel and trustees must soon recognize that the implementation of total systems for health care must be undertaken. If not done in the near future, the entire structure of the health care industry may be forced into some rather traumatic changes under pressure from the government as well as local community interests.

This example illustrates typical costs and planned savings for a model total hospital information system in a medium-sized (500 beds) general hospital providing a full range of services. The system proposed is an on-line multi-processor configuration supporting 70-80 terminals and remote printers driven by off-the-shelf minis. Initial software costs are expensed across eight years, the planned system life. Allowance has been made for the annual cost of software improvements and new applications.

Out-of-Pocket Annual Expenses

Hardware rental	\$400,000
Software costs (enhancements, etc.)	100,000
Basic software development (annualized)	125,000
Operating costs	175,000
Total costs	\$800,000

Annual Savings to the Institution

Increase employee productivity	\$100,000
Net reduction in personnel ¹	400,000
Recovery of lost charges	100,000
Reduction in cost of special forms	50,000
Elimination of financial data entry	60,000
Long-term personnel savings (annualized) ²	100,000
Total savings	\$810,000

¹Typical personnel reductions might be Business Office (8), Laboratory (2), Pharmacy (4), Admitting (2), Ward Clerks (15), Central Supply (2), Dietary (1), a total of 34. Different institutions would show different numbers for each category, but the total would be approximately the same.

²These savings are from two sources. First, an annual savings of \$70,000 is included to compensate for an expected yearly 5% increase in labor costs—a very conservative figure. Second, \$30,000 is included annually in lieu of hiring additional clerks to handle the increasing flood of government-mandated reports and forms. (At the present rate new reports are demanded, there appears no limit in this area.)

Stockholm was held jointly with IFIPS, and was the first international medical computer symposium. And authorities in Germany, Japan, Sweden, Israel, France, and Canada, among others, are becoming more and more involved in all aspects of hospital computer applications.

In graduate education, a major effort is underway to include instruction in the application of the computer to health care. The government, through NIH (National Institute of Health) and its subagencies such as the National Library of Medicine, has funded proposed pilot applications at various installations and has given training grants to several major universities. Universities active in the field include Duke, UCLA, Stanford, Univ. of Missouri, Case Western Reserve, Michigan, and the Univ. of California at San Francisco. Some of these institutions now grant joint M.D./Ph.D.s, and M.A.s in the specialty area of computer science applied to health care.

Existing computer installations in hospitals are coming under close study by computer professionals, medical groups, and others. In this issue we present two articles describing very different technological and philosophical approaches to hospital information systems. Mr. Carren describes a unique distributed processing approach using multiple minicomputers to handle mostly Level I applications. The second article by Charles Ferderber describes a Level II type system with software developed by National Data Communications, the firm which operates the installation under a facilities management contract. The two articles illustrate the wide range of concepts and approaches to the hospital information system. *



Ms. Ball is the director of the computer systems and management group at the Health Sciences Center of Temple Univ., in Philadelphia. The author of several books in the field of medical computer applications, she is also a member of several professional organizations and serves on the board for the Society for Computer Medicine as well as the review committee for the National Library of Medicine.

A Standardized Solution for Hospital Systems

by Charles J. Ferderber

Facilities Management and off-the-shelf systems can solve the toughest people-oriented problems and yield other major benefits almost as by-products.

Hospital systems and procedures are normally people oriented. While a manufacturing company might get by with spending 30-35% of its total budget on personnel, a hospital spends over 60%. It presently takes approximately 2.7 staff members for each patient to supply care and handle the running of a hospital, and as innovations are added, even more people are being hired. Therefore, to conserve personnel, streamlined systems that do a superior job with less people are essential. That's where computer systems come in.

Deaconess Hospital in Evansville, Indiana, is a 597-bed general services hospital which specializes in open-heart surgery and cancer treatment among other things. We began using computers in 1963 when a Honeywell 1710 was acquired, primarily for billing. In 1965, payroll, inpatient accounts receivable, general ledger, Medicare billing, outpatient billing and other applications were added when an IBM 1440 was installed. By 1966, we were using an IBM 360 series machine, and by 1970 we were looking both for an upgrade and for a way to get out of the business of running a computer.

Packaged hardware

In 1972 the hospital joined in a facilities management contract with National Data Communications Corp., a Dallas firm which developed a turnkey hospital information system called VITAL (now marketed by Honeywell Information Systems, Inc.) The version of the system installed at Deaconess includes:

- 2 cpu's (HIS model 1695s, 48K each)
- 14 disc drives (HIS 273s, 16.8MB per pack)
- 4 tape drives (HIS MTD-11s)
- 83 crt terminals (Raytheon DIDS 40Ds)
- 48 receive-only teleprinters (Teletype 33s and 35s)
- 5 hardcopy terminals (GE Terminet 300s)
- 1 line printer (HIS 222-5, 950 lpm)
- 10 serial printers (HIS 3510s, 10 cps)

During regular operation, one cpu handles the on-line tasks while the second does batch processing. Partly due to the off-line backup, the system has been extremely reliable; unscheduled down time amounted to only 20 hours altogether last year. Great pains have been taken to ensure its reliability, including the acquisition of backup power supplies, but even when the sys-



The Raytheon terminals provide function buttons to speed the selection of items or functions listed on the screen. The VITAL system installed at Deaconess includes 83 crts in various departments, labs, and at nurses stations.

tem goes down, things are not too traumatic. Manual systems are used until the system is again available, at which time we play "catch-up."

The system's operation was designed around the patient ordering process, so following the progress of an order will give an example of its use and flexibility. Let's assume that a nurse or unit clerk wants to order a drug based on a physician's request. (All orders must be confirmed by the attending or consulting physician.) The nurse inserts her badge into the terminal. The first display to appear is a list of all the patients and room numbers. The nurse presses one button to the left of the screen adjacent to a patient's name. The next screen presents a menu of functions: "order drugs, lab tests, x-ray, view chart, etc."

Let's say the nurse wants to order a drug called Darvon Compound 65.

There are approximately 6,000 drug items in the system's catalog, including both generic names and trade names. She needs only to key "DAR" on the keyboard opposite "trade name" and all drugs beginning with DAR appear. The nurse then selects the button adjacent to Darvon Compound 65. The next screen asks, "are there any allergies to this drug?" If not, she proceeds to select other screens that deal with amount, dosage and time drug is to be given.

If the order is for four times a day, the system automatically orders three days' supply, or 12 capsules. When the "Enter" button is pushed, the printer in Pharmacy is activated; two pressure sensitive labels describing the drug are printed, and the patient's billing record is charged. The prescription is filled by a registered pharmacist; one label is placed on the drug container and the duplicate kept on file in Pharmacy. The drug is then forwarded to the nursing unit by messenger or pneumatic tube. At any time, the pharmacist has the capability of reviewing all drugs ordered for any patient, and errors in ordering can be readily retrieved and corrected.

Ordering lab tests, respiratory therapy, surgery, physical therapy, and sterile supplies can be done in essentially the same manner as ordering drugs.

The admitting procedure is done on a preformatted screen. Hardcopy is furnished for the nursing unit, x-ray, patient representatives, and Public Affairs departments as required through local printers.

As a byproduct, the system automatically computes what insurance benefits are available to the patient. In fact, records of all major insurance company policies and their benefits are maintained in the system. (Also, in Indiana a new state law was enacted which permits using computerized records as legal evidence, closing a loophole which previously ruled out anything but handwritten medical documents.)

In addition to billing requirements, the system has a complete list of physicians, their specialties, and their biographical information. Subsystems for

the blood bank program, general ledger, budgeting, personnel reporting and others are included.

A payroll system is also implemented, and the employees use their badges to clock in or out at any of the 83 crt terminals. Those badges are also used to maintain security by limiting user access to files. A nurse can access patient data only for patients on her floor. The cashier can access only financial data, and Radiology only x-ray orders and results.

Fighting for acceptance

For all its usefulness and anticipated benefits, installing a system like VITAL is a difficult and touchy business. It's especially important to consider "how does one install a highly sophisticated computer system where 60-70% of employees become directly involved without losing his sanity?"

At Deaconess, a coordinating team was selected prior to the system's installation. It consisted of the Assistant Hospital Director, the Controller, and the Director of Management Services. This group oriented department directors to the system, its capabilities, and its hardware configuration. Then it organized a training program which began operation many months before live implementation of VITAL. Classrooms with five crt's were set up. One and one-half hour sessions were conducted 24 hours a day for two months. A total of 500 employees passed through this training program, which included hands-on instruction.

During the initial training period, supervisors were specially trained to become trainers for later classes. In-service training has been continued since the inception of the program; the Audio-Visual Dept. even produced a film for new employee orientation.

Early physician involvement proved essential. Doctors' questions turned out to relate to "what can this do for the patient?" In some cases, the answers were not easy. For instance, computer printouts are black and white. Physicians were accustomed to receiving color-coded lab slips (yellow for urinalysis, red for blood work, etc.), and black printing was a poor substitute. The doctors had to be sold on the superior advantages of speed and accuracy of the on-line system compared to handwritten and hand-carried reports. Certain specialty physicians who order extensive lab and diagnostic reports were difficult to convert; being able to review patient records on the crt helped a little in selling them.

Getting 100% physician acceptance of any system is a noble but unattainable goal. Not all staff employees accept changes gracefully either. After more than three years, some employees still would rather be functioning under

the old tried and tested manual systems.

To complicate matters, the system was implemented between March and July of 1972. In our haste to bring up the system, too much was attempted in too short a time, and as a result many changes had to be made under crash conditions.

Things are smoother now. National Data Communications supplies on-site operations and maintenance personnel. Requests for changes or new programs are handled through that firm's Dallas office, where programs are checked out before being installed here. To make things even smoother, a Deaconess employee has been named full-time coordinator between the vendor and the hospital. The hospital might further benefit from having its own systems analyst, but presently does not have such a person.

Going into our fourth year of operation, we feel we are realizing only about 60% of the capabilities of an on-line system. Within the next 1½ years we expect to add a complete material management subsystem, another for Dietary ordering to include special and regular diets, a report generator, a preventive maintenance program, an outpatient system, and many other smaller programs.

Savings justify the effort

The benefits of the system are far-reaching. Among others we can identify are:

1. reduction in personnel
2. reduction in clerical work required of professional personnel
3. reduction in lost charges*
4. instantaneous input and retrieval of clinical information from numerous remote sites
5. centralized patient care data
6. reduction in printed forms
7. improved accountability and accuracy of information
8. improved cost accounting and cost containment
9. possible reduction in length of patient stay

*(Hospitals, like hotels, can lose track of services or goods provided someone, and then not ever be reimbursed for them. Fortunately, lost charges are practically nonexistent with an on-line system since services and supplies are chargeable at the time of order and all orders are on-line.)

The question most asked by other hospital administrators is "how much does the system cost per patient-day?" ("Dollars per patient-day" is a conventional measure in the industry.) After our initial investment of \$2.5 million, for hardware, software, static inverters for power backup, air conditioning, flooring, etc. our costs have been running approximately \$750,000 per year.

That amounts to about \$4.25 per patient-day, but that measure doesn't tell the whole financial story. Missing from that figure is the fact that we reduced our staff by 23 people when the system was installed, primarily by eliminating our in-house dp staff. Also, we improved our revenue in the first year of operation by \$180,000, without increasing the number of patient-days. Even more important, we have been able to reduce our accounts receivable turnaround from about 60 days to 44 days—a very considerable factor since the hospital's outstanding billing amounts to \$2.5 million!

Not all hospitals would save as much. The system we have probably could not be justified by a hospital of less than 250 beds. For many, shared services or minicomputer-based systems might be better.

For us, the system pays off, but the savings are not "free." One main objection to standard hospital computer systems like ours has been the underlying assumption that all hospitals are different and what applies to one will not apply to another. This basic assumption has been detrimental to the entire field of computers in health care.

The fact is that all hospitals are alike in many respects, and to think otherwise negates any possibility of a standardized (and therefore affordable) hospital information system. In trying to contain costs, we hope to use more standardization, not less. State regulations and health plans will force changes on hospitals anyway. If each hospital required its own changes to standardized systems, the cost of such systems would be prohibitive. We found this to be essentially true of our own installation, and have since learned to "live with" and benefit from what was designed. *



Mr. Ferderber is the director of management services at Deaconess and as such is responsible for the operation of the computer system. A member of the American Hospital Assn. and the American Hospital Management Systems Society, among other organizations, he also serves as the vice president of the Evansville Goodwill Industries Board of Directors.

Multiple Minis For Information Management

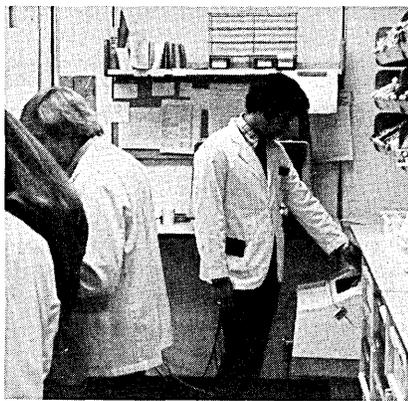
by Donald M. Carren

The data processing system has been designed in, rather than added on.

The medical information system at Canyon General Hospital in Anaheim, California, was born into the best of all possible worlds for a hospital dp system. First, because the hospital is brand new, its dp facilities were designed in rather than added on. Second, because the dp system was installed with the backing of the physicians who own and practice at the hospital, it met little resistance from its principal users. As a result of these twin advantages, Canyon has an advanced—even pioneering—doctor-oriented medical information system, which is also efficient and cost-effective.

The objective of putting in the system was to simplify and maintain stricter control over large volumes of patient-related medical and financial data. Called "CHAMPS"—all such systems seem to need a name—the system maintains patients' charts, handles the ordering of supplies and services,

schedules the use of operating rooms and other facilities, and keeps track of charges accumulated. It will soon also be doing in-house applications like bill-



Printers like this one in Pharmacy are used to automatically generate drug labels, wrist bands, and worksheets as patients are admitted or whenever doctors order goods or treatments.

ing, payroll, and accounts receivable.

The concept of CHAMPS is not unique, but its approach is unusual. It has been implemented on a cluster of minicomputers for what we believe to be a fraction of the cost of a large computer installation which would handle the same functions.

The system features on-line access to patient records and all of the by-products associated with that: instant response to queries from any location, concise and readable output, etc.

Its functions can best be shown with an example. When a patient is being admitted to the hospital, for instance, the admitting clerk fills in a screenful of information on a formatted display at the admissions office. If the patient was expected, an existing skeletal record built from data supplied in advance by the doctor is updated. If the patient has come in for emergency treatment, enough medical and finan-

CHAMPS: Canyon General Hospital

The CHAMPS system was developed to provide fast responses to requests for important medical data. The system currently responds at between two and three seconds for information and slightly slower for data entry functions. The first data screen on a display request will appear two to three seconds after "Send" has been pressed, depending upon the system load. The following pages in a multiscreen request will be displayed about one second after "Next Page" is pressed.

The ease of access and fast response times are a product of the minicomputer system which includes: 10 Data General Nova 800 minicomputers, five 30MB discs, four 45ips magnetic tape drives, a high speed inter-processor communications bus, two 1100 lpm printers, 60 crt terminals, 20 60 cps printers, and various other peripherals.

The system operates differently than most other minicomputer networks. A typical mini network is built on a hierarchical structure in which the computers may be widely separated physically and are logically separated by task assignments. In

contrast, all computers in the Canyon General system are in one room, and the operating system is distributed over the network. The concept of the distributed operating system leads to a powerful network functioning as a parallel processing machine rather than as a ring of independent minis.

The distributed operating system was constructed by putting tasks normally resident in a single mainframe into separate minicomputers. While this loses the shared memory and high speed intertask communications of a single computer environment, both of these functions are less of a problem in this network because of the high speed bus between computers. Gained is the ability to process several jobs in parallel with little or no interference, and to handle trivial requests with no interruption of other jobs and little burden on the operating system. Since each computer dedicates all of its computer time to its specific task, it need not share the machine as in a typical multi-tasking environment.

The CHAMPS operating system is broken into five categories: job

scheduling, file management, output scheduling, terminal interfacing, and job execution. A front-end computer handles all terminal interfacing. This is a common use for a minicomputer and serves the same purpose in this system as in others, relieving the main processor of the problems of comparatively slow speed terminal communications. Communications between the terminals and the front end are at a rate of 15,700 bytes/sec. Since the terminals being used with this system are microprocessor driven, they provide for a further distribution of the operating system. Terminals operate entirely in batch mode; all editing and data entry is local. The front end system is only involved when an entire screen of data is transmitted to it or when it is transmitting a screen back to the terminal. The microprocessors handle bidirectional traffic; all communications between them and the front end computer are through direct memory access.

All data must be buffered through the front end system and passed to the task scheduler. The task scheduling system is responsi-

cial information is collected on the spot to construct a skeletal record.

The screenful of information is transmitted to central files and stored in a patient's "chart" record. Concurrently, printing terminals produce all patient labels required for arm band strips, information desk labels, labels for hardcopy versions of the patient's chart, etc. Several copies of the admitting information sheet are printed, notifications of the patient's arrival are printed on the floor to which the person will be sent, and appropriate ancillary departments are notified. If a doctor had provided advance orders for drugs or services, they will be issued automatically to the proper departments, like the labs or pharmacy. At the same time, charges are automatically accumulated.

The computer room is located in a central position in the hospital. I/O devices are distributed throughout the building on patient floors, doctors' lounges, and other departments. On each floor that handles patients, there are several terminals and a unit manager's station with a terminal and printer for immediate notification of orders, progress notes, lab results, patient histories, physicals, etc.

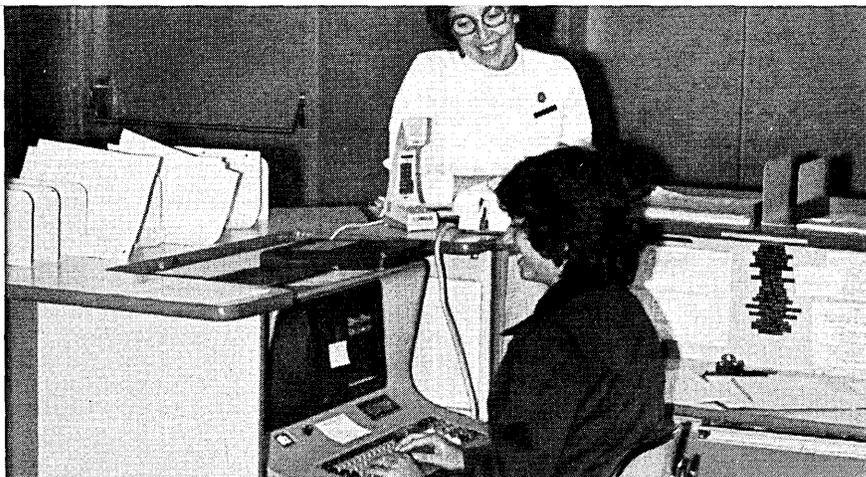
There are terminals and serial printers in other departments too, as mentioned. The X-ray and Pathology departments have printers for receiving

orders and for local report generation. The laboratory uses its printer for producing worksheets, and the pharmacy uses its printer for producing labels.

The terminals were designed for minimum user effort. Special function keys were added so that one key can initiate an entire job or function. Keys currently used include "Start," "Next Page," "Back Page," "Clock In," "Clock Out," "Print," "Time and Date," "Time Card," "View Messages," "Send Messages," "Send," and one simply called "Miscellaneous."

After inserting a badge which identi-

fies him, a user may press any of the special function keys in any order. "Start" will log the user onto an "active user" list and retrieve a display of functions open to that particular user. Most of the other keys are self-explanatory, except for the "Time Card" key which displays the current status of an employee's time card ("Clock In" and "Clock Out" transactions, total hours worked, overtime, etc.), the "Send Messages" key which displays messages saved for the person identified by that badge number, and the "Miscellaneous" key which displays a list of functions



Sixty crt terminals throughout Canyon General Hospital link nurses stations, labs, and other departments. Patient charts, lab results, drug orders, and accumulated charges are maintained on-line.

Automated Medical Processing System

ble for maintaining the active user table, sustaining system throughput, and handling the system backup function. It receives the job stream from the front end and schedules jobs for execution. The task scheduler communicates with all of the other machines, and controls the operation of the entire network. It performs the system backup and recovery procedures by logging a partial job stream to a backup tape and reading the job stream from tape for recovery purposes. Only jobs that are possible disc-write jobs are logged to tape; display-only jobs are not logged. The entire system is backed up once a night; disc copy takes about 30 minutes. In the case of a catastrophic failure, the system can recover up to 24 hours of data within a few hours by executing the current job log over the previous night's discs.

Due to its redundant configuration, the system has proved extremely reliable. Only one processor at a time has ever been down, and the system is capable of running with any five of the ten. The fixed-head disc once went down and we were forced into operating manual

systems for eight hours; a second disc would insure that never happened. Actually, most failures have been nuisances—like the failure of the vertical hold on a terminal—rather than catastrophes. Un-scheduled down time has run about one hour per month.

The third segment of the operating system is the output scheduler responsible for maintaining an efficient stream of data to the front end system for output to the terminal network, and for spooling printer output to disc. Spooling terminal output enables fast response to multi-page output requests from "Next Page" and "Back Page" keys without adding any processing time to the operating system. These requests are sent directly to the output scheduler and the requested page is sent from disc.

The fourth segment of the operating system is the file management system, the interface between other systems and the data base. All disc and tape requests are channeled to the file management system, which either returns data or an "I/O complete" signal to the requestor. The totally dedicated file manage-

ment function provides maximum cpu time and enough available memory to manage the data base in a highly efficient way.

The fifth and final portion of the operating system is the task processor system. There are six task processors in the system, each identical. The number of task processors used directly relates to the response time required. When a job is assigned to the task processor by the scheduler, it is loaded into memory and runs to completion. (It's really like assigning a processor to a task rather than a task to a processor.) There may be six jobs running in parallel but there is no intercommunication between the task processors. Independent task processors allow uninterrupted job execution with little operating system overhead. Compute-bound jobs have no effect on the rest of the system, disc bound jobs compete for service from the file management system. The competition for the disc is not significant, however, and there has never been any noticeable contention delay. *

MULTIPLE MINIS

any user can access.

The badges are used for records keeping and for security purposes. A badge number is appended to any message transmitted, and users are locked out of programs or files which do not relate to their work. For example, a physician may access only patient records, and then only if the records are for his patients or patients he has been asked to examine.

Pushing the "Start" key provides a physician with a list of his patients and a menu of functions he may choose from. With one or two numeric selections, he can identify the type of information he wishes to display and the patient he wishes to know about. On the other hand, he cannot alter or add to the records he can display.

Data entry by transcription

To add to a patient record, the physician (or nurse or other qualified person) *dictates* orders, progress reports, and textual notes using a recording system accessible through the hospital's phone system, in-house dictation units, or through outside phones. Dictation units are placed on every floor of the hospital. Incoming calls are automatically recorded on cassettes or large tape "tanks." There are three telephone numbers, and three buttons on the dictating units for specifying three types of dictation: orders (such as for drugs or tests), routine reports, and priority reports.

Once an order is dictated, the cassette is ejected from the recorder and a registered nurse listens to the order. If a rush ("stat") order is on the tape, the R.N. will notify the required departments immediately by telephone. All orders are then given to a transcriptionist, who enters the data into the system. The R.N. views the transcribed orders at her crt while simultaneously listening to the tape, and verifies their correct entry. Once an order has been verified by the R.N., it will be immediately printed at the terminals in the proper departments.

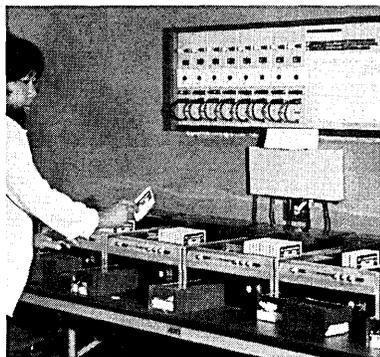
The appendectomy sequence is typical. The doctor will dictate the order stating his name, the patient's name, and the type of surgery. The transcriptionist accesses a preformatted surgery order entry screen, and keys that information. The patient number or name, doctor's number or name, and the appendectomy are all the inputs that are required. This information is transmitted and the computer generates a screen listing the input information plus a list of secondary orders normally associated with an appendectomy. Any or all secondaries may be cancelled if there are special

circumstances. This display also has fields for special instructions, surgeon's name, and other information. The data is verified by the R.N. and transmitted.

An appendectomy requires four departments to be notified. The nursing floor receives orders for pre-operation



The hospital's method of data entry is unique. Most orders, test results, and other information is transcribed by its originators, using telephone-like dictation equipment located throughout the facility. Three buttons on the automatic dictation equipment allow the data originator to identify rush orders, routine orders, and lengthy reports, all of which are handled differently.



As soon as an order is recorded by the dictation equipment, a tape cassette ejects. A registered nurse then listens to all tapes identified as having priority orders, and handles them immediately.



A transcriptionist listens to each dictated message and keys its contents into the system using another crt terminal. For verification, a registered nurse again listens to each tape and visually checks the displayed data against the recording.

care, a surgical bath and "no food after midnight." The Central Supply department receives an order to send a pre-operation preparation kit to the patient's floor, and to provide transportation for the patient. The Food Service department is notified that no food is to be served that patient after midnight. The Laboratory will receive an order for the surgical and pathological services required.

Once orders have been entered into the patient's record and dispersed to ancillary departments, work will begin based upon the orders received. Both X-ray and Pathology may give their results to a local transcriptionist to enter into the system. X-ray and Pathology reports appear in the patient's on-line chart, and are printed both locally and on the patient's floor. Similarly, lab results are entered directly from the lab.

Learning to work on-line

Again because the dp system was designed into the hospital, staff members in these departments were not forced to convert to on-line operations after first becoming familiar with a manual system. They were informed when hired that they would be using an automated terminal network. Perhaps this made it easier for them to accept the system.

Other steps were taken to make the system attractive to its users too. First, training was done with small groups, and training schedules—especially for doctors and other professionals—were sometimes established by the prospective users rather than at the convenience of the dp staff. Also, since employee time-keeping is done through the terminals, employees were forced to begin some use of the system immediately. A calculator simulator program attracted 20-30 users nearly immediately, and the message system also proved appealing.

The system is not difficult to learn. Doctors are generally able to gain a comfortable familiarity with it in a couple of weeks; nurses, who actually use more functions than doctors, take up to four weeks. Transcriptionists, whose interface with the system is most difficult and sensitive, need six to eight weeks of training before they become proficient.

Fortunately, user attitudes have been "when will it do more?" and the dp staff now is dealing with more requests for additional functions than it can handle—the usual dp problem.

In addition to the medical information handling and other functions described, several financial programs are almost ready to implement, including accounts receivable and a payroll/personnel subsystem. After those, we expect to work on accounts payable, bill-

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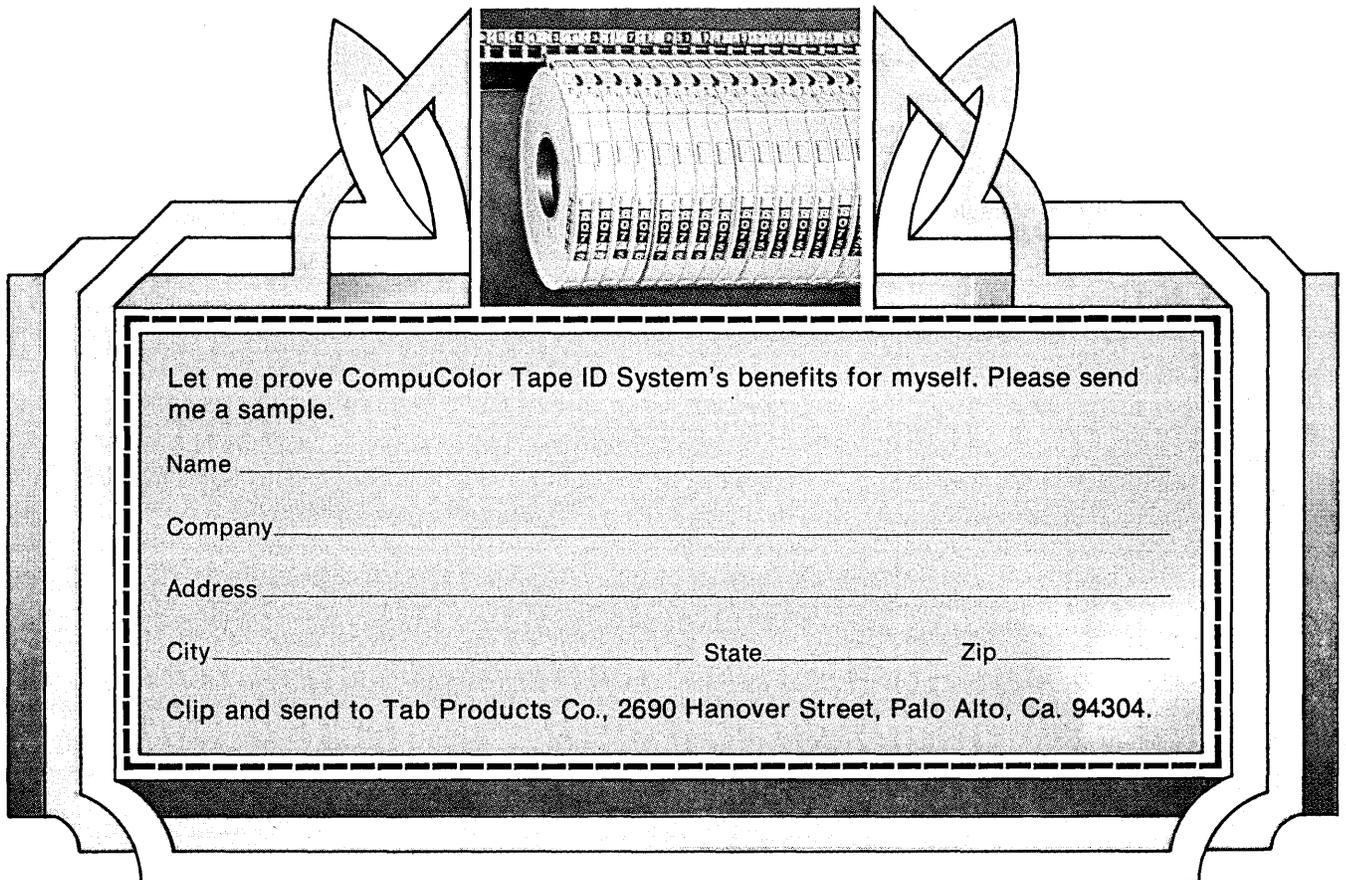
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NEW BOOKS

Economics of Informatics

Papers presented at the International Symposium (organized by the Inter-governmental Bureau for Informatics, IBI-ICC, Rome), held September 16-20, 1974, at Mainz.

edited by **A. B. Friellink.**

1975. 476 pages. US \$ 41.75/Dfl. 100.00

The use of computers is no longer a technical or mathematical problem. The economic impact of computer use is tremendous. The Mainz International symposium included about 45 papers by experts in various economic fields of informatics, (the use of automatic digital computers as seen from the user's standpoint).

Data Base Description

An In-Depth Technical Evaluation of Codasyl DDL

edited by **B. C. M. Douqué** and **G. M. Nijssen.**

1975. 390 pages. US \$31.75/Dfl. 76.00

The DDL (Data Description Language), considered by many as the basis for standard data description in industry, was the main theme of discussion at the IFIP-TC-2 Working Conference, Belgium, January 1975. Implementors, users and language designers including members of CODASYL committees jointly analysed the DDL in order to preserve its strong points, and if necessary, propose improvements for weak points.

This volume contains the papers presented at the conference and summaries of discussions after relevant papers.

Conceptual Information Processing

by **R. C. Schank.**

1975. 392 pages. US \$27.50/Dfl. 75.00

A description of conceptual theory is contained in the first three chapters of this book. A fourth chapter treats the theory and processes underlying the language analyzer in the MARGIE computer system. Next the structure of the memory used in MARGIE (used to make inferences from unjust sentences) is examined, while a final chapter traces the process of the generation of sentences from the conceptual dependency representation.

Human Choice and Computers

Proceedings of the IFIP Conference on Human Choice and Computers, Vienna, April 1-5, 1974.

edited by **E. Mumford** and **H. Sackman.**

1975. about 330 pages. US \$35.50/Dfl. 85.00

At the meeting, computer technologists, trade unionists and sociale scientists discussed a variety of human problems: How to use computers and design systems for the collection and application of information which will give more, rather than less satisfaction to employees; how to improve democratic processes in management and prevent the concentration of excessive power in the hands of managers by developing information systems that are not solely management-oriented; the dissemination of information by governments and questions of privacy.

Command Languages

Proceedings of the IFIP Working Conference on Command Languages, Lund, Sweden, July 29-August 2, 1974

edited by **C. Unger.**

1975. 403 pages. US \$29.95/Dfl. 72.00

This IFIP Working Conference brought together users and designers of operating systems with the purpose of establishing a common base for further research into command languages and their design considerations. Twenty-five papers delivered at the conference cover: functions and facilities analysis, the relationship of command languages to general purpose programming languages; formal descriptions of operating systems from the users point of view; portability and machine independence; and network command languages.

Transcripts of the discussions following each paper as well as those of panel discussions, are included.

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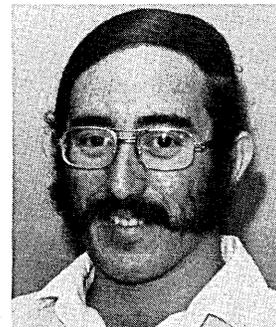
ing, inventory control, and staffing programs. The operating system took about 18 man-months to complete, and applications programs have already taken about 12 man-years.

Because the hospital never operated without the computer system, it is difficult to figure the "savings" attributable to dp. One thing we do know is that we use the equivalent of about 40 fewer full-time people than other proprietary Southern California hospitals of similar size (assuming a 60% occupancy factor). Not all of this difference may be directly attributable to the computer systems, but it is attributable to our manner of operation, which in turn depends on the computer system.

We expect to be able to shorten our accounts receivable cycle nearly 20% within a couple of months of implementing the A/R program, and see a savings of \$12,500/month. Within a year's operation we expect to drop the cycle another 10% at a further savings.

We have invested about \$800,000 in CHAMPS hardware, \$500,000 in the computers and peripherals, and another \$300,000 in the terminal network. We project the maximum operating cost of the system, including equipment amortization and dp staff, to be in the range of \$20,000/month, or \$3-plus per patient per day with 200 patients. (Canyon is licensed for 250 beds.)

Though far from complete, CHAMPS is now providing Canyon General with a fast, reliable, and inexpensive means of maintaining patient data and documenting orders and treatment. It will soon be much more powerful, but we think it has already proven itself. *



Mr. Carren was a project director for Information General, Inc., the firm which first began studying the multiple-mini system for Canyon General Hospital. As Canyon's director of information services, he is presently responsible for the design and development of applications software, as well as the operation and maintenance of the hardware.

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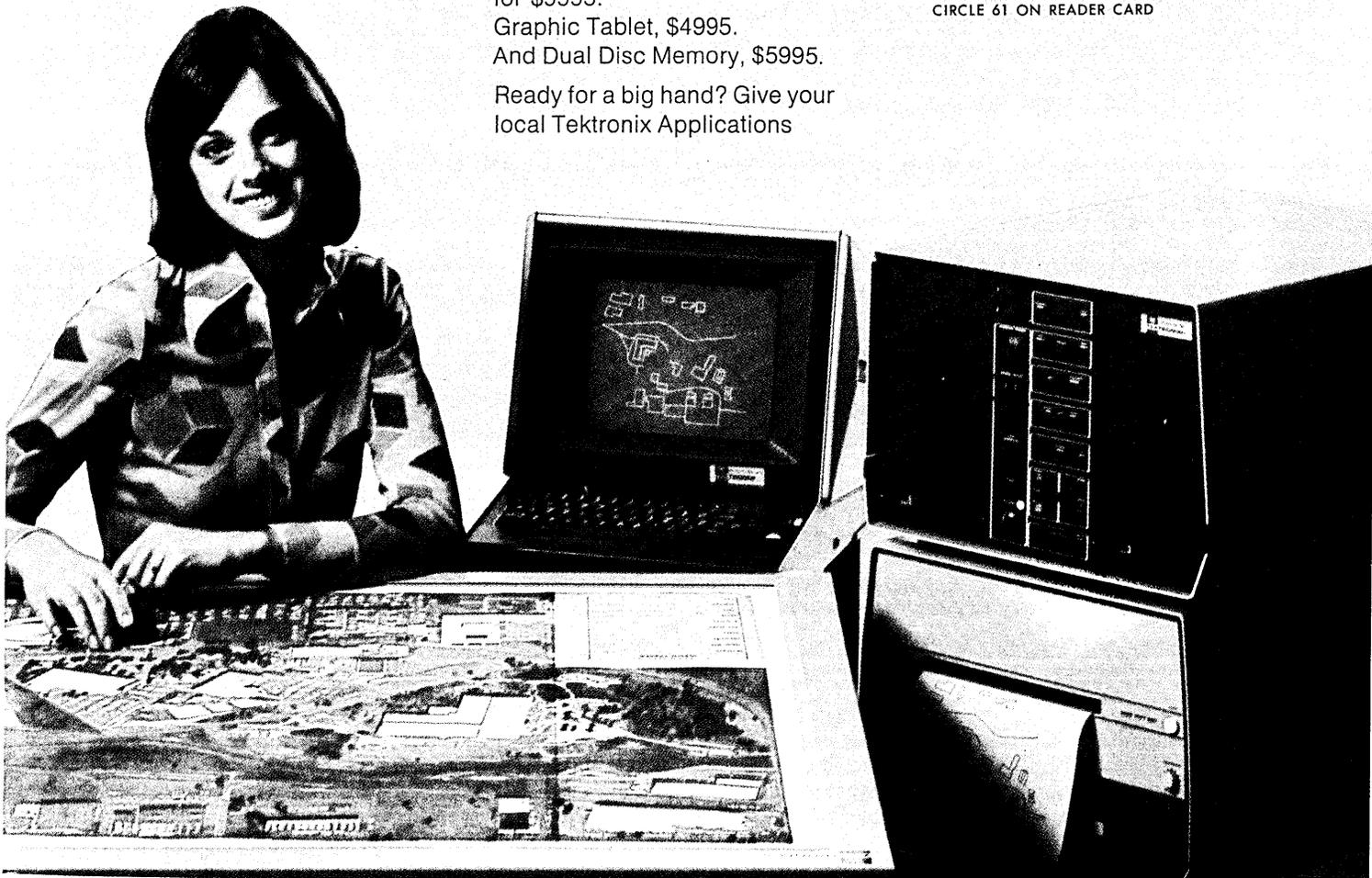
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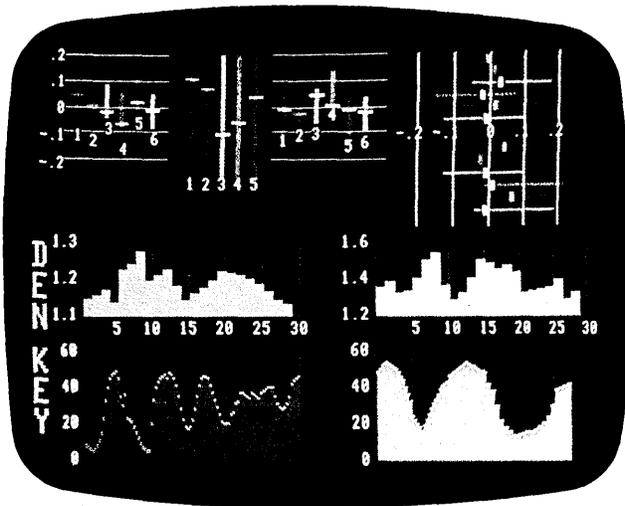
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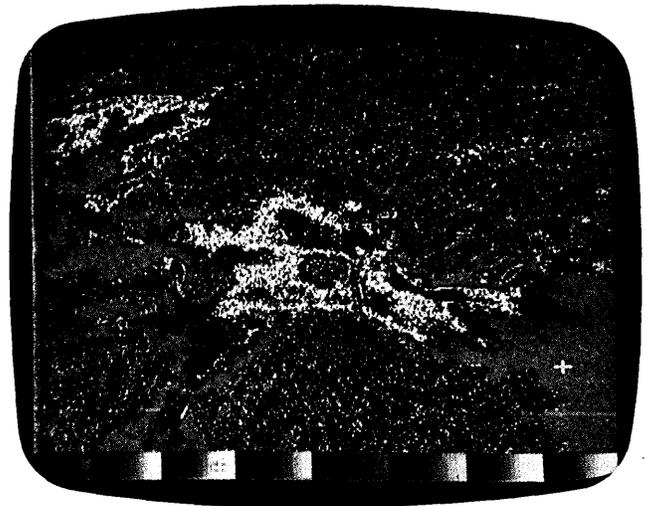
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CIRCLE 27 ON READER CARD

Investing in New Employees

by Charles Siegel

There is more to hiring than just finding someone likeable, and more to training programmers than just teaching how to code.

What do a 47 year old librarian, a 30 year old clergyman, a 29 year old clerk, a 27 year old Math Ph.D. and a 22 year old college graduate have in common? They were all participants in United States Fidelity & Guaranty Company's entry-level programmer/analyst training program, a program that enabled the firm to expand its staff nearly threefold in less than three years without the usual problems of high attrition and delayed productivity.

USF&G is a large multi-line insurance company headquartered in Baltimore. Its premium sales are just under \$1 billion, and its subsidiary, Fidelity & Guaranty Life, has just under \$3 billion in insurance policies in force. The company serves its nationwide clientele through 61 branch offices, but has centralized its data processing in its home office. Branches communicate with the dp center's IBM 370/158 and 145 through intelligent terminals.

When the company decided in 1971 to automate many of its policy-writing and policy maintenance functions, and to build an on-line system for its life insurance subsidiary, the application development staff had 32 persons, too few to do the job required. Now the staff has 109. In making the transition from 32 to 109 persons, 79 inexperienced trainees were hired and put through a new kind of training program. Though not all 79 are still with the company, the majority of them are. Further, those new hires became productive employees in a relatively short period. Both facts, the high employee retention and fast productivity, can be attributed to the success of that training program.

It was apparent from the beginning of the expansion that much of the hiring would have to be of trainees, for two reasons. First, we could not find enough experienced persons looking for jobs at the time. Second, USF&G's past experience indicated that the job longevity of most experienced personnel was not high. With few exceptions, experienced people tend to leave one installation for the same reasons

they left the one before. (The exceptions are people who have been forced to move to Baltimore, usually because their spouses were moved there, or very bright individuals stuck in shops where seniority rules. In any case, there were not enough of these two groups to meet USF&G's demands for people.)

Actually, the firm's experience with retaining trainees had also been bleak. Trainees had previously been hired one at a time and trained using courses available from outside vendors. That method was ineffective. Trainees were not able to become productive quickly enough, and often left before ever becoming productive. USF&G has been able to alter that picture, however, by paying careful attention to all three phases of the process of adding employees to the staff: selection, training, and placement.

Selection

In the past, USF&G used the IBM Programmer Aptitude Test (PAT) as a screening device, considering for employment any applicants who passed. A later analysis of the performance of these people showed that the candidates who did poorly on the test did poorly as programmers, but that the candidates who did well on the test might do well as programmers or poorly. USF&G has since established the PAT as an initial screening device only and requires candidates to score an "A" on it. The PAT is given to any candidate who requests it. Employees of the corporation are given identical consideration as non-employees and must meet all of the requirements, including the "A" grade. No further testing is used.

All those candidates who score an "A" are scheduled for an interview, which is the most important part of the selection process. There are at least four people present with the applicant at the interview; two of the five user division managers, the data processing education coordinator, and the training class coordinator. At times, the

systems and programming manager also sits in. The two division managers are rotated so that all five interview an equal number of candidates and so all division managers interview with all others.

The interview is scheduled for an hour, in which time the interviewers attempt to determine something about the candidate's job longevity, verbal facility, personality, curiosity, maturity, judgment, drive, motivation, growth potential and community orientation. The greatest importance is placed on growth potential, motivation, drive, and longevity. To measure these qualities, the interviewers have access to the candidates' school records dating back to high school. Course content and grades play an important part in determining these four traits. For example, if a candidate does poorly in one major but well in another, this *may* show lack of drive. Did he do poorly because he did not like the material and wasn't willing to work hard enough? Summer employment during college is considered a plus. Nonsocial or nonathletic extracurricular activity are also found to be traits of a good employee.

The tone of the interview changes from stress at the beginning to a friendly around-the-table discussion at the end. (Although some feel that stress interviewing is poor, it has been successful at USF&G.) At the conclusion of the interview, the interviewers discuss the candidate and individually write a critique of him.

Weekly, the eight-person interview team meets for selecting candidates. All decisions on whether to make an offer must be unanimous. In the earlier selection sessions, the candidates are split into three groups. Those to whom we will make offers, those we will not make offers to, and those with whom we will conduct further interviews. At the last session, the final offers are made and an ordered waiting list of five names is constructed.

That is how USF&G selects, but there is a significant question of whom to

NEW EMPLOYEES

select. There isn't any magic formula. In the first class we held, we made what we now consider a mistake by hiring 10 young men right out of college. (See Table 1.) Five of them left within 12 months.

In our second class, we tried to hire the 15 brightest people we could find. We accepted one applicant with only an A.A. degree but with a grade point average of 4.0. All the rest had higher degrees, including some M.A.'s, M.S.'s, and Ph.D.'s. The average undergraduate grade point average, of the candidates who received a bachelor's degree, was 3.43. There was no question that the goal of hiring the brightest people we could find was achieved. The performance of this class has since justified its promise. We then became concerned that there might be too many chiefs and no indians. In the next class, we opted for less talented people. Although we did not hire 15 indians, the class definitely was not as talented as its predecessor. We now feel that hiring less qualified people was a mistake. *You should hire the best qualified people even if you end up with all chiefs!* The chief will write better code quicker, will become productive earlier, and, even if he quits to become a chief in someone else's shop, he will leave lasting work.

The USF&G training program has clearly shown that the best candidate for a successful career in programming is a college graduate who has spent several years in another discipline and decides on a career change. These trainees have shown a clear perseverance and bring a maturity to the shop that is not found in candidates who have had no prior work experience. Our worst results have been with men right out of college who never worked before. Women out of college show better longevity than their male counterparts, especially those with math or science majors. And a considerable success has been achieved by people switching from the teaching professions, especially high school science teachers. It is impossible to select on these guidelines, of course, because there are always exceptions like excellent programmers who were men just out of college.

We have hired high school graduates through Ph.D.'s. We make no distinction between the education level once they are hired. All candidates start at the same salary with no exception. Our experience has shown that those with advanced degrees progress faster than those with bachelor's degrees, and those with bachelor's degrees progress faster than those with high school diplomas. However, again there are ex-

ceptions. If proper care is taken, a high school graduate can have excellent success.

Training

At the time we begin interviewing candidates for the training class, we also interview application development personnel who volunteer to work on the "faculty." USF&G is fortunate in having several ex-high school and college teachers who have enabled us to bring professional teaching, with excellent knowledge of data processing, to the classroom. Some members of our faculty have participated in more than one of the classes even though they are not relieved of their regular duties to teach.

There are four application development people on the faculty for each class. Though some of them have had prior teaching experience, all are required to attend teachers' training seminars put on by the corporate education department. This includes their being videotaped while teaching.

Two people serve especially important roles in the training. One is the data processing education coordinator, a senior level dp person whose fulltime job is to assure adequate professional education for the class in all aspects of data processing, not just application development.

The other is the class coordinator, a middle level application development staff member. Very critical to the success of the program, it is he (or she in our case) who sets the tone for the

class. She acts as supervisor, assigns lab problems, checks code written by students, keeps records, and administers tests. She has a strong voice in the final placement of trainees and files a full critique of each.

The nature of the position of class coordinator makes it necessary to relieve that person of regular duties for five months (for testing, interviewing, teaching, and followup). This puts the person "behind" other programmers who do not interrupt their careers, but the added experience of supervising 15 people proves valuable later, and the coordinators do recover from their absence.

We believe it is important that on the first hour of the first day the class become involved in programming, therefore the class members clear new hire paperwork during the week before the class starts. When the students enter the classroom, they have all the necessary manuals, pads and other tools of their trade. They are introduced to the faculty and begin immediately to learn data processing fundamentals.

The class day is split into nine periods. Each period on each day is preplanned, so the class knows what subject will be covered on what day.

In the nine-week course, the trainees learn data processing fundamentals, introduction to system 370, OS/VS concepts, OS/VS JCL, OS/VS dump reading, documenting procedures, OS/VS utilities and sort merge, linkage editor, advanced JCL, and a USF&G subset of

Candidates Screened for Training Classes					
	June 1972	June 1973	January 1974	July 1974	December 1974
Took PAT	77	150	108	178	187
Passed PAT	48	87	67	127	88
Interviewed	42	82	65	111	78
Offers	21	17	17	21	17
Total hired	15	16	15	17	16
Men hired	10	8	8	8	6
Women hired	5	8	7	9	10

Table 1. The Programmer Aptitude Test is the first step in USF&G's screening. Candidates must score an "A." During the course of the five classes, the proportion of men to women hired has been nearly reversed. (The numbers for the January '74 class are smaller because the class was announced late.)

Employees Retained After Training								
	Start		Left Within 12 Months		Left Within 18 Months		Still Employed	
	M	F	M	F	M	F	M	F
June 1972	10	5	5	0	6	1	4	3
June 1973	8	8	0	0	0	0	6	8
January 1974	8	7	0	0	2	0	6	7
July 1974	8	9	1	1	1	1	7	8
December 1974	6	10	1	0	0	0	5	10

Table 2. For the first class, twice as many men were hired as women. Most of these were fresh college graduates, and half left within one year. The firm learned from the experience. Most of the employees hired for the next class are still with the company now, more than two years later.

COBOL. The trainees learn that they can only use the GO TO statement to exit from a performed paragraph, that no numbers can appear in the procedure division and other things associated with a full structured concept of programming. Their first program is structured, and all code they write is structured because they know no other way. The trainees are also put into teams and are encouraged to work together on their projects.

The curriculum includes labs, lectures, and business courses, given in a mix to prevent boredom. Toward the end of the nine weeks, lab courses predominate.

In addition to data processing training, the trainees are given insurance courses and must pass a basic insurance exam to graduate from the program. It is unfortunate that data processors often consider themselves technicians in their discipline instead of bankers, manufacturers or whatever they are employed at. This leads to data processors having great data processing loyalty and little or no industry loyalty. To overcome this, in addition to the insurance program, we bring department heads from user departments to the class to explain to the trainees what the user's function is in the corporation. In addition to making the trainee feel a part of the enterprise, it gives the user manager an early introduction to the data processing personnel who will be dealing with him in the future. This has been a very rewarding aspect of the training program.

Placement

At the beginning of the last week of the class, the five division managers meet to put in their requests for the trainees. These requests are not for a particular individual, but for the type of person they need. Since the trainees have had a very successful history, there are usually more requests than trainees, and disputes are arbitrated by the systems and programming manager.

Before the class graduates, the systems and programming manager meets with the class coordinator and the faculty to assign the trainees to their groups. A strong attempt is made to match the trainees' strengths and weaknesses with the future supervisor's strengths and weaknesses. Care is also taken to break up training class cliques if any exist.

The next morning, the students are told of their assignments and spend the rest of the morning with their new supervisors. This gives them the continuity they need to go from the highly charged and organized training state to the sometimes chaotic real world at-

mosphere. When they reach their permanent desk the Monday after the class, there will be an assignment waiting for them.

The results—it pays off

Not everyone that the course touches automatically turns into a super programmer. The selection process has been good enough, however, that only two trainees were encouraged to try something else. (One of them went into another field; the other went to another company.) Of those who complete the course, there are also mixed degrees of success. Although we attempt to teach programming—by having the students produce several iterations of their program designs on scratch sheets before even translating them to COBOL—only about the top third of the class will mature into top “programmers;” we must also admit that many of the bottom third will be “coders.” Almost all of them become productive employees within three months of completing the class, however.

As a junior programmer, he will be assigned to work with a more experienced programmer, perhaps in a team. Frequently the senior person serves as a resource to the new programmer in helping to better structure his code.

The only problem we have encountered is one of the trainee having to do maintenance on a non-structured program. We have succeeded in turning this to our advantage because it is usually easier for the new programmer to rewrite the code in question than attempt to do maintenance on it. In this way we are reducing the cost of future maintenance and have already seen a noticeable reduction in present maintenance costs.

The result of this training program has been the development of a well-trained staff that shows excellent potential for good longevity with USF&G (see Table 2). In the first class, the five men who left within 12 months were all just out of college and had never worked before. All of those five went to work “next door” for more money. Of the other people who were trainees and left, with one exception, all left USF&G either to move out of town or because they decided the data processing business did not fit them. The two 1973 trainees who left moved out of town and obtained positions in the business which were normally reserved for people with twice their experience.

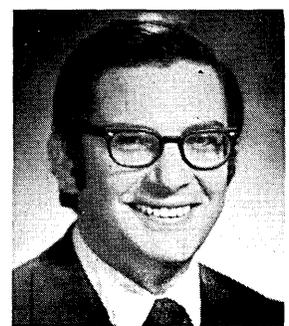
There are also some fringe benefits to the training program. There is an *esprit de corps* among the class that continues long after their training program ends. It manifests itself in anniversary lunches and such and, more important to the corporation, in the

passing of knowledge from group to group. As in all large installations, it is difficult to keep all programmers informed even with informal newsletters and formal updates to standards manuals. The class groups, with their informal system of information exchange, see to it that new techniques developed in one area quickly spread through the shop.

The cost of this program is relatively high, due partly to the amount of time spent interviewing prospective candidates. We spend roughly 1,000 hours interviewing candidates for each class, and another 1,000 hours in instruction. Computer costs for the class run about \$4,500. Therefore the cost of selecting students and teaching the course is roughly \$29,500, or about \$2,000 per trainee. Trainee salaries for the period are \$1,400, making the total investment in each employee \$3,400.

The cost of hiring through headhunters, for comparison, is not much lower. We used headhunters for about two years. Not only were the employees supplied usually of low quality, but they stayed less than two years on the average. Headhunter fees averaged \$2,000. Employment costs ran approximately \$500 more, and relocation expenses sometimes added \$1,000 more. We feel training is cheaper than using headhunters, especially considering that the trained employees already know our programming techniques and even a little about USF&G's way of doing business.

We now have reached the staff size necessary for our workload. With our low turnover rate, we do not know when we will need another class. But our success has been good enough that we plan to further lower our recruitment of experienced people, and to conduct classes of inexperienced people instead when we need more staff. It pays. *



Mr. Siegel is systems and program manager at United States Fidelity and Guaranty Company, where his previous responsibility was as project manager in the development of a full life insurance policy-writing, daily maintenance and valuation system. He is also active in SHARE.



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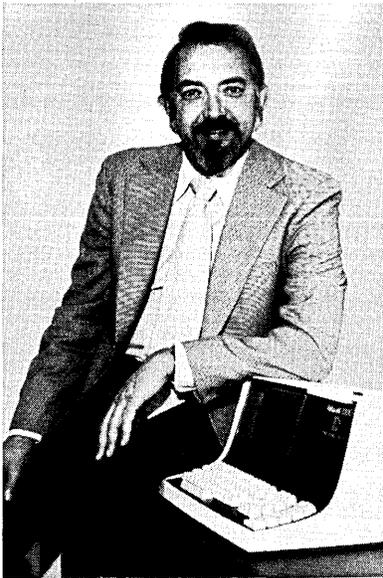
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which will incorporate the same "building block" approach based on the initial data entry. "Programs we develop for these innovating applications will be suitable for use at other hospitals and institutions. We plan to make these programs available to outside users as they are created, tested and proven. The data processing capability provided by the DATASHARE system will be of great benefit to hospital and medical administrators in holding down costs and improving employee productivity."

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Skills Matrixing

by Frederick F. Jahnig

Put 1,100 data processing people into the same department and personnel management problems multiply. Are matrixes the answer?

At the Chase Manhattan Bank, in the early '70s, the lack of effective personnel management techniques in data processing was causing serious and expensive operational problems. These included high employee turnover, low productivity, rapidly escalating project costs, delays in developing new automated systems, and a general feeling of inefficiency.

Chase is the country's third largest bank, and its data processing resources are very large. The bank operates three computer centers stuffed with a variety of machines including an IBM 370/168, two 158s, one 360/65MP, one Burroughs B7700, a B6700, four B3500s, four Univac Spectra 70/45s, half a dozen Digital Equip. Corp. PDP-11s, and a few others. Its data processing staff—not including data entry personnel—has 1,100 people. Of these, 550 are "professionals"—programmers and analysts and their managers.

Personnel problems involving 1,100 people are big problems, and Chase had them. In addition to a turnover rate of 35-38% per year and all the other problems mentioned, we were having difficulties maintaining our technology at the state of the art. Skills development had slowed, and in spite of the number of people available, we lacked the capabilities to do some of the things the company needed.

Our professionals were confused. They were unhappy, and many of them were taking their talents elsewhere.

These problems have largely been solved during the last two years, but the solutions were not easy to implement.

The solutions involved restructuring the entire organization and developing a new set of personnel development techniques and tools.

Matrix management

Our first step was to alter the shape of our organization to put it into a form

which would help us emphasize personnel development. We added to our line organization, which was a vertical project-oriented structure, another management layer, making it a specialized kind of matrix (see Fig. 1).

The result is that each dp employee has two managers: his line manager who gives him his specific work assignments, and his manpower or pool

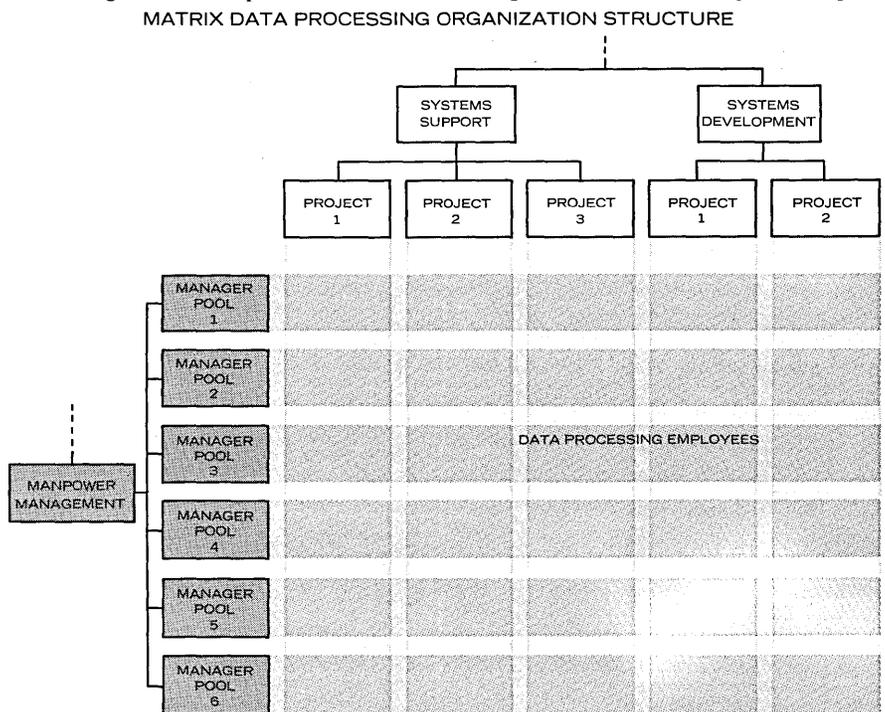


Fig. 1. To better emphasize personnel development, Chase Manhattan Bank organized its programmers, analysts and other professionals into a matrix structure. Project managers worry only about projects. Manpower managers worry about personnel problems. Each manpower manager has only people with similar titles reporting to him; even systems analysts and senior systems analysts are separated.

MATRIXING

manager who is responsible for his training and career development.

Each employee belongs to one of six pools or staff units, depending on his skills. For example, one pool contains mostly systems analysts. Senior systems analysts belong in another pool. Among other advantages derived from this pooling is that a pool manager is capable of maintaining the integrity of a position classification across department or project lines. There are many other advantages, too.

Conceptually this was a fine way to develop and manage the manpower resource, but converting to this organization also forced us to redo all our manpower management processes. That, too, proved beneficial. Among other things, it led us to develop five related management tools: a career ladder, a set of position descriptions, a skills glossary, a training catalog, and the "skills matrix" which helps make the other four useful.

An outside consulting firm was engaged to assist in evaluating our problems. With its help we soon turned up a significant gap between the skills inventory of our staff and the skills needed to get the job done. The gap was found by simply comparing each employee's skills with the job responsibilities assigned him. To make sure the job responsibilities assigned were appropriate, we examined department procedures and standards, conducted interviews and circulated questionnaires. It's always a surprise to see how differently managers and staff see themselves, their functions, and their responsibilities—and how far off target everyone can be about their job assignment.

Once the job responsibilities had been defined, we determined what position titles we wished to associate with each set of responsibilities. This led us to invent several new job titles, including "technical specialist" and "systems specialist" and three more that have to do with systems engineering. It led us to discard a few positions also, like "systems analyst trainee," a slot which previously required no programming training!

Career ladders & job descriptions

Given the set of positions we wanted, we worked with the consultants to create our first tool, a "career ladder." (See Fig. 2 for a portion of the career ladder). This tool shows which way is up in our dp hierarchy. It displays clear, distinct career path guideposts which tell our staff where they are, where they are headed, how far it is to their destination, and what

skills are needed to get there. It outlines interpath mobility and shows all available career routes open to each member of our dp organization.

The career ladder provides both management and staff with a positive overview of organizational relationships. It also can be made more sophisticated to show paths into the dp group and out of the group into other sections of the company. However, exposure, training, and education must be ready for those who choose to leave the dp group, particularly in the realm of management development; we have not yet developed these.

The second tool created is a set of position descriptions, which basically attach words to the position slots we created. Each position has a pre-

determined acceptable level of skills broken down into nine subsets: hardware, languages, system software, technical skills, project skills, interface, applications, business and industry, and supervisory.

Skills glossary & training catalog

Our third tool is a detailed "skills glossary," a dictionary that defines the data processing skills required across our installation. (Fig. 3 is an example of the breakdown of one skill, programming in COBOL.) The glossary lists four levels of proficiency: conceptual knowledge, familiarity, good working knowledge, and comprehensive knowledge.

The glossary is updated on a

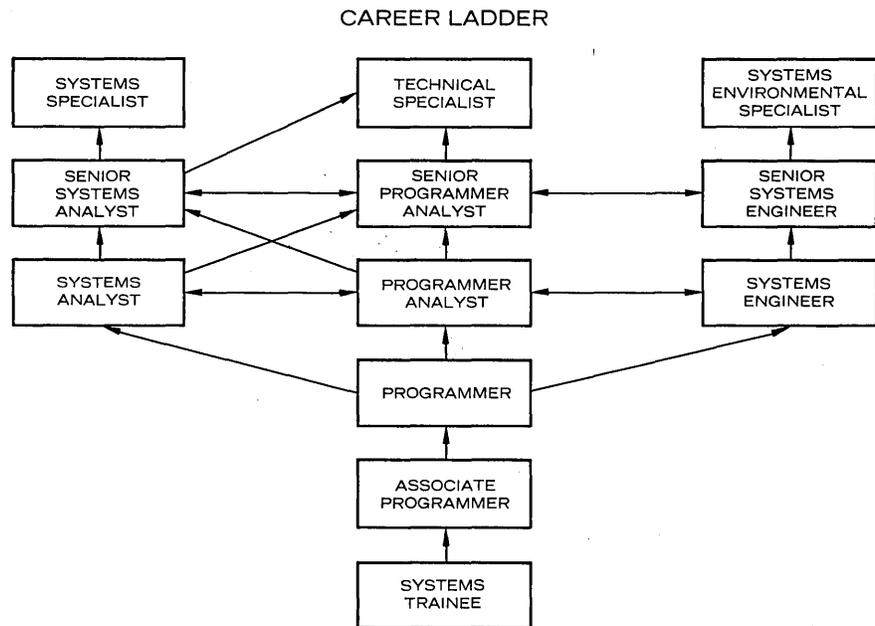


Fig. 2. The career ladder shows the job path alternatives open to employees within the dp department. It does not yet reflect branches into and out of the department.

SKILLS GLOSSARY IBM COBOL	
Level 1—CONCEPTUAL KNOWLEDGE	Knowledge of structure of COBOL program, various divisions, syntax conventions, major verbs. Has coded and debugged at least one minor program.
Level 2—FAMILIARITY	Has coded and tested five or more nontrivial programs or modules using major COBOL verbs and logic branches.
Level 3—GOOD WORKING KNOWLEDGE	Has used sequential and random access methods, printer options subscribing and debugging aids such as TRACE, memory dumps, looping options.
Level 4—COMPREHENSIVE KNOWLEDGE	Has used indexing, SORT verb with input/output procedures, modular programming techniques. Is knowledgeable concerning various trade-offs between logical equivalent coding schemes. Knows COBOL interface techniques.

Fig. 3. Four-level skills "definitions" are contained in the skills glossary which is used to build position descriptions.

TRAINING CATALOG

1. COURSE TITLE—Introduction to Programming
 NUMBER —S03
 DESCRIPTION —This course will introduce the basics of data processing. Topics of instruction will include the history of EDP, components of a third generation data processing system, data recording concepts, numbering systems, systems phases and applications and the concepts of programming and the operating system. The mode of instruction is to be both lecture and self study. The course will be graded.

2. COURSE TITLE—ANS COBOL Coding
 NUMBER —I 02
 DESCRIPTION —This course will cover the structure of COBOL program divisions, syntax conventions, major verbs, subscripting and I/O options for sequential access. Intensive workshop sessions are included, with compiles and executions being submitted. Emphasis will be placed upon the IBM compiler options. The mode of instruction is to be lecture. This is a graded course.

3. COURSE TITLE—ANS COBOL Programming Efficiencies
 NUMBER —I 03
 DESCRIPTION —This course will provide an analysis of ANS COBOL coding emphasizing the efficient use of the programming language. Specific verbs will be covered with reference to generated instructions. The following will also be included: report writing, sort features, segmentation, debugging, and linkage conventions. Workshops will be set up to use techniques learned. The mode of instruction is to be lecture. This is a graded course.

4. COURSE TITLE—Advanced Programming Techniques
 NUMBER —I 10
 DESCRIPTION —This course will provide detailed discussions on resource allocation processes of multiprogramming environments, multiprogramming techniques, dynamic module loading and execution and the tradeoffs of using various program segmentation techniques.

Fig. 4. Courses in the training catalog relate directly to the four proficiency levels defined in the skills glossary.

		POSITION CLASSIFICATIONS					
		ASSOCIATE PROGRAMMER	PROGRAMMER	PROGRAMMER ANALYST	SYSTEMS ANALYST	SYSTEMS SPECIALIST	
SKILLS CATEGORIES	1. IBM HARDWARE						
	2. TIME-SHARING						
	3. IBM COBOL						
	LEVEL DEFINITIONS	1. CONCEPTUAL	1	2	3	4	S 03 INTRO. TO PROGRAMMING
		2. FAMILIAR					I 02 COBOL CODING
	3. GOOD WORKING KNOWLEDGE					I 03 COBOL EFFICIENCIES	
	4. COMPREHENSIVE					I 10 ADVANCED TECHNIQUES	
	50. FLOWCHARTING						

Fig. 5. The skills matrix ties all the other tools together. It is possible to look up, for any position classification, the skills proficiencies required and even the courses available for developing those skills.

periodic basis and distributed to the entire staff. Originally the list contained 50 skills, but several have been added, including skills involving mini-computers, data bases, and data communications.

There is a direct fallout for targeted dp education from the glossary, and that is the fourth tool, the training catalog. The catalog explains how needed skills can be acquired. It lists the course material required to advance from one level to the next in the skills glossary. Fig. 4 illustrates the portion of the catalog related to IBM COBOL programming.

The four tools, the career ladder, position descriptions, skills glossary, and training catalog, had to be inter-related to be effective, and therefore the fifth tool, the skills matrix, was developed.

The integrated skills matrix

The matrix is a master cross reference and skills profile for each position. It defines each position and describes its required skill levels. It provides a skills hierarchy where the upper range of one job interlocks with the minimum entry level into the next higher position in the sequence, and thereby provides a clear understanding of the skills needed to progress from one position to the next in a chosen career path. (Fig. 5.)

The matrix has three dimensions. It contains: (1) the glossary's 50-plus skills broken down into the four proficiency levels; (2) the training catalog's course titles; and (3) the job classifications of the set of position descriptions. At the point where the three dimensions meet, it shows the appropriate skill requirement for each position and the related course material for acquiring that level of proficiency of that skill.

Once the matrix was completed, tool building was over. The tools were put into operation. People were trained and oriented. The implementation program and schedule is too detailed to show here, but it worked—partly, we think, because the employees participated directly with management in the skills evaluation process.

When the implementation was completed, in 1972, Chase had a new, stronger management structure and the tools to support it.

The results

Overall, we have a system of managing human resources that provides control and enables employees to realize their own career goals. It motivates employees through their own ambition, channels their energy into productivity by satisfying their career goals, and displays the bank's commitment to their development in a visible,



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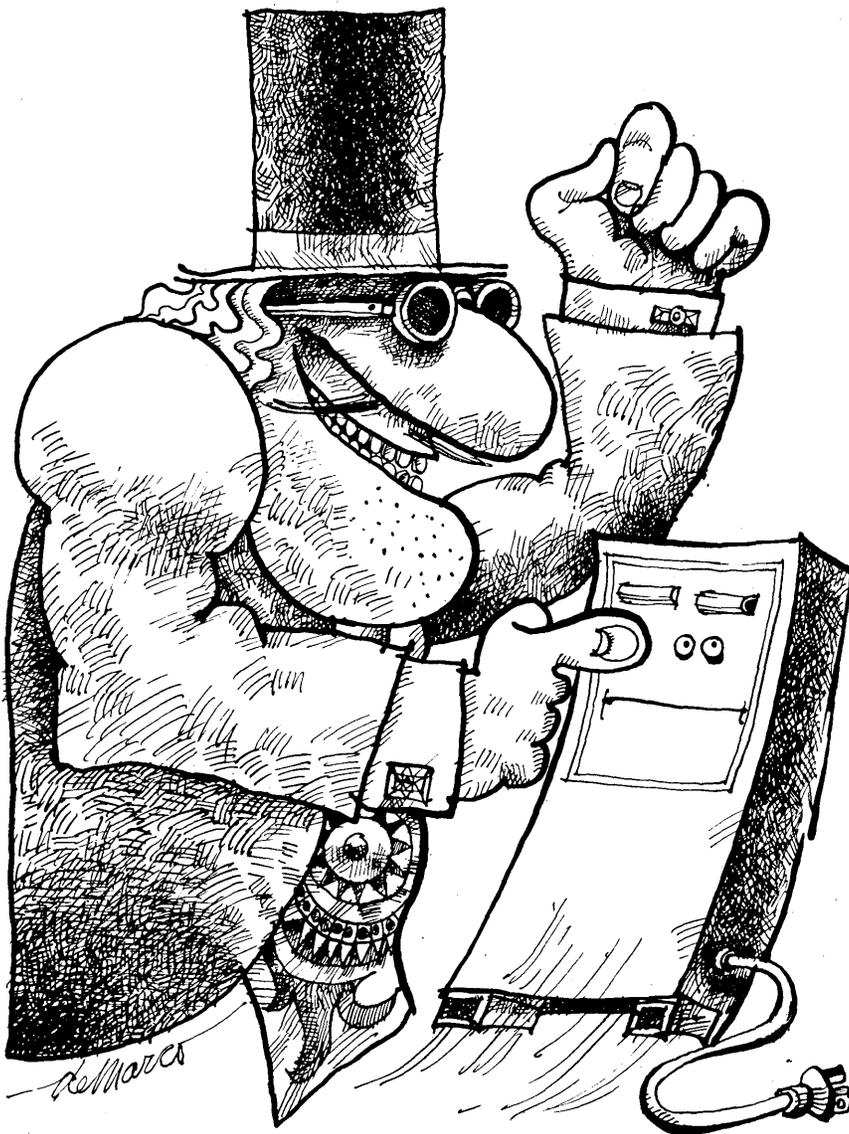
Employee turnover has decreased drastically and is now running at something near 10%. While we recognize that economic conditions influenced this, we have been able to retain significant numbers of qualified people and are no longer losing them to other companies.

We started with a huge staff but still limited capabilities. Nearly half of those employees are no longer with us, though we still have an equally large number. The present staff is more capable and can handle the jobs assigned us.

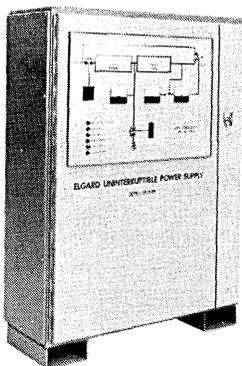
Our few years with the skills matrix have shown that it is a viable tool. However, there are still some areas that need to be addressed. One of them is the quantum jump from the highest technical proficiency level into management. We have recognized the importance of the technical specialist who does not wish to become a manager, and made a position for him. But we have not yet smoothed the transition for those who wish to manage.

Another deficiency results from the manner in which the tools were made. Since the core of the matrix is concerned with technical dp skills, it does not address the skills needed in other parts of banking. Thus career pathing from dp into those areas is limited. The reverse problem of bringing people into dp from other areas of the bank is even more difficult. We are now addressing both these deficiencies by adding management and banking skills to our program.

In spite of its current inadequacies, we believe our approach to human resources management is a success, and that we have taken an effective first step. *



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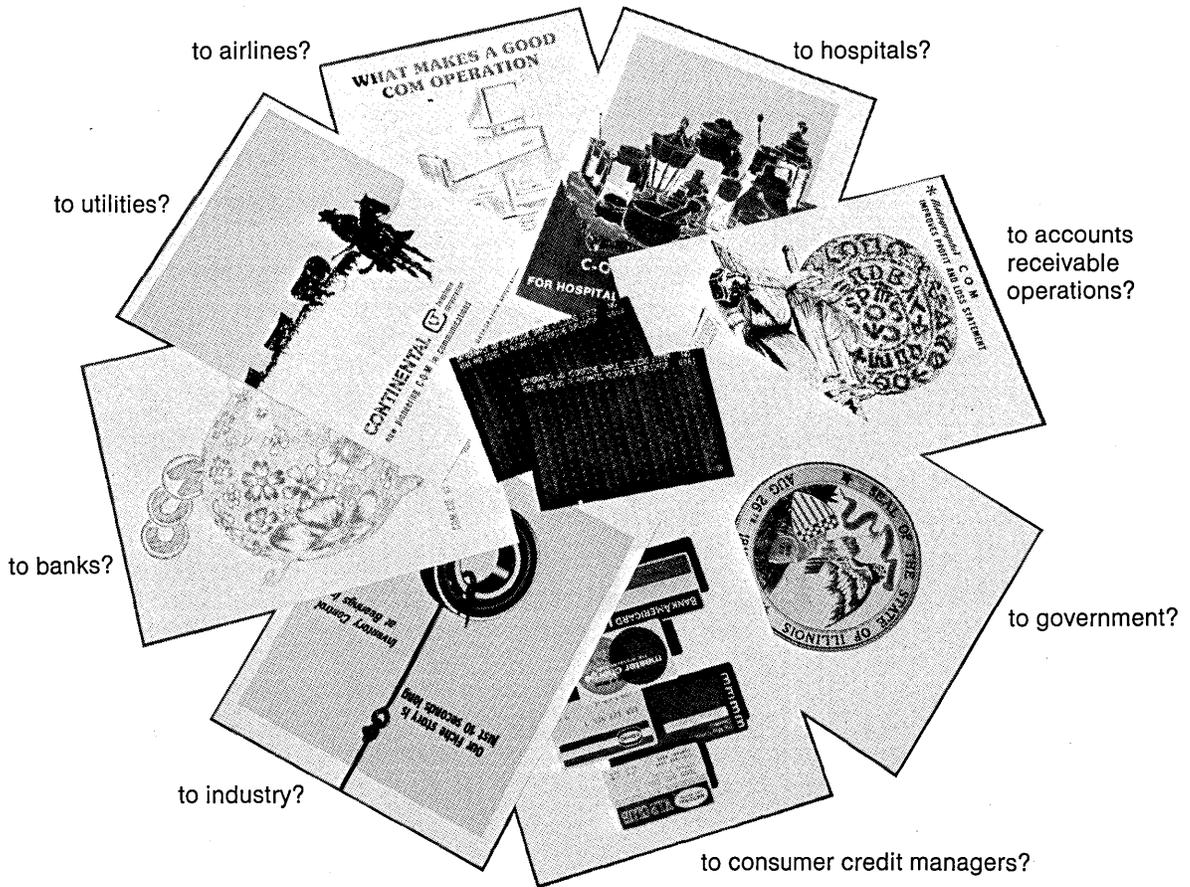
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Since joining Chase Manhattan Bank in 1960, Mr. Jahnig has held the positions of personnel representative, systems analyst, personnel officer, assistant treasurer, and second vice president. He is now group executive of manpower management for data processing and vice president.

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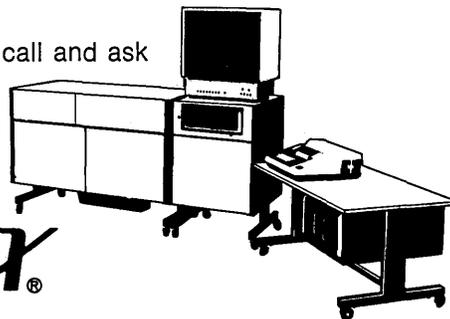


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The Hewlett-Packard 3000 is a minicomputer?

“The 3000 a minicomputer? I think calling the 3000 a mini is an abomination!”

When we asked Mr. Thomas Harbron, Director of the Computing Center, Anderson College, Anderson, Indiana, what he thought about the HP 3000, he had some very interesting things to say:

“We’re using the 3000 for administrative processing, academic work and some commercial work. We have 27 terminals and we selected the 3000 because we wanted a system that would provide us with remote access and would do general purpose types of things from the terminals. The 3000 allows us to do many different things at different terminals. In fact, it does everything we expected it to do and was the only machine we could find in its price class that would. I’d recommend the 3000 to others. It’s a powerful and versatile machine. And it’s cost effective as well. It’s half the price of anything that comes close to it!”

“I don’t think that Hewlett-Packard ought to call the 3000 a minicomputer. It is a complete medium-sized system.”

That’s what the EDP center manager of an aircraft manufacturer said about the 3000. He also had this to say:

“One primary reason we bought the 3000 was to collect and analyze radar development data. The problem is that we have to collect data fast enough, pipe it to a computer, analyze it,

and then make the necessary instrument adjustments. HP’s 3000CX was the answer. We also bought it for its interactive capability. Very significantly, in our acoustics department we had to have the ability to turn around data analysis fast. The 3000 has been a real cost saving computer for us. For the last two years I was the entire staff for the 3000. Not a great deal of detailed knowledge of the system is necessary. Technicians can use it without much training. I’m very much sold on the 3000. And it’s definitely a complete system—not a minicomputer!”

“It allowed us to run eight times the volume at a third the cost. No minicomputer could do that!”

The above statement was made by the corporate banking division EDP manager of a major California bank. He also said:

“We’ve had the 3000 for over nine months. A year ago we were on a time-sharing system and the cost became prohibitive. We contacted six different companies to look over and bid on a proposal that defined our needs. HP was the only one that could handle our total application of management information for the Corporate Banking Division. The 3000 is not just a mini—it’s much more. We’re constantly amazing people here with what we can do. It’s not hard to operate, not hard to cope with. But our favorite topic is that we’re paying less than one third of what we were paying and running four times the volume. And this year, we’ll double our volume again. That’s eight times greater and less than one third the cost.

That’s really productivity!”

“We found the only thing mini about the 3000 was its price.”

When we asked the EDP center manager of another major manufacturing company about the 3000, that was what he had to say. He also had this to say:

“Our computer needs include both scientific and commercial applications. We were phasing out our teleprocessing terminal and our Environmental Monitoring Division's computer. So we started looking. We spent several months studying computer systems, and rated them on speed, versatility and ease of operation. The result of our study showed that the HP 3000 provided these requirements and had the best cost/performance ratio. We didn't fully realize the potential of the 3000 until we started programming it. We have experienced a significant cost savings in the seven months we've had the 3000 and we expect a greater savings in the months ahead. We really like the interactive CRT for programming and data input. Being a multi-programming system we can have many users on at the same time. The power and speed of the 3000 is equal to a large machine. It's no mini. Calling it the Mini DataCenter is more accurate. I'd definitely recommend the 3000 to other potential users. In fact, we already have. We feel they would be money ahead.”

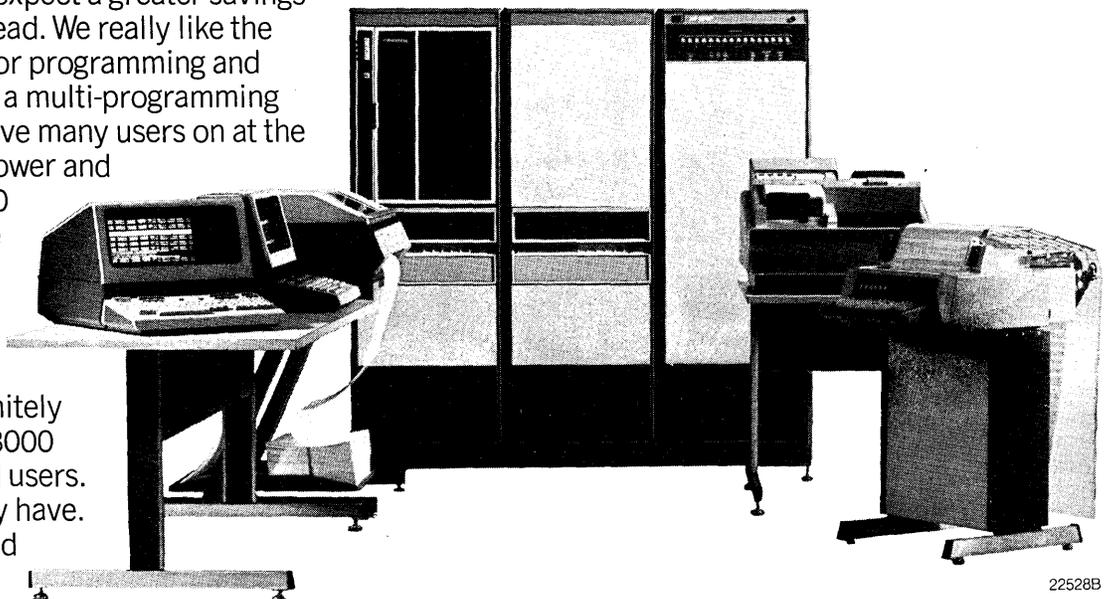
We're glad these and other users of the HP 3000CX set us straight. We called it a mini-computer because its state-of-the-art technology lets us sell it for a minicomputer price. From now on we'll call it a Mini DataCenter.

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A History of Computing In the U.S.S.R.

by Andrei P. Ershov

Though second generation machines still perform the bulk of the workload, a nationwide computer utility is planned for the 1980s.

There are three specific fundamental factors which have greatly affected the development of data processing in the U.S.S.R.:

- The Soviet Union has been forced to develop all aspects of the computer business relying exclusively on its own intellectual and technological resources.
- Computer development in the U.S.S.R. exists outside the scope of multinational computer companies.
- The U.S.S.R.'s social system directly and decisively influences the development and application of computers.

The first factor is not now as absolute as it was, say, 10 to 15 years ago. The normalization of international relations and growth of exchange in trade, science, and technology, led to a levelling of the scientific and technological base through a flow of technical information. The extension and reinforcement of this base have been greatly affected by processes of integration in the national economies of Socialist countries and, in particular, have been embodied in the development of ES EVM (the Unified Range of Electronic Computing Machines) known better under the acronym "Ryad." It wasn't always that way.

The history and prospects of computer development in the U.S.S.R. can be divided into four 10-year periods. The '50s were characterized by the first generation computers, their applications to the most urgent scientific and technological problems, and pioneering works in computer design, software development, and basic applications concepts.

In the '60s, the second generation computers appeared, a foundation for the regular production of computers and their components was built, and all branches of the computer business were identified and formed.

In the '70s, a broad expansion of third-generation computers into all sectors of the national economy is taking place. In all major organizations, computer applications have been developed to the point of regular service, and data bases are being computerized.

In the '80s, a global network of

computers, terminals, and switching centers will be established. This network will allow an integration of data bases and their transmission at electronic speeds. All business units of the national economy, without exception, will be involved in computer applications through a network of multi-access computer utilities. Public computer applications (schools, medical service, public libraries, home terminals) will start to grow on a large scale.

Computer development is subject to a number of long-range national programs with well-established goals.

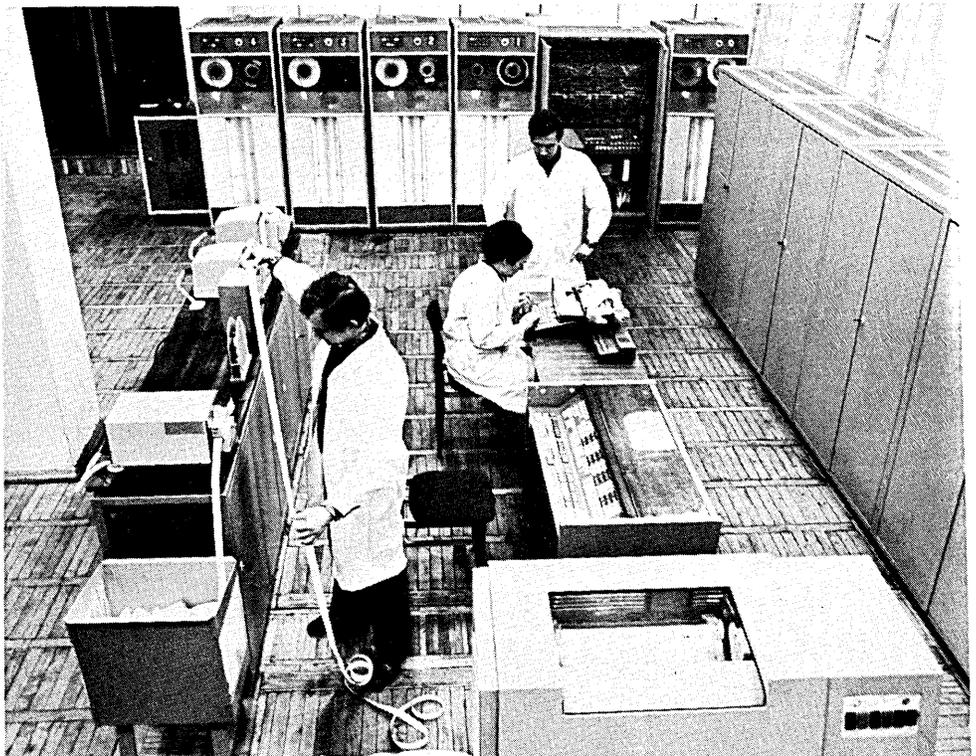
The first program is for computer production. Since 1971, computer production has been considered a separate industry sector and separate statistics have been kept for it. The total sale price of computers manufactured in 1970 was 710 million rubles. The program for production in the 1971-1975 period assumed a growth rate of 2.6 times the 1970 level; the actual rate is greater than this. (See Fig. 1.)

The main component of this boom is the production of ES EVM (or "Ryad") computers. These machines are produced through a joint venture of the seven socialist countries acting as a kind of large-scale multinational company. Twenty thousand people participated in ES EVM design and production preparation; 70,000 are involved in production.

The second program is for computerized automation of manufacturing and management. Systems for these applications are called Automated Control Systems in Russian terminology. Industry is the main field for introducing them, and they are accordingly classified as:

- automated process control systems (APCS)
- plant automated management systems (PAMS)
- branch automated management systems (BAMS)
- regional automated management systems (RAMS)

The last three correspond to the En-



The MINSK-32, one of the U.S.S.R.'s first transistorized computers has approximately the same computing power as the GE 400.

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U.S.S.R.

glish term "management information systems." PAM operates within the limits of a single enterprise; BAM, within a branch headquarters; and RAM covers some territorial region, like a city.

The program of automated control systems started during the eighth five-year plan, 1966 to 1970. Over 400 systems in 30 sectors of the industry were put into operation at a total cost of over 1 billion rubles, plus indirect expenditures for basic research. In spite of the experimental nature of many of these systems, and their short duration of operation, the net return for that period was 680 million rubles—mainly realized as a consequence of raising labor productivity.

This program has been given real thrust now. The Directives of the 24th Congress of the U.S.S.R. Communist Party prescribed the implementation, between 1971 and 1975, of about 2,000 automated control systems—in particular, 65 statewide and 150 republic-wide BAMS, over 1,000 PAMS, and 670 process control systems. In 1974, 614 new systems were put into operation.

Another long-term program is the construction of the Statewide Automated System of data collection and processing for accounting, planning, and management of the national economy, the Statewide Automated Management System (SAMS). SAMS will be implemented in two stages. The first, during 1971-1980, will be the global design and the definition of standards and procedures. Stage I involves the creation of a Unified Automated Communication Network (UACN). One basic component of the system is the Statewide Data Communication System to which any computer or appropriate terminal could be switched. The character of this work does not require much comment except that the gigantic size of the Soviet Union and its longitudinal geographic orientation make the problem extremely difficult.

During SAMS second stage, a great number of multi-access computer utilities will be constructed. According to some estimates made at the early stages of preliminary planning, some 10,000 multi-access computer utilities are required.

THE HARDWARE

This list of the main computer models currently in active use in the U.S.S.R. also shows their Western counterparts. The majority of Russian machines are still second generation ones, including the BESM-6, a reliable and powerful machine whose value is still rising due to the growing pool of software available for it.

The MINSK-32 is a very popular inexpensive computer with reasonably good software; it is the primary machine for management information systems.

M-220 and BESM-4 are workhorses of the '60s for engineering and small scientific applications.

The MIR-2 has no direct counterpart in Western computers; it combines a microprogrammed byte-oriented mini-computer with an alphanumeric display and a light pen. Besides being used extensively for engineering cal-

culations and analytic manipulations, it can also be used as an intelligent terminal.

The NAIRI-3 is very popular as a small, compact configuration for engineering and design departments. It has a large read-only memory where a subroutine library and ALGOL compiler are stored. Recently it has been given an emulator for the MINSK-22, the predecessor of the MINSK-32.

ES EVM (Ryad) models do not require any specific comments. They use integrated circuits and have perfor-

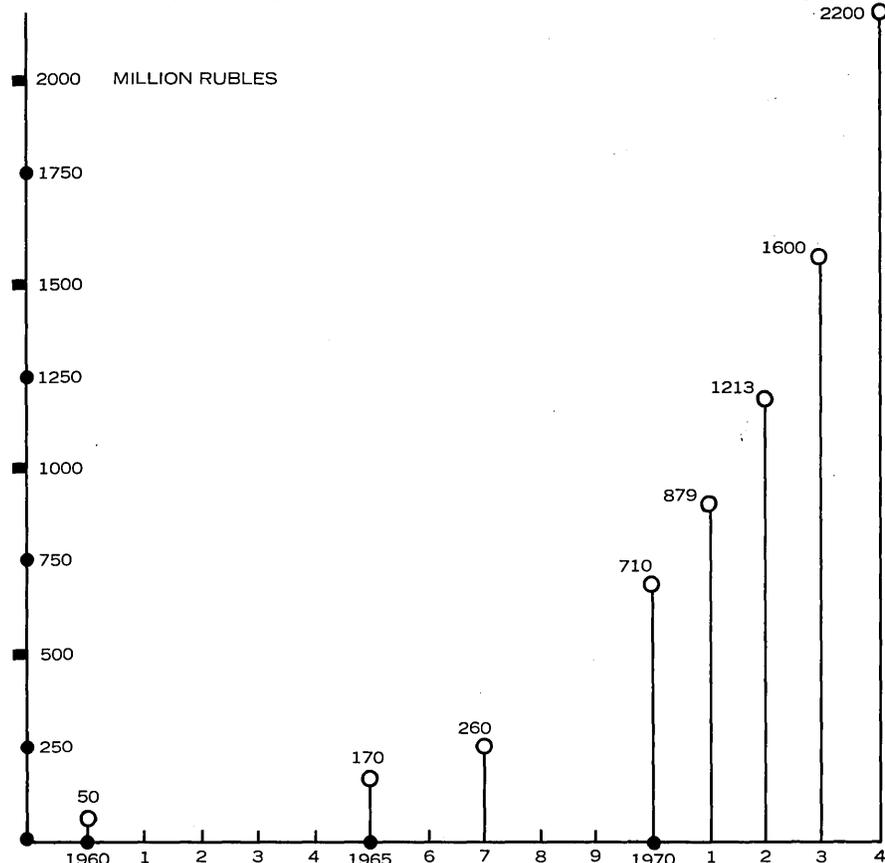


Fig. 1. Since 1971, computer production has been tracked as a separate industry in the Soviet Union. The government program for production in the 1971-1975 period assumed a growth factor of 2.6 times the 1970 level; the actual rate is greater than this, largely due to the ES EVM or "Ryad" Series. The figure for 1974 surpassed 1,850 million rubles targeted for 1975.

APPLICATION DEVELOPMENT IN THE U.S.S.R.

- 1951 Scientific application (MESM)
- 1953 Math tables (BESM)
- 1954 First public computing service (STRELA)
- 1956 Language translation experiments (BESM)
- 1957 Economic calculation (M-2)
- 1958 Medical application (STRELA)
- 1961 Process control (DNEPR)
- 1964 Bank office (URAL)
- 1966 Chess program (M-220)
- 1967 Plant management information system (MINSK-22)

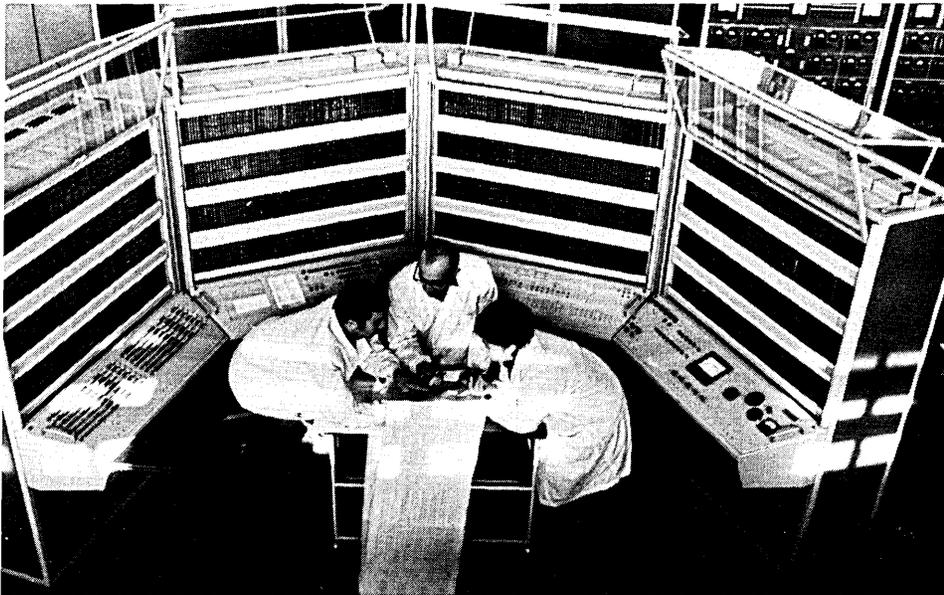
The first scientific computations were done during the checkout of the MESM computer. The economic calculations were also a self-serving step, from the hardware's viewpoint, as they were done as part of a study to introduce the computer into economics. Also of interest is the chess program; it beat an American program running on a 7090 in a four-game match.

mance characteristics approaching the IBM 360 models 30, 40, 50, and what would be models 60 and 70.

The ES 1010, ELECTRONIKA, and M-6000 are minis.

In the early period of mass production, computers were sold, installed, and put into operation by a manufacturer without any obligation for subse-

quent maintenance. Recently the manufacturing ministries have established a statewide network of field engineer and software teams which, on a contract basis, take full responsibility for the installation and maintenance of computers. In the U.S.S.R., computers are not rented, but service bureaus are quite widespread.



Developed in 1966, the second generation BESM-6 is still the most powerful Soviet computer. NOVQSTI from SOVFOTO

SOFTWARE DEVELOPMENT IN THE U.S.S.R.

- 1953 Subroutine library (STRELA, BESM)
- 1955 Algorithmic language compiler (PP-2, PP-BESM)
- 1957 Assembler (PAPA, SSP)
- 1962 Algol 60 compiler (TA-1)
- 1962 Batch processing monitor (AUTOOPERATOR)
- 1966 Delivery of first operating systems (MINSK-22, BESM-6)
- 1967 Systems programming languages (EPSILON, ALMO)
- 1971 Operating system with batch and multi-access (AIST-O)
- 1972 Delivery of time-sharing operating systems (OS IPM, DNEPR-2)

The first Russian computers contained read-only memory with built-in libraries of math and conversion functions. Compilers were the first big advance, providing Assignment, Conditional, For statements, subscripted variables, and, strangely enough, appearing before assemblers.

HARDWARE DEVELOPMENT IN THE U.S.S.R.

- 1951 ENIAC type computer
- 1952 First logical structure computer (BESM)
- 1953 First serial production line computer (STRELA)
- 1960 Transistorized computers (RAZDAN, DNEPR, MINSK-2)
- 1966 Most powerful computer (BESM-6)
- 1969 Conversational computer with display (MIR-2)
- 1970 Integrated circuit computer (NAIRI-3, M-3000)
- 1971 Time-sharing systems (AIST-O, SIRENA, BESM-6)
- 1971 Minicomputers (ELECTRONIKA, M-6000)
- 1972 ES EVM or Ryad computers (1010, 1020, 1030, 1040, 1050)

Though built in 1966, the BESM-6 still remains the most powerful computer built in the U.S.S.R. Its rate is 1 million operations per second. Third-generation computers did not appear until 1970, when the small (and very popular) NAIRI-3 and the medium-scale 360-like M3000 were introduced. The SIRENA system listed as "time-sharing" is for airline reservations.

Second Generation Machines

Soviet Model	U.S. Counterpart
BESM-6	CDC 3600
MINSK-32	GE 400
M-220	IBM 7040
BESM-4	
MIR-2	—

Third Generation Machines

Soviet Model	U.S. Counterpart
NAIRI-3	—
ES EVM	IBM 360
1020	30
1030	40
1040	50
1050	"60"
1060	"70"
ES 1010	MITRA 15
ELECTRONIKA	DEC PDP-8
M 6000	HP-2116B

THE SOFTWARE

For every Russian computer, there is both "official" and "unofficial" software. Official software is delivered by a manufacturer as an integral part of the product. This software is not separately priced and its cost influences the price of a computer quite indirectly. Unofficial software usually appears as a result of some user activity and is accumulated at a particular installation either through exchange agreements or through user association efforts.

Official software, in turn, consists of basic and secondary software. Basic software is part of the design specifications prescribed by a general contractor. For national economy applications, such a contractor is the State Committee for Science and Technology. The basic software is usually a compromise between users' insatiable demands and manufacturers' available resources. The manufacturer gets big pieces of the basic software from subcontractors—some academic or educational institutes.

The secondary software has usually been successfully developed by one user for his own purposes, and later, as a result of formal recommendation by some authoritative committee, is accepted and ratified by the manufacturer.

In the established Russian terminology, a well developed software system consists of three parts: the operating system, the programming system (including compilers, debugging means, and other man-machine interface aids), and application packages. Data base management is not yet technically stable and falls into operating or programming systems depending on the designer's philosophy.

The MINSK-32 has a sound example of a well integrated software system of reasonably high quality. Most users adopt the official software without modification. The size of the system is over 225K words, available in 175 modules. A high integrity also charac-

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terizes the software system for ES computers. Its first release, delivered in 1972, consists of 600K instructions and is close to Dos/360.

Operating systems

Official operating system versions provide support for batch multiprogramming on single processor, large and medium scale computers. These operating systems are of reasonably high quality with respect to effective performance. The overhead time for the DISPACK operating system for BESM-6 is no more than 9%; the idle time is no more than 8% and the multiprogramming factor is over 1.6.

Some actively used unofficial systems have much broader capabilities. The operating system of the Institute of Applied Mathematics for BESM-6 provides a combination of multiprogrammed background batch processing with a multi-access foreground, and adopts a multiprocessing architecture. A universal time-sharing operating system for the MINSK-32 has been developed but not yet ratified.

Operating systems for small cpu's and minis provide a combination of the main program calculations with operator dialogue. The official os for the DNEPR-2 also has some multi-access features. There may be only several dozen time-sharing systems in operation, but their number is growing very rapidly. The most usable terminals are standard RFT teleprinters from DDR, terminals based on a CSSR electric typewriter "Consul," and Hungarian alphanumeric displays called "Videotons."

Programming systems

It should be noted that the Soviet Union has become the home for ALGOL. ALGOL and ALPHA, its extension into complex and vector-matrix arithmetic, are the primary languages for scientific, engineering, and educational purposes. Its popularity is depicted in a breakdown by language type of all the jobs run at the Computation Center of the Siberian Division of the Academy of Sciences (which has 3,000 users) during April 1974:

ALPHA	35%
ASSEMBLER	20%
ALGOL	13%
FORTTRAN	12%
EPSILON	9%
Others	11%

One of the reasons for ALGOL's and ALPHA's great popularity is the fact that they have lent themselves to the construction of so many *efficient* Russian compilers. Although I have no elaborate statistics to prove that efficiency, a case study of one program for meteorological calculations supports my claim. Dr. G. R. Kontarev from the Novosibirsk Computation Center, during his visits to the U.S. and

France, had chances to run his program without changing the basic algorithm through several different computers and compilers. The results of the tests are shown in Fig. 2.

A few words about the fates of FORTRAN and COBOL are appropriate. FORTRAN appeared in the U.S.S.R. as a direct result of scientific exchange, but not until the second half of the '60s! Its first implementations were for the MINSK-22 and BESM-6; they were done in response to the demands of physicists who had visited Cern, Switzerland, and were eager to use programs developed there.

The sale of western computers to the U.S.S.R. also resulted in the gradual growth of the use of FORTRAN. I am not sure we are experiencing a FORTRAN boom, but FORTRAN as well as ALGOL and COBOL are "by law" obligatory parts of every basic software set for general purpose computers.

The need for developing a common business-oriented language became apparent in the U.S.S.R. in the beginning of the '60s. The first responses to the demand were ALGOL adaptations to data structure description known under the names of ALGEC and ALGEM.

LANGUAGE	COMPUTER	PERFORMANCE THOUS. OP/SEC	PROGRAM RUN TIME MIN.
OCTAL	M-220	40	45
ALPHA	BESM-6	1000	2
FORTTRAN	CDC 6600	3000	6
OPTIMIZED FORTTRAN	CDC 6600	3000	4
ALGOL	CII	1000	12

Fig. 2. The relative efficiencies of various compilers was tested by running a meteorological program through several machines without changing its algorithm. The ALGOL-based ALPHA compiler on the second-generation BESM-6 stacks up nicely, even against optimized FORTRAN on the CDC 6600.

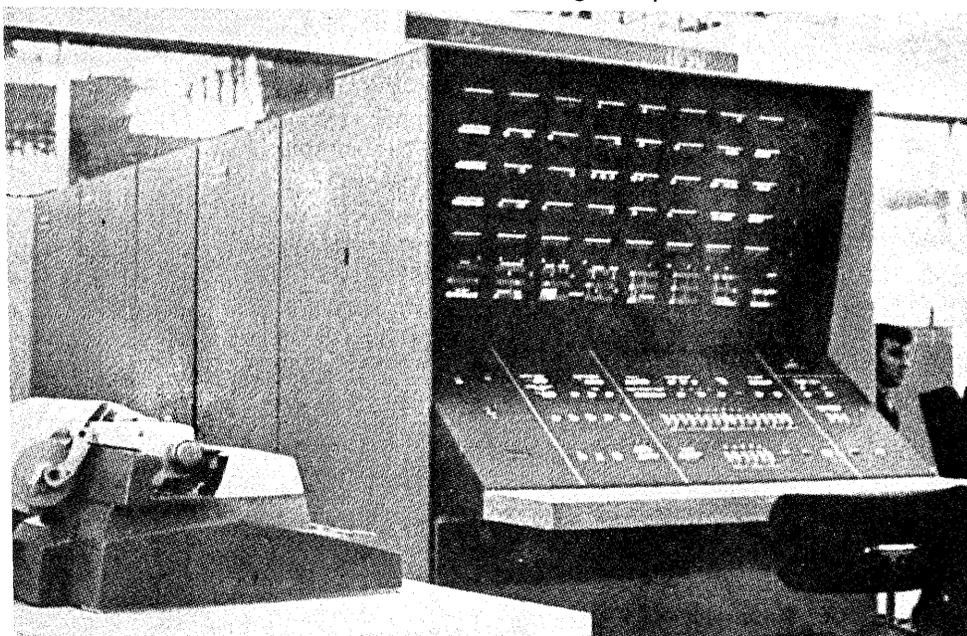
Some implementations of these languages are still in use.

Meanwhile, patient work on COBOL and its adaptation to the Russian language led to a "minimal" COBOL for broadly used implementations on the DNEPR-2 and MINSK-32. Now a draft of Russian standard COBOL has been prepared which corresponds to the ANSI version.

PL/1, ALGOL 68, and SIMULA 67 languages are not yet in use, but about ready. And almost all time-sharing operating systems have Russian as well as English versions of JOSS and BASIC.

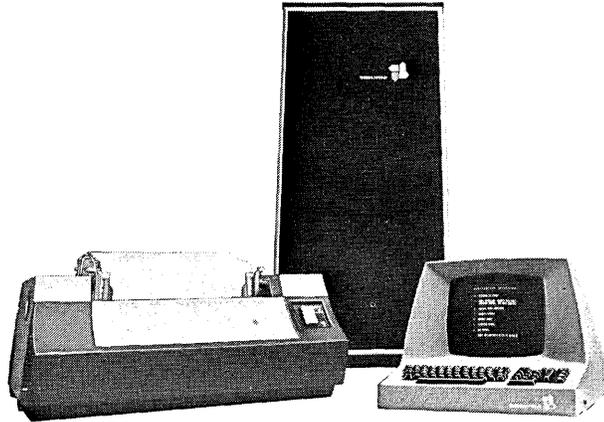
Applications packages

The first applications packages were in the lines of standard subroutine libraries. Later, large application programs were created in the "black box" style with a monolithic structure which made adaptation and modification difficult. Recently a new concept has been accepted, that of a structured and open applications package taking the form of a dedicated operating system



The ES EVM or Ryad series of third generation computers is reportedly comparable to the IBM 360 series. This model 1050 has a main storage capacity of 128-1024KB; the larger 1060 has twice this amount.

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U.S.S.R.

either occupying all computer resources or acting as a subsystem of a general-purpose operating system.

With our current knowledge, such an applications design is obvious to everybody, but it poses a problem which hasn't been solved in the



The NAIRI-3, developed by Armenian scientists, is used primarily to solve engineering and design problems. This third generation integrated circuit machine has 4K words of memory.

NOVOSTI from SOVFOTO

U.S.S.R. either. We can establish modules of a quite different nature in such a system:

- data access (search, fetch, store, sort)
- functions (problem-oriented)
- communication with a user (input data translation, text editing, output display)
- control (calls, storage mapping, parameter processing)
- communication with a designer (modification, adaptation, extensions, statistics)

This variety requires different specialists in the design team, and different implementation languages. If we can sometimes find the right language to solve the second half of the problem, we often cannot find the right mix of skills to solve the first half.

Research and development

Space limitations prevent a detailed exposition of the state of research, but a few interesting facts are easy to present. Since an analysis of publications in the field reflects reasonably well the trends in R&D, I have looked through 800 research and technical papers appearing in publications in Russia and the U.S. DATAMATION was one of the U.S. publications. The percentages of papers on various topics were closely related between the countries. The biggest differences were nearly traditional—the Soviet papers had more on programming systems, math methods, and math theory of computations; U.S. papers had more on computer equipment and operating systems. On the other hand, these traditional differences are

diminishing (and the comparison is getting tougher, now that DATAMATION is being widely circulated within the Soviet Union).

Also, in the Soviet Union there is no tradition of holding annual gatherings of thousands of professionals similar to the U.S. National Computer Conference. Again this might be explained by the size of the territory. However, smaller thematic symposia and conferences are held regularly. And Soviet experts travel widely. (For example, the full staff of the Novosibirsk Computation Center numbers 630; they accounted for 600 business trips and 40 visits abroad in a single year.)

Education and training

Higher education, at least from the organizational point of view, effectively responded to the appearance of the new branch of knowledge called computer science. Nevertheless, it took about 10 years to establish the necessary basis (computers and professors) in educational institutions for providing mass education in computer science.

At first I should make a few general remarks. In the U.S.S.R., education is provided through universities and "institutes." Universities roughly correspond to schools or faculties of science in European and American universities. Institutes are divided into polytechnical institutes (which correspond to schools of engineering or technical universities), economic institutes, and branch institutes which prepare specialists for specific industries or other sectors of the national economy. Each student graduating from a university or institute gets a kind of degree of a certified specialist.

In the early '60s, the major educational events were the opening of a degree in economic cybernetics in universities and in engineering math in polytechnical institutes. But the key issue in computer related education took place in 1969 when a formal program in applied mathematics (for universities and polytechnical institutes) and in automated control systems was established. The applied math is our analogy to computer science and informatics in Western schools. The specialty in automated control systems prepares specialists for designing and maintaining such systems.

In 1972 a formal course in applied mathematics was opened at 40 universities and institutes, and one in automated control systems at 50 institutes. Besides this regular education, two and three year courses were opened in 23 universities and institutes for getting a second diploma in these subjects.

Basic courses in computer science include programming and languages, computer architecture, information

processing methods, numerical methods, optimization, and operations research.

Students practice on computers three and a half years, typically using an installation providing batch processing with ALGOL and FORTRAN compilers, and, to a lesser extent, assemblers.

In addition to the formal schools, there is a "scientific and technological school" in every center of an administrative region in the country. These schools charge up to 40 rubles for short, intensive courses or seminars on a variety of subjects, including computer subjects. Their average enrollment is between 100 and 200.

Conclusion

I apologize for a fragmentary presentation, but I deliberately preferred to present a collection of more or less concrete information rather than general statements.

On the whole, Soviet computer scientists and engineers are faced with a great deal of work to respond effectively to those challenging problems in this sector of science and technology. Nevertheless, premises to solutions to the problems are being established, the goals have been formulated, and the program of action determined. We hope that this program will be a considerable contribution to world technical and social progress. We are sure that this program of computer development can be a broad platform for intensive international cooperation in science, technology, and trade. *



A leading Soviet authority on computers, Dr. Ershov is a professor of Computer Science at Novosibirsk Univ. His professional associations include membership in ACM, U.S.S.R. representative on the IFIP Technical Committee on Programming, member of the IFIP Working Group on Algol, and editorial board member of several Soviet computer journals. He has contributed to many projects including the ALPHA programming system for the M-20 computer, and the BETA universal programming processor.

The information here was first presented at the XXXI Diebold Conference in Rome in 1974.



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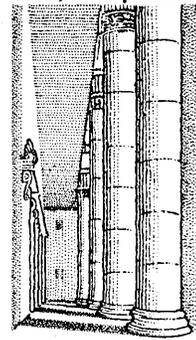
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Computing in South Korea

by Richard A. Bogen

Does the introduction of computers cause or result from a growth in the economy? Perhaps developing nations can't have one without the other.

The current status of computers in South Korea is representative of other developing countries in that properly trained manpower is in shorter supply than hardware. But the turbulent history of the country in this century also individualizes many of her problems.

Korea emerged from a policy of isolation only to be occupied by the Japanese for 35 years, from 1910 to 1945. After World War II, after the division of the country, and after a devastating war (1950-53), South Korea was in no position to make use of computers that in the '50s were proliferating throughout the U.S. and Europe. Reconstruction, rehabilitation, and reform were the three R's for the country during this period. Computers were unknown, and technological development had to wait for the following decade.

It wasn't until the mid '60s, when a few students began returning home from abroad, that real interest in computers arose in South Korea. Furthermore, diplomatic relations with Japan were not normalized until 1965, which slowed dissemination of technical expertise from that nearby country. However, computers now are making definite headway.

Available computer education

Prior to the '60s, people were trained either through the U.S. armed forces, or by going to the U.S. However, few were trained beyond IBM's first-generation plugboard machines or the 1401.

By 1968, along with the introduction of more computers, the manufacturers, data centers, and universities began offering programming courses. These courses were for two to three hours each weekday for up to 12 weeks. Actual use of machines in the courses varied, in some cases being nonexistent.

At data centers and training institutes, the quality of instruction is roughly proportional to the cost to the student. This could run as high as \$30/month, which is too high for many South Koreans. (The per capita GNP for 1974 was about \$450.)

More advanced computer courses are found at fewer than 10 schools and are offered in either mathematics or computer science departments. Find-

ing qualified people to teach these courses is a major problem; currently members of the operations staff or self-taught professors conduct them.

There are two schools which stand above this general level: Seoul National Univ. and Korea Advanced Inst. of Science (KAIS). The latter is a graduate school of applied science and technology established in the last few years with the help of a \$6 million USAID loan. The 250 students at KAIS have satisfied highly competitive entrance requirements and receive free tuition, housing, a stipend, and special treatment with regard to military service. In return they are obligated to work in a South Korean industry or institution for three years.

KAIS offers two-year M.S. degree programs, with the first graduates in 1975, and Sc.D. programs are planned. Its 34 member faculty are Ph.D.'s, obtained mostly in the U.S.; three are in computer science. (The institution has a NOVA time-sharing system with eight tty's.)

Except for KAIS however, the schools suffer from a lack of essential facilities for computer education. Not only are most schools unable to provide machine time, but textbooks and journals are also not readily available. Some U.S. textbooks appear in reprint editions, but only a dozen or so titles in computer science can be found—and these are beyond the means of many students. With ill-equipped libraries, it is difficult for students to be aware of dp developments outside of South Korea.

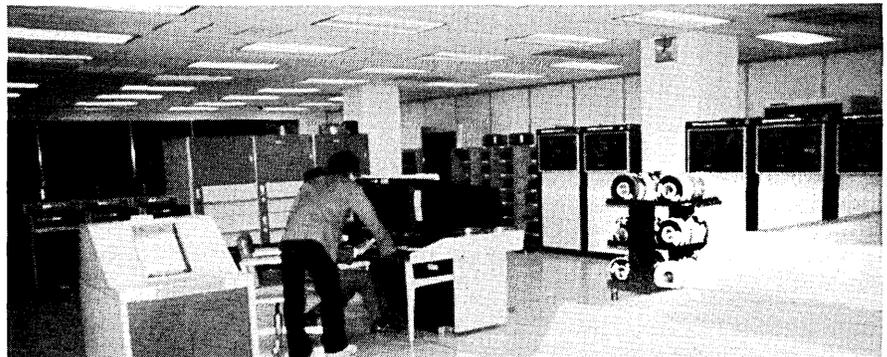
The problems

Unfortunately many government agencies acquired computers with inadequate planning or knowledge of how to utilize them. Staffs are poorly trained and pay is low, thus causing a high turnover to private industry where salaries are often two to three times as high.

Until recently computers have been rather expensive, and this has also been an impediment. Due to the balance of trade problems, lack of foreign exchange, import duties, and restrictions imposed by a government doing its best to restrain imports and increase exports, it is not easy for the business and academic sectors to acquire computers. The problem is especially severe among the schools because they receive very little outside financial support.

Another reason why large businesses and industries do not use computers is the large, cheap labor force available. Routine calculations have long been performed by an "abacus army," and though computers can carry out these and other tasks more efficiently and with fewer errors, there is little incentive to replace people with machines. In those cases where the amount of computation is not feasible without computers (e.g., input/output economic analysis or large linear programming models), development may be hindered.

More than 80% of the computers are located in Seoul, which is not the geographical center of the country but has 20% of the population. South



The CDC CYBER/73 at the Korea Inst. of Science and Technology is the largest computer in the country. It provides access from 110 baud remote tty's and crt's, plus 2,400 and 4,800 baud remote batch terminals at offices over 400 km. (240 miles) away.

SOUTH KOREA

Koreans believe that to obtain a good education, to find a decent job, and to achieve a reasonable station in life, one must live in the capital city. The result

is a clustering of people, businesses, and computers in Seoul, at the expense of the rest of the country.

Yet another consideration is language. Peripheral devices available use the Roman alphabet, and it is usually necessary to "Romanize" native

scripts, thus preventing computer use in some applications. Since 1970, however, line printers have been equipped with both native Korean and Roman characters.

The Korean alphabet has 24 fundamental characters (14 consonants, 10

The computer census

The first automatic, stored program computers in South Korea were an IBM 1401, used for statistics analysis at the government's Economic Planning Board, and a FACOM 222 (made by Fujitsu), used for common dp jobs and for programmer training at a private data center. Both began operations in July 1967, and were programmed in assembler. It wasn't until the end of 1969, with the installation of a CDC 3300 at the Korean Inst. of Science and Technology (KIST), that FORTRAN and COBOL were used for production runs.

During the next five years, the situation changed considerably. There are now about 60 computers in operation, ranging in size from a FACOM 230/10 of 8K bytes, with paper tape input and typewriter output, to KIST's latest model, a fully configured CDC CYBER/73 of 128K words, installed in March 1975. (The table listings are accurate as of that date.)

Computer use in South Korea is predominantly in business applications. The mode of use is almost entirely on-site batch processing, with the overwhelming majority of jobs written in COBOL (except in universities where FORTRAN is used extensively). Government-related organizations, including the national railroad, customs and tax offices, and various ministries such as defense, communication, and con-

struction, apply computers to tax management, analysis of economic and social statistics, and long range planning. The Ministry of Construction, for example, uses a CDC 3170 to process data automatically collected and transmitted from several remote sites in order to monitor water levels for flood prediction and control.

Private companies such as dp service bureaus, banks, and an airline, as well as others like the electric company which are principally owned by the government but managed like private firms, use computers for such industrial uses as control of steel cutting machines, gasoline distillation and blending, and shipbuilding. However the bulk of computer time is used for other business applications. The main nonbatch user is a large bank, which has an on-line NCR system and terminals located in 17 of its branches throughout the country.

KIST, which also falls within this user category, is one of the most sophisticated users of computers in the country. It is an integrated research and development organization established to contribute to the development of South Korean industry. Its computer department, claiming nearly 200 of 900 employees, is KIST's largest department. Although CDC CYBER/73 is normally used as a scientific machine, KIST's machine is programmed mainly in COBOL since the applications are mainly computerizing functions of various govern-

ment and private organizations, and providing business-oriented support for them. Some nonbusiness applications such as civil engineering are performed, but little computer research is done that does not have direct and immediate application.

The third user category includes an engineering college, a military academy, and universities with small computers, some of which are over a decade old. FORTRAN is the main language used, with RPG and a COBOL subset also available on some of the 1130s.

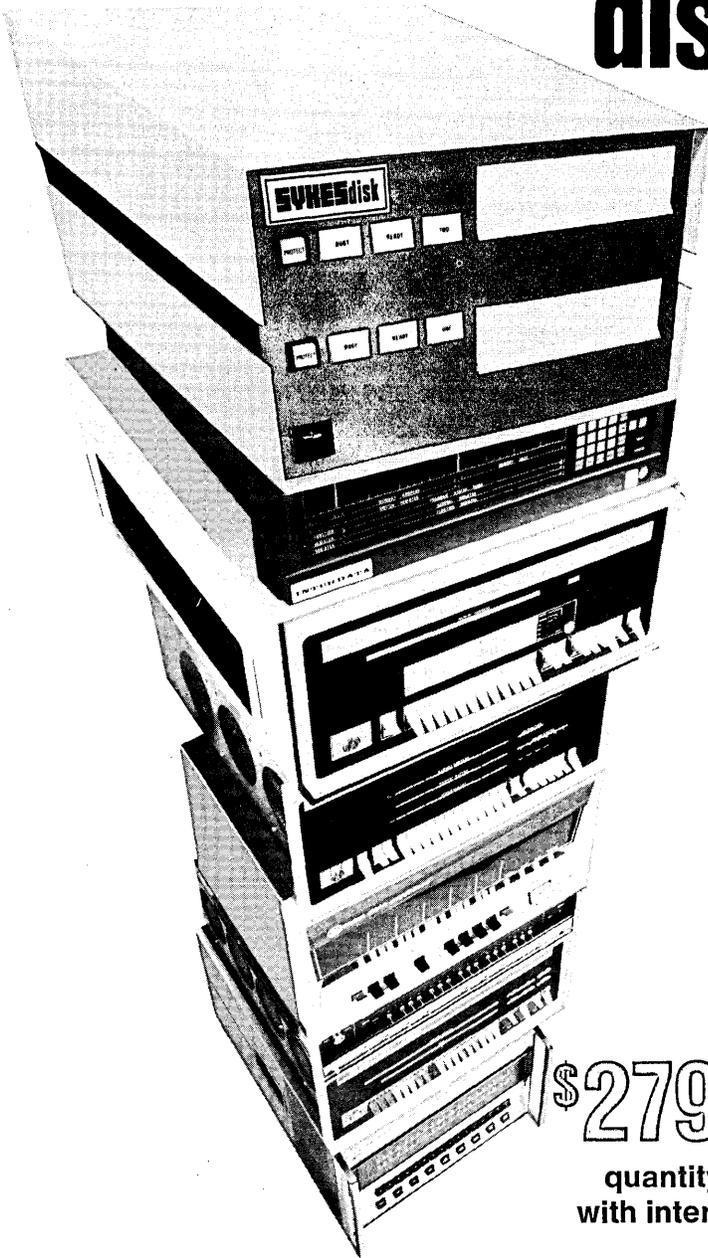
One of the universities the author visited has what must be one of the oldest functioning computers in active use, a Univac ss/80. It is a tribute to the Electrical Engineering Dept. that it can maintain this circa 1957, drum-type main storage machine by replacing components Univac no longer supplies with those of its own design. However, when the drum wears out, the university will probably be forced to retire its museum piece.

In addition to the hardware listed in the table, a CDC 3150, a Univac 9030, and an IBM 360/40 should be in operation in three more schools sometime this year.

The NCR machines, three of the Univacs, and all but two of the FACOMS have been purchased. With the exception of an IBM 1620 and two Univac ss/80s that were gifts, all other computers are rented; rented machines represent 75% of the total number of computers in the country.

VENDOR	NUMBER OF MACHINES	GOVERNMENT		PRIVATE & SEMI-GOVERNMENT		SCHOOLS	
IBM	26	(4) 370/135	96-144KB	370/145 (3) 370/135 (2) 370/125 360/40 (3) 360/25 (4) S/3 1800 1130	256KB 96-192KB 96-128KB 64KB 16-48KB 16-24KB 48KB 16KB	(6) 1130	8-16KB
UNIVAC	17	(2) 1106 418 9480 (2) 9400 (7) 9300	128K words 64K words 96KB 128KB 12-32KB	9480 9400	64KB 64KB	(2) SS/80	5-10K words
CDC	5	3170 3150	64K words 16K words	CYBER/73 3100 8092	128K words 32K words 4K words		
NCR	3			(2) C/200 C/100	32-128KB 32KB		
FUJITSU	8	(2) 230/10	8KB	(2) 230/25	64-96KB	(2) 230/25 230/15 230/10	24-32KB 8KB 8KB
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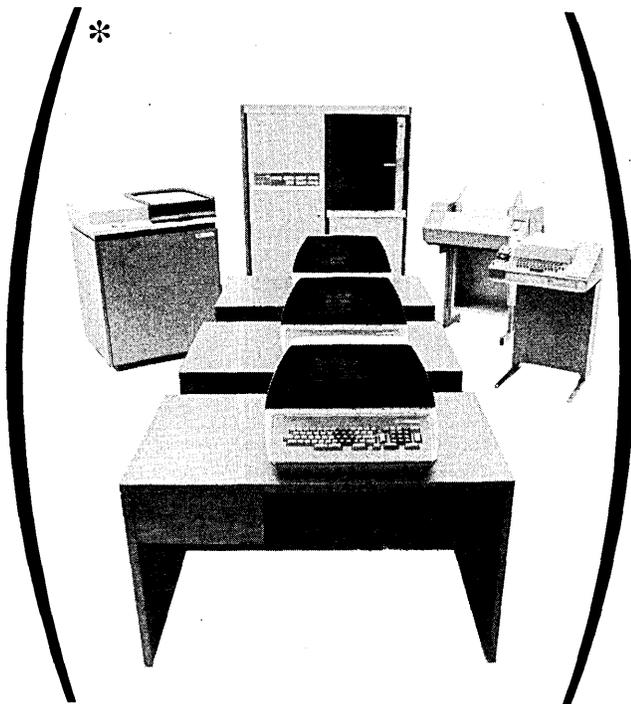
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SOUTH KOREA

vowels), and words are spelled phonetically in groups of syllables written linearly. The letters making up the syllables are written two-dimensionally in one, two, or three rows; for example, the word "computer," if it were Korean, would be written as:

c o p t
m u e
r

The problem of two-dimensionality was solved somewhat differently by each of the computer companies, al-

computers per billion dollars is obtained using 1974 data; in contrast, for each of seven South American countries, a figure of 10 to 12 was reported for as long ago as 1968-69. (For comparison, the number for the U.S. in that period was about 80.)

Whether an increase in the number of computers stimulates or results from a growing economy is an open question. Probably it is a feedback relationship. The conclusion for developing nations is that you cannot have one without the other.

Trying to predict the future number of computers (excluding minis) is dif-

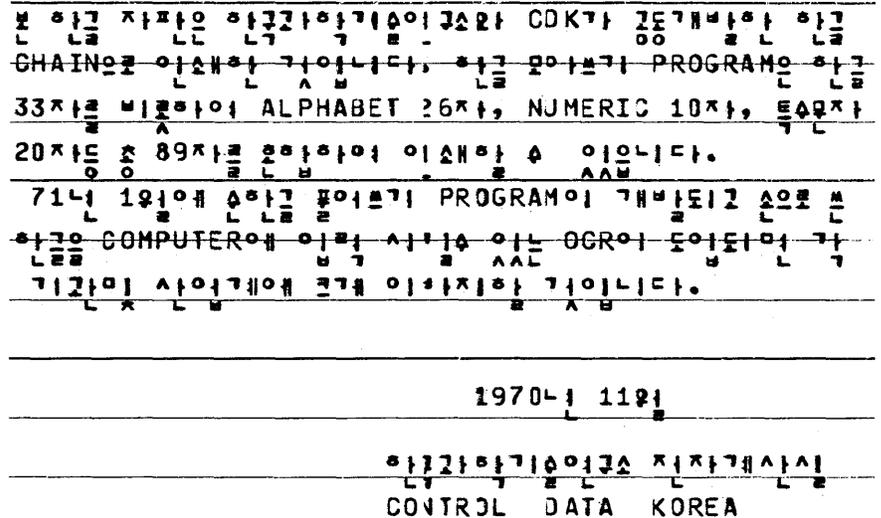


Fig. 1. Since 1970 line printers have been equipped with both native and Roman characters. Now lucky South Koreans receive telephone, water, and electric bills processed by computer and written in their own language.

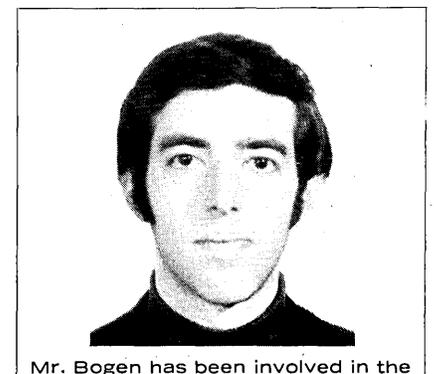
though all of the implementations involve overprinting one or two lines by means of a chain or drum containing Korean letters of various sizes and positions (Fig. 1). As a result of this development, millions of telephone, water, and electric bills are now printed by computer each month.

It is education however, in this author's opinion, which is the fundamental problem affecting computer development in South Korea. Since equipment and facilities are lacking in most schools, donations of used computer equipment and textbooks from abroad are urgently needed. Paid visits of specialists can also be helpful. (As in August 1974 when four U.S. specialists gave a month's duration, full day "Teach the teachers program" to 34 South Korean college professors and other interested persons.)

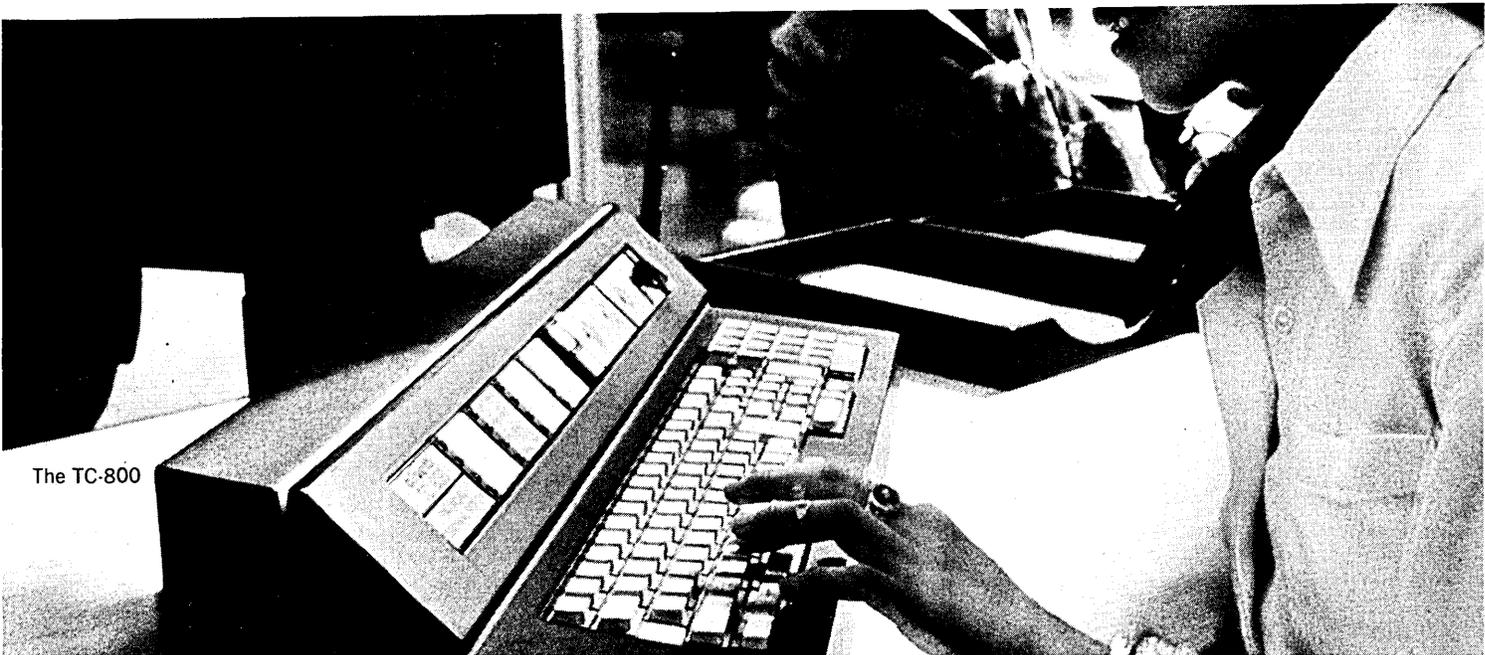
A final word

There is a strong correlation between the number of computers in a country and its gross domestic product. The ratio of the two gives some measure of a country's prosperity relative to that of other countries. For South Korea, a figure of six to eight

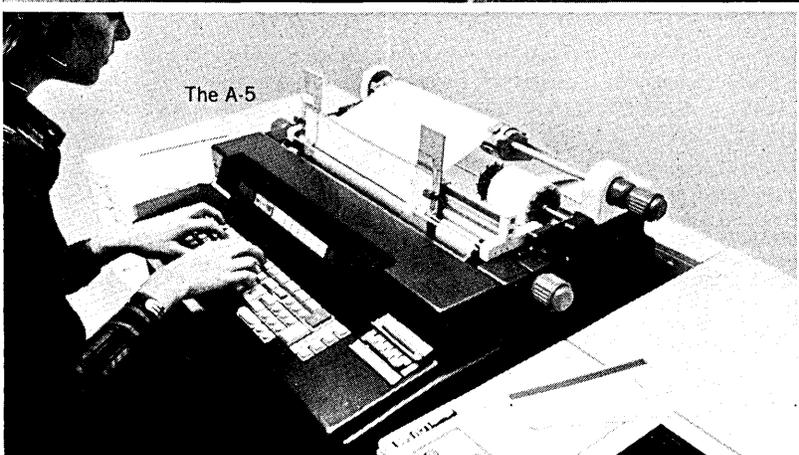
figures because of economic and political instabilities. However, since the South Korean economy has been expanding rapidly, the number of computers should steadily increase. By the end of 1976, the number should probably grow to 100. *



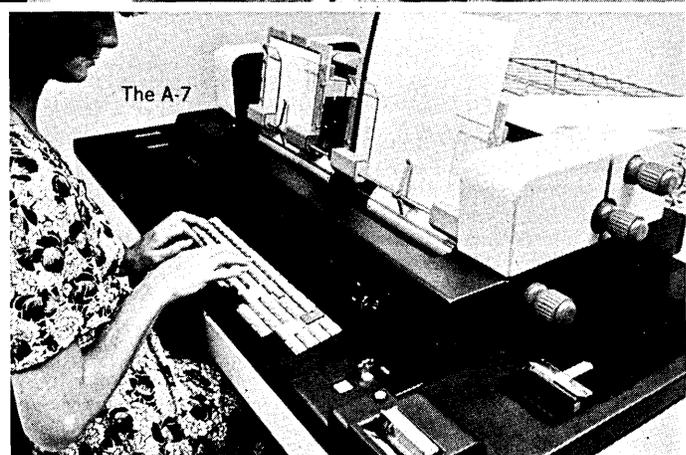
Mr. Bogen has been involved in the development, maintenance, and documentation of the MACSYMA symbolic algebra system at MIT's Project MAC. During a year in the Far East, he served as a research consultant at the Korea Inst. of Science and as an instructor for university-level computer science courses in Taiwan.



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IBM and the structure of the industry

Supervision is Better Than Regulation

Suppose the government wins its antitrust case against IBM. There will then exist a risk that the costly and time-consuming efforts of both parties may be dissipated in an inconclusive formula of relief, and that the corresponding opportunity for significant advances in the health of the data processing industry and of the relationship between government and business will be lost. Let's think about some kind of formula that will lead to positive results instead.

The "best" solution to antitrust problems seems to be to impose only that degree of legal control which will create competition. It may be just such a consideration that has led the Dept. of Justice to propose breaking up IBM as the major remedy to be sought. Yet few industry insiders are comfortable with such a solution and a number of important elements oppose it. In effect, the government, by creating more firms in the data processing industry, is trying to make the industry conform to an elementary economic model of competition. This is rather like changing the ground to look like the map.

An alternative plan was put forward by Nancy Foy, *DATAMATION's* European editor (September 1974, p. 185). Her leading recommendation was that IBM be compelled to open itself to public inspection. In particular, she would compel access to IBM's organization charts and to details of intracompany transactions.

Apart from the "government's plan" and the "journalists' plan," comment in the industry press has been principally directed at particular marketing practices that should be either prescribed or proscribed.

In principle, breaking up IBM into several competing entities ought to create competition and diffuse power among the daughter entities. Unfortunately, the economic and legal models on which such a plan would be based do not seem to fit well the realities of the situation, and if principle does not conform to practice, the results are likely to be undesirable.

There are two legal models for breaking up a monopoly. The Standard Oil model is not appropriate. IBM does not make a fungible commodity which can be divided among its successors who can then compete with one another on equal terms.

In motion picture company antitrust cases, on the other hand, a divestiture was made between horizontal levels, production being separated from distribution. Here too, there is a crucial distinction. The motion picture producers controlled marketing organizations to press their products on exhibitors. In IBM's case the control is reversed; the marketing organization controls factories and laboratories to create products it wants to sell. A cut between these parts of IBM would leave intact the marketing organization that led to the monopoly.

There is no rational way of breaking up IBM so that its

daughters will compete more vigorously with one another than they do against other firms. The plan will redistribute the bad practices of IBM and erode the benefits of a large, profitable company at the center of the industry. What is needed is a plan which redistributes the benefits and erodes the bad practices.

The trouble with daughters

What is most likely to happen is a continuation of the trend toward concentration as IBM's daughters, each with substantial resources and dominant in its sector of the industry, press on the non-IBM firms. With the slate wiped clean, so to speak, by the conclusion of the antitrust proceedings, the daughters will be in a position to be even more aggressive than IBM is now. In the longer run as alternative firms drop out, the daughters may begin to compete more with one another, diminishing profitability and eventually creating forces favoring recombination. Competition among IBM's daughters would not be a good substitute for competition between an intact IBM (under certain restrictions) and a group of innovative, healthy smaller competitors.

The good qualities of IBM are, for the most part, made possible by IBM's profitability. Any plan for the future of the company should distinguish between growth or dominance, on the one hand, and profitability on the other. While there is no doubt a relationship between dominance and profitability, remedial steps should be directed at dominance, not profitability. The government's plan seems likely to substitute the dominance of IBM's daughters for that of their parent but to erode the profitability of the successor companies.

Large, highly-profitable companies enrich society in diverse, unique ways, and IBM is perhaps the best of such enterprises. Its generous economic cushion enables it to act in an exemplary fashion that a poorer firm could not afford. Its low labor turnover attests to fair treatment of the workforce. It can sponsor a wide range of speculative research which adds to general knowledge and understanding without necessarily providing direct payoff to the sponsor. It can sponsor cultural amenities (art, architecture, public instruction, and entertainment) that would not otherwise be created. Up to a point, its ability to challenge government serves as a restraint on overweening bureaucracy. It can afford to take an exemplary role in exploring solutions to difficult social problems such as discrimination and alienation.

Yet, under conditions of monopoly or excess, each of the virtues of profitability may become a vice. The good treatment of employees and the loyalty it evokes may become paternalism and lead to elitist attitudes in which company ends justify questionable means. Research kept in private hands can lead to preemption of key knowledge for private ends. If it takes an IBM to cut through bureaucracy, the less powerful become disenfranchised and the private values of IBM are imposed on the public. Cultural diversity is lost if sponsorship is largely in the hands of corporate-style institutions.

The double wisdom of the courts in holding monopoly, of itself, to be illegal is now apparent. Not only does monopoly power mortgage public welfare to private interests, but the potential bad effects of monopoly are so diverse, unquantifiable, and unpredictable that neither courts nor legislatures can spell out in advance the rules that would protect us from these effects. The practical defense is to regard monopoly, generally, as the cause of trouble and to proscribe it.

The "journalists' plan" correctly recognizes the value of an intact IBM and a major source of the bad things about IBM, the facelessness of its corporate body. Even a monopoly that makes a conscientious effort to act benignly cannot make its decisions in a vacuum. No organization the size of IBM can make all significant decisions in one place nor can its decentralized decision-makers meet their re-

IBM . . . AND THE INDUSTRY

sponsibilities to the public if they are isolated from that public. IBM, with its low turnover, is notorious for the lack of diversity in the backgrounds of its key decision-makers. Not only have they typically spent all their working years in IBM, but predominantly they rose through its marketing ranks. This pattern may be the formula for success; it is clearly not a formula for increasing sensitivity to the needs of a diverse public. The "journalists' plan" speaks directly to this matter and should be part of any court-imposed sentence.

By itself, however, this plan is inadequate. The plan relies on public opinion to enforce decision-making in the public interest. The men who now run IBM are indeed sensitive to public opinion. This sensitivity is no doubt sharpened by the fact that the company has been exposed to government scrutiny on antitrust grounds at approximately 20-year intervals. It is the power of their government to act for the people that makes public opinion effective. Given a different balance of power, it is possible for public opinion to become ineffective as an influence on corporate policy. Changes in that direction are already under way.

There are two clear indications that IBM is close to getting beyond the control of any government. IBM has been able to concentrate more resources on the current case than has the government, which has other fish to fry; in another, hypothetical round 20 years hence, the government may be totally outclassed. As a multinational corporation, about half of IBM's assets and income are already beyond the effective reach of the United States' jurisdiction.

The trouble with so much money

A deficiency shared by both the government's and journalists' plans is their exclusive concentration on the producer-user market for data processing equipment and services. Neither addresses the market for capital investment or the effects of dominance on innovation. Despite its expenditure of 7% of its gross income on research and development, which inevitably must yield a continuing stream of results, the effectiveness of IBM's own R&D, as seen in its products, is relatively low.

Among professional designers of hardware and software, with certain exceptions, the general level of technical polish of IBM's products is regarded as mediocre. That is to say, IBM's corporate policy places a higher value on other business factors than product design.

IBM has consistently failed to respond to outside inventors' requests for support, and then come to market with their own version of the invention. The salient examples have been Chester F. Carlson (xerography) and Drs. Eckert and Mauchly (the electronic computer).

Similarly, IBM has held back from introducing innovative products until the market has been established by competitors. The buffered keypunch (Univac) and virtual storage (Burroughs) are outstanding instances.

It is evidently good business for IBM not to be innovative, and there is no way for government to compel them to be. The insidious effects of this pattern of preemption of innovators' profits by overpowering marketing should now be clear, and if IBM is allowed to grow from a position of relative dominance to one of unassailable dominance, the results would be pernicious indeed. The scenario runs like this.

Innovation requires capital. During the flush decade of the '60s there was venture capital around to support speculative product development. If IBM was then outstanding for its growth and profitability, it served as a paradigm for others to try to emulate and thus it drew money into other ventures. Times have changed and people now will interpret IBM's significance differently. Not only is IBM one of the few

sources of liquidity, but its demonstrated ability to capture markets created by others' innovations further dries up incentive for non-IBM investment in areas of potential interest to IBM. Thus is IBM's dominance reinforced at the source of innovation, the capital market. Nor is breaking up IBM likely to help matters; the corporate style of the mother will no doubt be inherited by the daughters.

Any plan that does not address the effect of monopoly on the capital market is unlikely to be effective. It is through this market that long-term commitments and insidious, irreversible trends are determined. The wisdom of the courts in proscribing monopoly is again apparent. The national economy cannot afford to wait until the effects of monopoly on investment have become self-evident, for by that time the only alternative left would be direct government intervention in the industrial capital market.

Another ten commandments

The remedies recommended in the IBM case are eclectic and in pursuit of the following objectives:

- Abating monopoly and encouraging innovation and competition.
- Creating processes that lead to desired ends rather than taking specific steps which may lead to unknown ends.
- Preserving, so far as possible, useful values in the IBM organization.
- Punishing only willful violations of the law, not mere overreaching.

Ten elements are proposed:

1. "*Lawyers' Remedies*": Corporate practices found by the court to be unfair may be proscribed as part of any sentence, but businesses are adept at changing strategies and tactics to meet such exigencies, so no fundamental cure will be found here. The purpose served is purely exemplary.

2. *Fines*: Fines are not proscribed in civil antitrust cases, yet it would be fair to assess a nonpunitive fine, limited to the costs of prosecution, against a monopolist. In effect, the monopolist's profits, rather than the public purse, would be taxed for enforcement.

3. *Definition of Criteria*: The court should define, in the light of the particular circumstances of the case, what ultimate changes in the posture of IBM would establish that it had purged itself of its status as a monopoly. This step is difficult and, to a degree, speculative, but it is necessary for the administration of further steps. The judgments required here are certainly not more complex or uncertain than other general rules the courts are called upon to pronounce.

4. *Judicial Supervision*: The court should establish procedures for supervision of IBM's activities until such time as the corporation meets the criteria established in the previous step. This procedure might be implemented through a court-appointed panel of public, customer, and industry representatives who, under the authority of the court and financed by a court-directed subvention from IBM, act something like a combination of regulatory agency, receiver, and super-board of directors. Unfortunately, lack of space bars the fuller explanation that this radical step deserves. In effect, instead of regulating an industry, which may otherwise be quite competitive, only the monopolistic firm is supervised.

5. "*The Journalists' Remedy*": Once IBM has been adjudged a monopoly, the journalists' plan, described previously, becomes an appropriate part of a list of remedies. As an ordinary competitive firm, any company must be allowed to mind its own business, keep its own counsel, and protect its secrets. A monopolist is in a position of special power and therefore, rather like government, has a duty to expose itself to those whose interests its power affects. If such exposure diminishes its power and makes it less of a monopoly, so much the better.

6. *"The Engineers' Remedy"*: As a dominant firm, IBM is in a position to impose its technical decisions on an entire industry. IBM should be prevented from using this power to increase its dominance. Specifically, in the area of technical standards in the data processing industry, the disclosure mandated by the journalists' remedy should be supplemented by special provisions compelling IBM to make timely disclosure of decisions affecting standards, to conform to any standards promulgated by any recognized industry-wide board, and to cooperate with such a board.

7. *"The Competitors' Remedy"*: None of the steps so far described addresses the problem of IBM's financial power to inhibit competition simply by the implicit threat to enter any profitable market developed by others. This, and the following two steps, deals with this matter. The general idea is that IBM's financial strength be directed at investing in areas that require large amounts of capital and away from investments made virtually riskless by overcapitalization. Specifically, IBM should be barred from entering any new market which already enjoys healthy competition and active development.

8. *"The Investors' Remedy"*: With growth (although not necessarily profitability) limited by judicial sanctions, the speculative component of the market price of IBM stock would be diminished or eliminated. Partial compensation for the change in the character of the company's prospects can be provided by increasing the dividend payout ratio. Over the past five years, this ratio has ranged from 55% (1971) of net profit down to 45% (1974). Increasing this ratio to, say, 65% would not only be helpful to stockholders, who do deserve some consideration, but more to the point, it would tend to diminish the threat to competition inherent in the flush cash condition of the company brought about by the compounding of half the current profit into expanding working capital. It would be a restraint upon expansionist tendencies, though not a prohibition, if management had to go to outside capital markets to finance expansion.

9. *"Pro Bono Publico"*: Even if 100% of the profit of IBM were removed from the control of its management, the company would generate sufficient resources for it to keep up to date. Depreciation provides more capital each year than does net profit. IBM could replace every item of capital (land, buildings, productive equipment, and rental machines) at cost out of depreciation in less than 7½ years. (Of course, land and buildings do not need to be replaced to keep the company current.) The practice of firms to finance expansion out of retained earnings and depreciation rather than new financing is useful in that companies can be more venturesome with internally generated funds than they can with capital raised on outside markets. We have shown that IBM is not such a venturesome enterprise but rather uses its resources to enter a market after it has been opened by others.

Returning all profit to the stockholders dissipates an important source of new investment and removes control of significant funds from specially-knowledgeable decision-makers. Using the court-appointed panel described above to determine how much, if any, retention of earnings should be allowed from year to year, a mechanism can be developed to recycle part of these earnings into venturesome investment. The court should sanction the establishment of a foundation whose trustees are entirely separate from the IBM board of directors and from the supervisory panel. At the direction of the panel, the foundation should regularly receive from IBM a share of the earnings that would otherwise be retained by the corporation. The foundation would be empowered to do two things with its funds: distribute them as grants for various good works or invest them in new securities of any enterprise other than IBM. Were it to invest in promising companies in IBM's own industry, the foundation would be

furthering the objective of diminishing IBM's dominance, but the opportunities of the next generation are not necessarily those of the last, so the foundation should be free to select its investments in any area of need and promise.

10. *Protection of IBM*: It should be no part of this process to "punish" IBM. (A corporation cannot really be punished anyway.) The object should be to create an improved economic and social situation, not randomly to pick apart IBM. Some limitation should be placed upon private suits against IBM. First, treble damages should not be allowed. Such damages are justified as an incentive for competitors to help in enforcing the antitrust laws. Private suits relieve the government of having to prosecute many cases, and the possibility of treble damages compensates plaintiffs for the risks of embarking on expensive litigation. Where the government has taken on the burden of prosecution, it is hard to find a justification for treble damages. Second, an effort should be made to combine all private antitrust suits. Preferably, comprehensive hearings should be held on the question of special damages arising from the monopoly, a global figure assessed against IBM, and the proceeds apportioned among the claimants.

A few words on the supervisory panel may clarify the most radical feature of this proposal. The table summarizes the traditional and the proposed modes for controlling monopolies. When the courts find that a particular firm is a

TWO MODES OF CONTROLLING MONOPOLY

Traditional Mode	Proposed Mode
1. Regulate industry.	Supervise monopolist firm.
2. Regulator is legislatively-sanctioned executive agency.	Supervisor is judicially appointed.
3. Regulation through rules.	Supervision by objective.
4. Regulate profit.	Control growth rate; use profit constructively.

monopoly, it should be sufficient warrant to regulate that firm. Clearly, in terms of scope of impact and risk of unforeseen consequences, supervision of an offending firm is more conservative than regulation of an entire industry. The supervisory panel simply is an agency of the court appointed to oversee the execution of its sentence.

The charter of the proposed panel can be stated simply: abate the monopoly of the firm with the minimum necessary effect on the operations of that firm. The performance of the panel can be measured against this objective just as the performance of a board of directors is measured against profitability. Although the plan is radical in that it injects an outside agency into a "private" firm's operations, it includes self-terminating provisions for that involvement, unlike endless regulation.

Classically, regulatory agencies have sought to control the monopolist's profits, but there is an alternative to total profit control, and that is control over the disposition of profit. To prevent a monopoly from using its profit to maintain or extend its dominance, it is not necessary to curtail that profit but only to prevent it from being used for certain purposes. The proposed foundation is a means making an alternative use of monopolist's profit.

These proposals will require changes in laws and in our ways of thinking about problems of monopoly. It should not be thought that any steps be directed at punishing IBM for its success. There should be serious concern, however, with the social and economic effects of IBM's domination of an industry that has, in a generation, become as necessary to our society as transportation or even agriculture.

—Sander Rubin

Mr. Rubin is the principal in Wordsworth Systems, a consulting agency. He has spent 20 years in data processing, including five at IBM, in positions ranging from logic designer to director of software development.

Mainframers

Xerox's Frustrating Drive for Dwarfdom

All was beginning to look well until the axe fell July 21

It wasn't a good summer for employees of Xerox Data Systems nor, for that matter, for users of xds equipment.

Oh, it began well enough. Orders were at record levels. The xds 550 and 560 computers were being well received. Getting even more favorable attention was the CP-V operating system, called one of the world's five fully versatile operating systems, and which was expected to make the Xerox 500 line highly competitive with products of the larger manufacturers. It looked, in early summer, as if Xerox could be on the road to becoming a major full-line competitor in the general purpose computer field.

xds employees were happy. In March 1972, the Xerox computer operation had been tucked into the corporate structure (April '72, p. 103). Then, last October, it was spun out again and given full divisional status with the autonomy that goes with it. With hindsight, some see this spinning out as a portent of things to come, but operationally it seemed to be working well.

Users were happy. Many were experiencing the best service, support and delivery times they had ever received from xds.

But on July 21, Xerox Corp. pulled the plug and announced it was pulling out of the mainframe computer business.

Its one percent had shrunk

Xerox was never the factor in the computer industry that RCA and General Electric, which bowed out of the industry in 1971 and 1970 respectively, were. The mainframe computer operations accounted for only 2% of Xerox Corp.'s total operating revenues. When Scientific Data Systems was acquired by Xerox to become xds in 1969, it had only about 1% of the total computer market. C. Peter McColough, Xerox chairman, said at a press conference to announce the pull-out that this share has shrunk since that time.

"We never even achieved dwarfdom," said one Xerox employee plain-

tively. The appellations "Snow White," for IBM, and the "seven dwarfs" for RCA, Univac, General Electric, Honeywell, Control Data, Burroughs, and NCR, had emerged in the industry before SDS was formed in 1961. After that there were frequent references to "Snow White, the seven dwarfs and SDS." If anyone wanted to advance xds to dwarf status when

Scientific Data Systems: A Bargain at \$4

Like a Phoenix arising from its ashes, Scientific Data Systems lives again.

Actually it's not quite the same. The name Scientific Data Systems disappeared from the public domain when Xerox Corp. acquired SDS and made it Xerox Data Systems. And the ashes haven't settled around xds as yet although Xerox announced it was discontinuing the operation last July 21.

The new SDS came into being before July 21, May 12, 1975 to be precise. It happened because Richard Duley, president of Interscience Systems, Inc. and a director of Intranet Computing Corp., both of Van Nuys, Calif., was driving on the evening of May 12, from Carson City, Nevada to Las Vegas. Duley personally owned some computer systems hardware which was out on third party lease. He owned the leases. "While driving through the desert night," he said, "I was trying to think of a name for a holding company I wanted to establish to take over those leases."

Duley worked for Max Palevsky's Scientific Data Systems during the mid-sixties in the financial department as manager of capital appropriations. "I suddenly began to wonder what ever happened to the name Scientific Data Systems," he said.

When he got back to California from his Nevada trip, Duley contacted the state's Attorney General's office to inquire. "I found out it was available and I applied for it and got

first GE and later RCA withdrew from the computer industry, nobody said so. The references after those withdrawals were rather, "and then there were six," and later, "and then there were five."

Will there be four?

And indeed there are just five now and the Xerox announcement like those of GE and RCA before it gave rise to speculation as to which one of the five might be next to go. Honeywell, which acquired the GE computer operations in 1970, was the most mentioned candidate.

There was speculation also about the possible impact of the Xerox decision on the Justice Dept.'s antitrust suit against IBM. McColough sidestepped a question at the announcement press conference as to whether or not he expected to testify in the suit that IBM's competitive practices were a factor in Xerox' decision. "This was purely a business decision," was his answer. "I haven't looked at any legal aspects of it."

SDS founder, Max Palevsky, thinks it

it. It cost me \$4." He subsequently obtained rights to use the name in New York, Illinois and Connecticut and expects to get it for other states.

SDS is far from being Duley's primary activity. His presidency of Interscience Systems which, among other things, provides an on-line ac-



RICHARD DULEY
Bought SDS for \$4

counting system for legal professionals in the Southern California area, is the mainstream. He also remains active in Intranet, a company which makes controllers for Univac and other non-IBM mainframes. He once was treasurer of Intranet.

But SDS could be a main claim to fame for Duley. What cost Xerox more than \$900 million, he got, in a sense, for \$4. At least the name and he's kept it alive . . . or rather revived it. *

will have an impact (August, p. 17). Dan McGurk, a former XDS president and SDS executive, and immediate past president of the Computer Industry Assn. which has taken an active interest in all antitrust actions against IBM, doesn't. He sees the Xerox action as providing "good evidence that the contention that this is a monopolistic market (computers) is true," adding that it is merely "additional evidence," lacking the impact of the GE and RCA withdrawals. "It was a sad day for the computer industry," said McGurk. "Now there is one less option for the user."

The only option Xerox computer users seemed to want in mid-August was more of the same. Many were rushing to place orders to beat the deadline of Oct. 1 when Xerox said it would stop taking new orders. Others were hesitating, wondering if they shouldn't wait until after that date for a possible fire sale.

Xerox' comment in mid-August: "There have been a significant number of orders for mainframes and add on equipment since the announcement. All orders are being taken on a subject to availability basis. This varies according to the type of equipment."

Support for seven years

Users were unanimously concerned about support. In his announcement of the withdrawal, McColough said Xerox would provide support to its customers for at least seven years. "But, can you expect to keep good people in a winding-down operation," worried one user.

Xerox has about 1,700 computers installed in the U.S. and 400 abroad. Probably one of the biggest users of XDS computers is Xerox Corp. itself. The corporation has declined to say how many Xerox computers it uses but Xerox Computer Services alone had, in mid-1974 (July '74, p. 132) three Sigma 7s, three Sigma 9s and a "whole bunch" of Sigma 3s. xcs, an on-line service operation the corporation is retaining, signed up its biggest customer to date shortly before the withdrawal announcement. It was Xerox Corp. Xerox is using xcs in a pilot operation for its Los Angeles Regional Distribution Center, an operation responsible for the turnover of 21,000 line items of inventory, spare parts and supplies for Xerox copiers and duplicators.

Emergency meeting

XDS did not have a representative at an emergency meeting of Exchange, the XDS user group, held in Los Angeles Aug. 5-7. There were 31 users present including the six members of the Exchange executive committee and the chairman of the U.K. user group. Barry Tomlinson. The organization represents some 600 installations and has 1,300 individual members.

Bill McAlpin, of Western Electric in

Atlanta, Ga., chairman of Exchange, said purpose of the emergency meeting was to establish a means of getting information communicated to users as to what's going on and what can be expected. A second purpose was to develop positions, statements of users' position under several possibilities. The possibilities being faced were an in toto sale of XDS, a piecemeal sale, and a simple winding down of operations. They developed a list of 100 specific questions based on the last contingency.

Written answers wanted

McAlpin said the questions would be made public when they received written answers from XDS. These had not been received in mid-August. The Exchange chairman said they'd gotten

some oral answers during the three day meeting with which he was, "not 100% satisfied, but I'm more concerned with written answers. You can't hold people to verbal agreements."

Exchange did come out with a general position statement during the emergency meeting, one in which it said the Xerox announcement was "greeted by unanimous disappointment and dismay by the user community. This decision was particularly disturbing in light of the years of constant assurances by Xerox that they were in the computer business for the long haul."

The devotion of the users to XDS hardware was evidenced by the comment in the statement that, "Xerox computers are recognized for the unexcelled capabilities and versatility of the operat-



The same old management that put SDS out of business now runs Xerox Data Systems.

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It's not just a management problem. It's a case history. Scientific Data Systems was founded in September, 1961. By 1963 it was in the black. And has reported increasing profits every year since.

Back in 1961 SDS management made a basic decision. Instead of following the leader they concentrated on a neglected segment of the market: the scientific-technical community.

Now they've made another decision: to expand their scope and go after the business in the general business community. And because in business the Xerox name is a recognizable asset, they changed the name of the company. Nothing else has changed.

So, if you're wondering about their chances in this new venture, don't worry. They'll manage.

XDS
Xerox Data Systems
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December 1969

CIRCLE 143 ON READER CARD



THESE HISTORIC MOMENTS: This advertisement was widely placed by Xerox Corp. shortly after its acquisition of Scientific Data Systems in 1969. Pictured are (left to right): Rig Curry, then XDS sales manager, now with Xerox corporate as a marketing vp; Harvey Cohen, XDS marketing manager, now president of International Communication Sciences; Dan McGurk, XDS senior vice president, operations, later a president of XDS, more recently president of the Computer Industry Assn. and currently a candidate for Congress in Los Angeles's west San Fernando valley district; Max Palevsky, founder and president of SDS, now in the motion picture business; Louis Horowitz, senior vp of operations, and now a computer consultant in Tustin, Calif; Montgomery Phister, vp computer development, now an author of computer-related books living in London; and Robert Spinrad, then vp of software development, who is vp of advanced development with Xerox corporate.

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western union data services company

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ing systems, and the reliability and cost effectiveness of the hardware."

"The users' group," the statement continued, "is concerned that the reduction or elimination of these capabilities will not only be a great loss to the existing customer base, but to the entire computer industry."

"We are hopeful," the user group said, "that a progressive company will recognize these qualities and purchase the Data Systems Division of Xerox 'intact', including the international operation, and will continue the innovative direction which Xerox has established."

This hope, that XDS would be purchased intact, was echoed by users polled informally, by XDS employees, by suppliers to XDS and by some who sell compatible equipment to the XDS market. At least one Xerox customer, Curtis E. Brannon, president of John C. McWilliams & Associates of Silver Springs, Md., doesn't want XDS sold at all and he's gone to court to prevent the sale, at least until certain commitments he alleges XDS made to him and didn't meet, are met. Brannon filed suit in Federal District Court seeking an injunction against the sale claiming "a

damage suit might take too long."

Many said Xerox's commitments to its users and employees were so strong as to make an intact purchase prohibitively expensive. The corporation took an \$84.4 million charge against second quarter profit to cover the net loss from discontinuing the manufacture and marketing of computers.

Smaller firms turned away

Some said smaller firms wanting to negotiate were turned away by Xerox which was holding out for a purchaser from the "Fortune 500." There was some speculation that the high price and the hold-out would last only until the Oct. 1 order deadline date and that after that the price would come down and part of the operation would become available piecemeal.

Many names were mentioned as potential buyers for all or part of XDS. Included were both computer and non-computer firms such as: Digital Equipment Corp., Sperry Rand Corp., Burroughs, Motorola, Texas Instruments, Hewlett-Packard, Exxon, and Hitachi.

Xerox, in mid-August, would say only that it had been contacted by "several

companies" that had expressed an interest in buying all or part of the computer business. Parts which were considered salable were the rights to CP-V, the installed user base, the service operation, and manufacturing rights to some or all of XDS' computers.

One who is interested in the last is Sam Edens, president of Telefile Computer Products, Inc., Irvine, Calif. Edens and Telefile, which manufactures a line of Xerox-compatible peripherals, actually would like to buy the whole thing. He thinks he could raise the money to do it but in mid-August, he said, Xerox wouldn't talk to him. He had some discussions with Xerox before the withdrawal announcement, about manufacturing rights for the Sigma 5 and 7 but he admits they were "cool." Says Edens, "I'm going to keep hammering at them." He says he can offer Xerox users anything else they might need except the CPU and he'd like to be able to do that.

Information service

There were other companies rushing to Xerox users' aid last month. Valcomp, a division of Tymshare, Inc., located in Westlake Village, Calif., set up a free information service using Tymshare's Tymnet. Valcomp built a data base for an on-line service on Xerox

Xerox Overseas: Most Customers Able to Fend for Themselves

The Rank Xerox ramifications of the Xerox decision to leave the mainframe business are mainly in Great Britain, where the majority of affected customers and employees live. Most of the customers are the self-reliant high technology sort, already able to fend for themselves to a large extent; the Xerox-dominated company is doing its best to make sure that the impact on employees is kept to a minimum, too.

Even so, it came as a surprise, overseas, right after a major press conference underscoring the company's good health. Rank Xerox's London-based communications director Robert Keen had to postpone his holiday to handle the flurry of press activity, and papers which had blazoned out the good news reacted fiercely, as if they, and not the company, had been the prime victims of the surprise.

Rank Xerox has about 330 people involved in Rank Xerox Data Systems (RXDS), about 200 of them in Britain, with the next largest cluster in Germany. The company, unlike its 51% parent, said it would try to save the jobs of all employees. Instructions went out around the world that not even a file clerk was to be hired without first checking with the

London task-force in charge of redeploying surplus RXDSers.

"All presently accepted orders placed with RXDS will be filled," said the official statement. "Commitments to customers under existing lease, purchase and service agreements will be honored. Orders now in process and additional requirements for products will also be honored depending upon availability." One of the honored few customers will be the Atkins time-sharing bureau, which had just signed a new seven year maintenance contract. "We will carry it out," an RXDS spokesman said firmly. Thus, since about half the people in RXDS are involved in support activities, their jobs are assured for at least a year or two, and the company expects to lose quite a few by attrition.

RXDS has never made a major impact overseas outside the realm of sophisticated users, which may be both a contributing factor in the Xerox decision as well as a blessing in carrying it out. The first Xerox activity overseas was a sales agent agreement with General Electric Co. back in the mid-60s characterized by a few Sigma 2 campaigns and very rare sales. In 1968 SDS sent a big Texan named Allan Skinner over to

set up operations, at first independently, and then later working with Rank when Xerox bought SDS in 1969. Competing against entrenched teams from ICL, IBM and the other contenders (most of them with five to ten years head start), the newcomer made headway only among users like the bureaus, ICI, Shell, British Aircraft, the universities and some government research establishments, plus occasional activity in the Middle East.

Customers are tending to react with a combination of themes, all peaceful. There is the school that hums: "We've been expecting it for a long time," represented by Alan Hendrickson at the CRC bureau and several other bureau users who have been intimately involved with the company as they engaged in joint software developments. The other theme is: "The support we've had has been good, and they've promised to continue it, so we're not too worried," a tune that comes from even smaller users like the three British hospitals who are just starting a project to link their three Sigma 6 systems and exchange information. They see no reason to rethink the project.

—Nancy Foy

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equipment, and components for users looking to acquire or dispose of Xerox cpu's, memories, peripherals or spare parts. The service became operational Aug. 15. "We will try to maintain the service on a no-charge basis as long as it is useful for the Xerox user community," said Valcomp president, John Cool, a former director of field maintenance for SDS. "Tymshare," said Cool, has long been one of the largest users of Xerox equipment and, through Valcomp, is entirely self-sufficient in operating and maintaining its 25 Xerox systems. Valcomp's business is providing a range of maintenance and depot repair support for Xerox and other electronic systems and providing refurbished used equipment and spare parts.

Then there's Quelex of Northridge, Calif., which does about the same thing and is, according to its vice president, Larry Levinson, three times as large as Valcomp.

And, in mid-August, Standard Memories, Ft. Lauderdale, Fla., manufacturer of add on core memories for the IBM 360 and three minicomputer lines, was considering designing memories for the Xerox 900, Sigma, and 500 lines. Vice President John A. Devine said the company hadn't decided if it would market the memories on an oem or end user basis. It has installed some 220 add-ons on IBM 360/30s, 40s, 44s, and 50s. It also makes pin and bus compatible add ons for PDP-11, Nova 2, and on all models of the General Automation line.

Users meet in December

The XDS user group has its next full membership meeting in December in San Diego. It's a safe bet most or all of these companies will be there.

Where most of XDS' 2,700 employees (at the El Segundo operation) will be was less clear at this writing. McColough said in his withdrawal announcements these employees would be given first consideration for any job openings within Xerox but he wasn't optimistic that very many could be relocated in this way.

In mid-August there had been no layoffs (McColough said withdrawal would take from a year to a year and one-half). There seemed to be little rush among XDS employees in the job hunting arena although Edens of Telefile said he was "sitting on" some resumes.

XDS was encouraging its employees to "hold on" and there was incentive to do that in the form of a generous "salary continuation" plan Xerox has which is based (the length of the continuation) on age and seniority. Some employees under the plan could have their salaries

continued for a year. But the continuation stops the minute an employee takes another job.

Xerox' generosity in both fringe benefits and salaries is something that will make a job change difficult for many XDS employees, said one Los Angeles headhunter. Then there's the fact that some people become addicted to living in Southern California.

In spite of all the "what-ifs" (rumors were more rampant in the XDS plant than anywhere else) it seemed like business-as-usual in El Segundo. "Where we can't find work we hold meetings," said an employee. People were coming to work on time and going home on time. On-going projects were being continued, even a super-secret project dubbed "Leo," said to be what would have been the next computer out of XDS. The astrological Leo is a lion so maybe this one will come on strong like the beginning of March. Or maybe they'll have to re-dub the project "lamb."

—Edith Myers

Trade Secrets

Xerox Had a Busy Month in July

Xerox Corp.'s activities concerning its computer industry acquisitions during the week of July 20-26, weren't confined to Xerox Data Systems.

On July 24, the giant copier manufacturer and its subsidiary Diablo, Inc., a Hayward, Calif., printer and disc drive manufacturer it acquired for \$28 million in March of 1972, filed a trade secret misappropriation and patent infringement suit against Qume, Inc. and its vice president, David Lee. Lee is a former Diablo design engineer and was one of the founders of Qume.

Xerox filed its suit in the U.S. District Court in San Francisco. The corporation seeks unspecified money damages and an injunction against continued use of "Diablo trade secrets and further infringements."

Xerox did not announce filing of the suit but Qume did, on Aug. 1. The Hayward firm, which makes daisy wheel printers competitive with Diablo's Hi-Type lines, not only announced it was being sued by Xerox but said it was going to come back with an antitrust suit against the copier firm. It's another of those David and Goliath situations. Qume, although it has grown rapidly in the two years and four months of its existence, still has only 150 people and annual sales of about \$1.6 million. Small potatoes compared to Xerox.

Improper control

In late August Qume still had not actually filed its suit but President Robert Schroeder said it would happen "within a month." The suit will allege, he said, that Xerox "has sought improperly to control the large oem character printer market and the non-IBM portion of the multimillion dollar word processing market."

Schroeder said Qume has been experiencing "a variety of anti-competitive actions by Xerox and Diablo which seem to us to form a pattern of restraint of trade.

"We have tried to avoid litigation," he said, "and to compete instead in the open marketplace. But Xerox's latest action . . . we believe to be wholly without merit."

Xerox declined to comment on Qume's proposed suit preferring to wait until it actually had been filed.

Schroeder said the Xerox suit came as "a complete surprise" (not unlike the XDS announcement—Xerox was full of surprises that month) because Xerox and Qume had been conducting meetings to discuss Diablo's complaints. "At the latest meeting Xerox had agreed to provide details on certain of its general claims but instead, filed its suit."

Schroeder said meetings between the two firms began six months ago when Xerox representatives voiced claims similar to those stated in the lawsuit and demanded that Qume enter into a licensing agreement with Xerox for the manufacture of Qume printers. He said Qume examined each item in Xerox' claim and consulted outside patent counsel "who rendered opinions without qualifications that Qume had not infringed on any valid Xerox patents."

He said Qume investigated the trade secrets claims and found them to be "over two years old and completely without merit."

Left Diablo

Lee, vice president, engineering for Qume, left Diablo, shortly after its acquisition by Xerox. He formed Qume with Lon Israel with whom he'd worked earlier at Singer Friden. Schroeder was brought in as president from Cummins Engineering where he'd been a group vice president. Lee was a prime design engineer on the HyType, and, according to a Qume spokesman, helped Xerox refine the HyType design to come up with a printer for incorporation into its word processing equipment.

Qume contends its printers are not only different from Diablo's "but better. They use the same daisy wheel as Diablo's but they don't print on the fly." A spokesman hastened to add that use of the so-called daisy wheel was not original with Diablo . . . that others, including Singer Friden of which most Diablo founders are alumni, were working on

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the idea before Diablo had been formed.

As stated earlier, Xerox paid \$28 million for Diablo. A recent issue of a word processing trade publication, hinting that Lee was one of the few key employees not signed to a long term contract by Xerox when it acquired the printer manufacturer, called Lee "the \$28 million man." Maybe \$28 million is the amount of "unspecified money" Xerox now wants.

—E.M.

Litigation

Core Memory Patents Challenged by NCR

While core memory won't go away, even in the face of new memory technologies, it is becoming evident that it is also true that the perennial debate on the genesis of core memory won't go away either.

The instigator of the current probe into the invention of core and its subsequent patenting is NCR, which follows the steps of similar actions in the past by IBM and RCA. The key core patents challenged by NCR are held by the Massachusetts Institute of Technology and one of its professors, Jay Forrester. Most of the work was done on the famous Project Whirlwind.

In a voluminous court record on the litigation in U.S. Federal District Court in Boston, NCR speaks of the "sordid history which gave rise to the Forrester patent in the first instance." NCR asks that the patent be set aside on the grounds of "patent use and misuse" and, in addition, the litigation raises an antitrust spectre, charging MIT, Forrester, IBM and RCA with antitrust violations.

The NCR allegations stem from a counterclaim the Dayton, Ohio, main-frame manufacturer filed against MIT after the university attempted to collect funds from NCR on the basis of its core memory patents. MIT, Forrester, NCR and IBM have all denied the NCR charges in one form or another over the years.

Filed in 1968

The proceeding is already almost hopelessly complicated by a myriad of documents and legal papers filed in connection with the case. However, important papers of a historical nature are being accumulated in the Federal Courthouse in Boston and, as the proceedings enter discovery stages in anticipation of trial, even more historical data should be gathered. The case was initially filed in February of 1968 by MIT, which was seeking payments from NCR for the memory patents. While the case

remained more or less in limbo for some time, it has been picking up momentum in recent months, particularly as NCR has pressed its counterclaim.

MIT, however, has vigorously denied the NCR counterclaim, stating that "NCR's proposed amendment represents an eleventh hour shift in NCR's position . . . The introduction of wholly new claims at this late point in the proceedings would frustrate MIT in its legitimate efforts to recover the monies properly due under its patents and would confront MIT with an ancient and, it believes, baseless claim at a time when witnesses are dead, documents lost, and memories dim."

Antitrust issue

One issue of potential immediate significance raised in the litigation is the charge of antitrust violations on the part of MIT, RCA and IBM. IBM is already the subject of antitrust actions, most notably



JAY W. FORRESTER
NCR claims his core memory
patents rightfully belong
to RCA

a case currently in trial stages brought by the U.S. Justice Dept.

A key point in the case is NCR's contention that MIT, Prof. Forrester, IBM and RCA conspired to illegally award the patent to MIT and Forrester while, in actuality, key core memory patents rightfully belong to RCA.

"MIT and Jay M. Forrester," the NCR suit alleges, "conspired with IBM and RCA to withhold from the Patent Office and/or the industry information potentially fatal to the validity of both the Forrester patent here in suit and the RCA

'Alternating Sense Winding Patent,' the net result being that each of these patents . . . has been asserted against the computer industry in a manner which has (i) unjustly enriched MIT, Forrester and RCA, (ii) effectively imposed upon the other members of the industry licenses under these patents which are a significant impediment to their ability to compete with the licensees IBM and RCA or forced them to incur legal fees without justification. . . ."

The NCR charge continued that the situation "strengthened the power of IBM over the data processing industry, in that by virtue of its long standing dominance of the data processing industry IBM has obtained financial resources far surpassing the resources of the remainder of the industry combined, the result of which is that any financial burden which is common to all competitors in the industry necessarily strengthens and enhances the dominant position of IBM and lessens the ability of its competitors to compete."

Tools to sign others

NCR charges that the MIT agreements with both IBM and RCA "were merely tools to be used by MIT in its efforts to sign up the remainder of the industry under the Forrester patent."

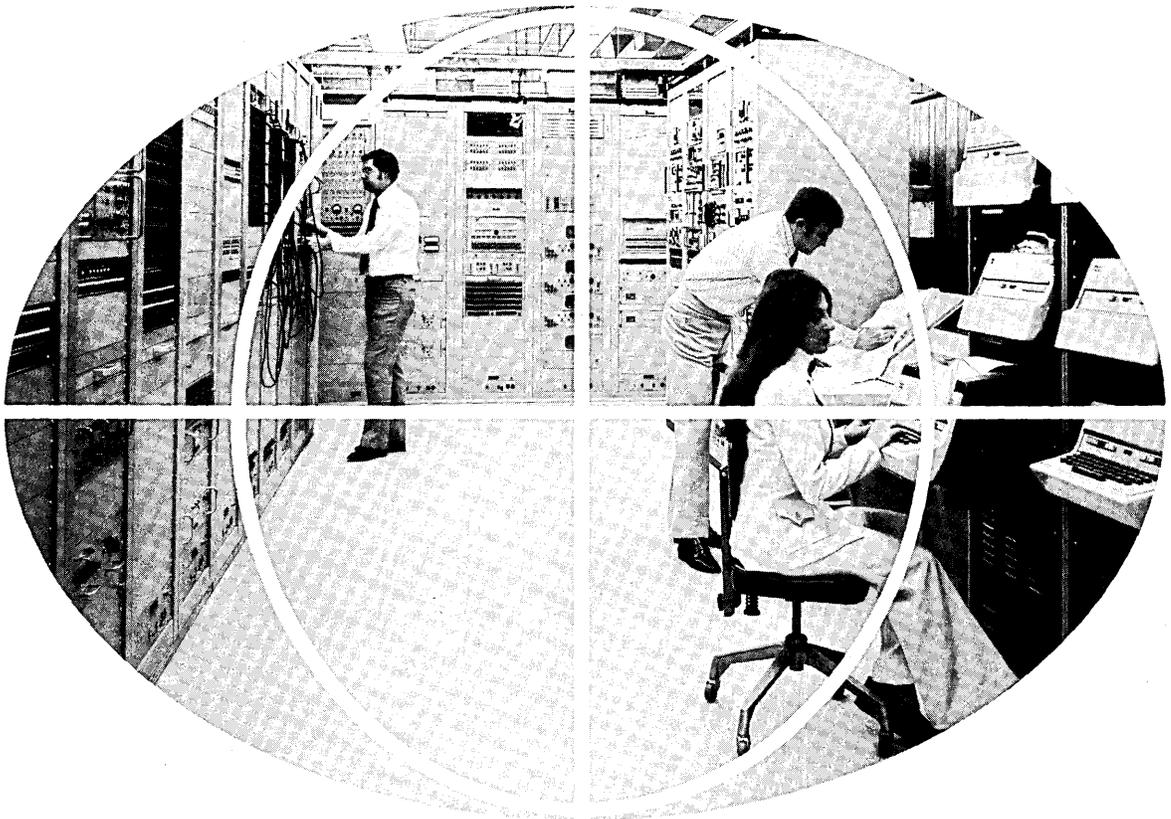
Greatly simplified, the background, as visualized by the NCR charges, is that others in addition to and before Forrester and MIT did crucial core memory work, including Jan Rajchman of RCA and scientists at the Harvard Computation Laboratory. Harvard has followed a policy of offering its inventions up to the public while MIT has sought to seek commercial gain from its work.

NCR maintains that "interlocking directorships" that existed between MIT and IBM helped effect "a settlement agreement with IBM based on improper considerations largely, if not wholly, unrelated to the merits of the Forrester patent."

In that agreement, IBM paid \$13 million in 1964 to MIT, ostensibly for the Forrester patent. According to a formula used at MIT at the time, Forrester would have received about \$1.5 million of that amount and he was to share in payments by other manufacturers. Although Forrester is named in the NCR litigation, he is not a defendant in the case.

Forrester has picked up recent fame as a sort of doom futurist, feeding data into computers, which report back that the world will be in dire shape in the future if it doesn't take corrective action. The general media has been fascinated by his work in general and in particular by the fact that he uses computers. He is in great demand as a speaker and, for example, was the keynote speaker at this year's NCC.

—W. David Gardner



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Used Computers

Cutting the Bargains From Used Computers

If you're a Honeywell computer user who bought your system from another user or dealer *months or years ago*, you now face a charge of tens of thousands of dollars from Honeywell Information Systems for using its operating systems and software. If you would like to buy a Honeywell system from someone else, you won't know officially whether the system needs refurbishment or is maintainable by Honeywell until the system reaches your site and can be inspected.

If you are one of these users, you may be justifiably angry, incredulous, bewildered, and/or misinformed. "They're crazy," says a Honeywell-115 user, who has cancelled plans to buy the 115 and instead will ride out the year left on his lease and switch to another vendor.

The furore is over a Honeywell notification this summer to users that own their own systems that the software provided with the systems is not transferable. That means that if a system is sold, the software cannot be sold with it. And systems that are sold won't be maintained by Honeywell unless it is recertified as maintainable by Honeywell at a minimum price of \$380.

Some users said they will sue Honeywell for discriminatory practices against the second owner; but no suits had been filed by mid-August. One user filed a complaint with the Justice Dept. about the policies—not a suit, a complaint. Used computer dealers were examining their position with lawyers, although none had indicated an intent to sue. Legal experts think users and competitors could argue violation of Section 1 of the Sherman Antitrust Act (against restraint of trade) and of the Robinson-Patman Act.

In the latter instance, the Schwinn case was noted, in which a court ruled that a company cannot control what happens to its products once they are sold. In Honeywell's case, the issue would be whether the software was judged part of the purchased system, rather than a license to use a proprietary product, as Honeywell claims.

Honeywell's legal counsel Jim Walsh noted, however, that the company carefully examined all of these contingencies as well as Federal Trade Commission regulations. He feels it is not in violation of any law.

Friend disagrees

But a user who considers himself "a friend of Honeywell" disagrees with

Honeywell's enforcement of its policy. "I was given a pre-release version of the new policies almost a year ago," says George Schussel, vice president of American Mutual Insurance Co., Wakefield, Mass. "My reactions were very negative."

"I told them: 1. It makes it appear to current and potential users that Honeywell is aiming its guns at small used-computer firms and persons trying to remarket Honeywell systems. 2. It is anti-competitive because it eliminates competition. Having a free market in which to operate is to the advantage of all, including Honeywell. 3. It erodes confidence in Honeywell's ability to survive."

Despite his openly concerned warnings about "Neanderthal-like" policies, Honeywell announced them to its field force last June and says it sent out letters to its customers in July. Schussel received one. He calls it "insidious" because the wording concerning software licenses to users of purchased or leased computers is ambiguous. The letter said that if a user has a Honeywell system that is purchased or leased from Honeywell, the user has been "licensed to use the Honeywell software." Later, it says, "Those who haven't signed this license, are not so licensed."

Paul Jarvis, dp manager of Technical Publishing Co., Barrington, Ill., publisher of DATAMATION, cited the confusion he experienced over the new Honeywell policy. Jarvis, who wanted to upgrade his HIS 2040 to a model 2050A, found a good buy from San Francisco Computer Group for \$225,000. That was a saving of \$100,000 from the Honeywell price. Then he was cautioned by the used computer dealer that there was some question whether Honeywell would approve it for maintenance or require refurbishment, even though Honeywell had been maintaining it. And, Honeywell salesmen were talking about a software charge. Jarvis asked about this and wasn't given a firm price for the os-2000—a system he had been using since 1972. Instead, said Jarvis, the local Honeywell branch manager wrote on July 21 and told him the charges would be specified after he signed the contract for the software. (Jarvis still is shopping for an upgrade and has been examining the offers of other vendors.)

Manager in error

Honeywell spokesmen said the branch manager was wrong. He had been on vacation shortly before the Jarvis query and hadn't had time to learn about the announcement Honeywell made to its field force in June.

Later, the company said Jarvis would be charged \$35,000 for a basic operating system and \$750 a month.

Honeywell spokesmen say all the company has done that's new is refused to certify a system's maintainability before it reaches its new site. But its field engineers, under a time and materials contract, will inspect the system at the seller's site and, according to Joe Keady, special assistant to the vp of dp operations, "We'll give him a letter saying what we've done . . . we'll tell him what it needs." Pre-certifying, Keady explains, has caused problems before, because systems may go into warehouses for long periods of time or suffer damage in transit.

Keady couldn't generalize on the costs of refurbishment, but said that the cost of inspection was \$95 an hour (time and materials) with a four-hour minimum. That means a minimum charge for inspection of \$380 at each site.

About the software charge, Keady said that Honeywell has now "provided a facility for users of our equipment not purchased from us to use our software." He explained that "we have found situations where people have come to us asking to use our software. When that occurs, we take on the immediate risk of having to supply support for our software now and in the future. We felt that if we have to take the risk we should be remunerated for it."

Illegal use

Anyone who does not have a license to use Honeywell's software is not using it legally, says Keady. All users who have rented, leased or bought Honeywell equipment since 1970 have, in their contracts, a clause to the effect that they're licensed to use the software, but it is not transferable, copiable, etc.

Keady said in a mid-August interview he didn't know whether second owners had been asked to sign this license, or whether a second owner had paid for a license or signed one prior to July 1. (Keady later called back and said there were "instances" of users having paid for a license prior to this time.)

He said Honeywell had the licensing clause in its contract since 1970 and anyone that transferred software or is using software without a license is doing so illegally. Furthermore, he said, prior to 1969 the "assumed industry position" was that the software belonged to the vendor, and not to the user.

Thus, the user buying from Honeywell gets a "no-fee license," explains Honeywell lawyer Jim Walsh, but the "price of the software" is included in the hardware bought from Honeywell, according to Keady. There is a price that can't be removed if the user doesn't want the software, but there is no charge if he does want it. "We don't want you to use someone else's software on our



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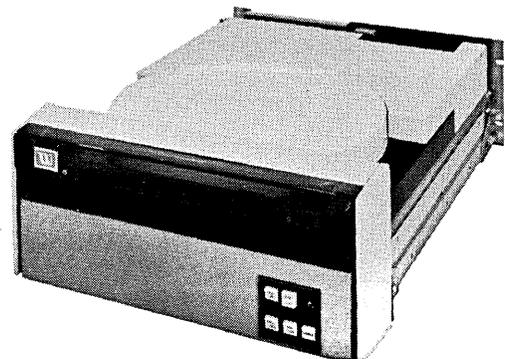
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systems." Keady said. "That's why we offer it in the bundled environment."

What was the Honeywell policy toward the second user during the period 1970-75, when a no-fee license was the only thing in effect? "I don't think we keep records of that detail. I don't know why we would," said Keady.

For six years, Honeywell didn't find out whether a second user signed a license?, Keady was asked in the interview. "No, officially we didn't know anything about it. We didn't know the situation until early this year when we were asked."

Experiences vary

Experiences of several users offer a different version. Steve Bray, vice president of Syncon, in Edwardsville, Kans., said that when his service bureau bought a Honeywell 200-0 from a school in March, he signed a maintenance contract with Honeywell, putting up three months maintenance charge in escrow. The Honeywell salesman gave him tapes of Mod I-TR operating system (and other packages), an obsolete, unsupported system that has been cut in the field—"in public domain"—since 1965, said Bray. The software was in

such bad shape, that "I had to re-do it." He was not asked to sign anything for the software.

In July, his local salesman told him that he couldn't use the software anymore unless he "bought it" and that charge would be a minimum of \$17,500, although he didn't have the exact price. On the other hand, for about \$25,000 Bray could trade his 200 in for a bigger system from Honeywell that came complete with bundled software. According to Keady, who doesn't have any idea why the Honeywell people gave Bray the software since Honeywell "knowingly" didn't do anything like that, that salesman's figures to Bray were in error. The software can't be purchased and that operating system in basic configuration costs \$9,000 plus \$289 per month.

Bill Grinker of American Used Computer tells of Teknor-Atex, with whom his company negotiated a system sale early this year. The contract was negotiated and then Honeywell said that it would not provide the software, says Grinker. After AUC complained to top management, Grinker said Honeywell offered to provide the software at a price, but didn't give him one. This was for a Mod I-MER system, which is priced

at \$17,000 and \$685 a month now. The user took a Honeywell deal instead. AUC tore up the contract.

When Grinker sold a 1200 to another customer early this year, Honeywell allegedly said neither software nor maintenance would be provided. The customer ripped up that contract and went to an AUC-provided IBM 360/40.

In May, Grinker said, Honeywell was claiming it had no new policy but the "salesmen were leaking it all over." (Honeywell says AUC was brought in to discuss the policies before July, which AUC denies.)

Dealer tells all

John Allen, of the used computer owner and dealer, Oliver-Allen, tells of a Honeywell system built in the U.S., used for 7-8 years by the U.K. government, and continually maintained by Honeywell. He said Oliver-Allen bought the system and sold it to a California firm before it was removed from the U.K. The local Honeywell office told Allen that his would inspect it at the customer's site in California. Then it was crated and Honeywell changed its mind. The system, since it was coming from another country, had to be refurbished in Wellesley. The refurbishment would be about \$60,000 which, says

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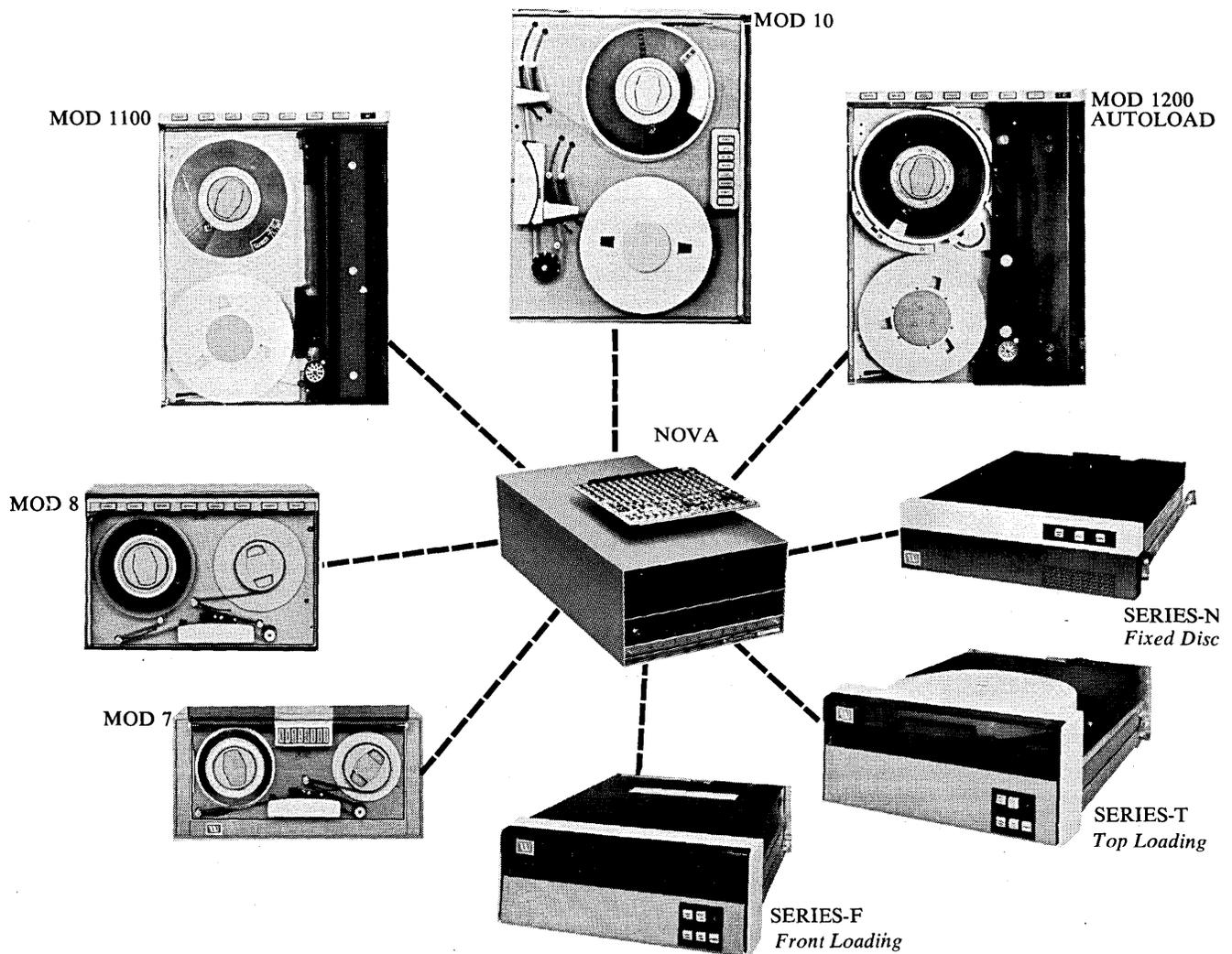
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Allen, in combination with his sale price was about equal to what the California user could pay Honeywell for the same system. His company lost the order and later sold that system for 50% less to a Chicago user.

Allen related another experience. A midwestern company bought a system from them that had been off maintenance for a year. Honeywell allegedly approved all the system for maintenance except the disc drives, three 259 drives,

"which are notoriously crappy," says Allen. Instead, the local HIS people told the user to run them for 60 days and if they ran satisfactorily, they would be maintained. Allen says that was in May. In July, Honeywell came in and said the drives were bad—although "they didn't go down once in the 60 days!" Allen exclaimed. The user was happy with them and didn't want them refurbished." Honeywell, says Allen, offered to sell the user three drives for \$3,600

a piece, just \$100 more than the refurbishment cost. The price was actually cheaper, since in addition to refurbishment, the user would also have had to pay to have the system removed, shipped and reinstalled.

Allen does not buy Honeywell's reasons for not guaranteeing the system before it is at the new owner's site, saying it is a sales tactic meant to scare the user about the risks he may be taking. Many users did not want to be quoted, some because they are about to file suit. One westerner, who was filing suit but wouldn't say why, lambasted Honeywell maintenance, claiming that his system was down 20-40 hours a month until he took maintenance over himself.

Another complained about the super-high price of Honeywell spare parts—\$75 worth of cables that Honeywell charged \$2,300 for; "eight-cent" filters for which Honeywell charges \$50.08. Was Honeywell higher than any other manufacturer? Yes, all were commonly high in spare parts charges, but none were as high as Honeywell. And its new maintenance prices—time and materials—came under fire, since they are now \$95/hour, four-hour minimum, vs. \$53 or \$54, two-hour minimum.

Honeywell's Keady explains that the company had planned to recycle its systems two and one-half times and it had a right to protect that. It turned out that the purchased equipment in the field was hurting that plan. Walsh asked rhetorically whether users were buying the equipment to use or to sell. In effect, the implication was that the second and first owners both were being treated as competitors since they both were a threat to the HIS plan.

What was confusing to most was that Honeywell campaigned long and hard to sell off the Honeywell 200/2000 customer base. Estimates vary from 50% to 80% on the number that are owned or under purchase option. The situation was foreseeable. The impact of this policy, according to everyone outside Honeywell that was interviewed, is negative. As Schussel noted, confidence has been eroded. Why would they take a short-term benefit that is negative in the long-term, unless, says John Allen, there "is no long term?"

Honeywell's future in the industry is very unclear to those interviewed. Since the policies have little effect on the big machines, the 6000 series, which are predominantly rented, and since Honeywell is making noises about a major attack on the minicomputer and distributed processing market, some think they may abandon the medium-scale market. But Honeywell's general manager of North American Operations, B. Sheehan, said, "There is no underlying move in that direction," and, "there are no plans to withdraw from that market."

—Angeline Pantages

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Communications

Congress Tightening Reins on DP Buying

"It will be next year at the earliest" before the Agriculture Dept.'s massive multimillion dollar data communications system is awarded, a knowledgeable Washington source claimed this summer. His comment followed the General Accounting Office's issuance of a blistering report recommending cancellation of the procurement because Agriculture allegedly hasn't defined its users' needs adequately.

Subsequently:

— Rep. John Moss of California sent a copy of the GAO report to the House and Senate appropriations subcommittees which control Agriculture's appropriation, along with a recommendation that they accept GAO's advice.

— The chairman of the House subcommittee, Rep. Jamie Whitten of Mississippi reportedly sent a letter to Agriculture Secretary Earl Butz telling him not to award a contract without getting Congressional approval.

Major result of all this activity is that Agriculture officially delayed—from June 18 to August—the projected contract award date, and may be thinking of cancelling the procurement altogether. Univac, Honeywell and Burroughs are the bidders.

An August award was predicated on the assumption that Agriculture officials could come up with documentation satisfactory to both GAO and Congress. But just before Congress recessed in August, the House and Senate appropriations committees ordered the procurement deferred.

More heat from the hill

The hassle over the Agriculture Dept.'s teleprocessing contract represents the latest of several indications that Congress is devoting much more attention to federal dp procurement, and that the whole subject is becoming steadily more acrimonious. Rep. Moss summed up this new climate neatly in remarks he prepared for a June meeting of the American Institute of Industrial Engineers (AIIE).

Congress intends to "insert itself more and more into the area of sole source procurement," said Moss. "Too many agencies are indulging in sole

sourcing, thinking that Congress is either unaware or uninterested in challenging such policies. The same is true of facilities management contracts, an excellent concept which has increasingly become subject to abuse by smaller, non-military agencies. In more than one case, Congress has suddenly been confronted with a fait accompli by an agency through this approach, and has, in the past, acquiesced. Several of these attempts are presently being probed and challenged by Congress, and federal agencies will find it increasingly difficult to use this route, thereby circumventing the appropriations and authorization process. What it boils down to is this:

"Federal agencies are going to have to go through the Congressional turnstile for permission to acquire any dp system of size. The entire spectrum of evasions presently utilized will inexorably be probed and eliminated by an increasingly oversight-minded Congress."

GSA's image problems

GSA is the agency responsible for riding herd on federal systems procurements, but it acquired a bad image on Capitol Hill early last year when Fednet—a proposed system for sharing computer resources among all federal agencies through an integrated datacom network—was shot down by a small army

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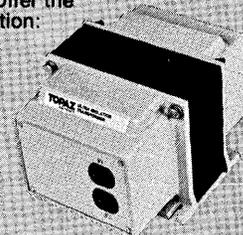
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of critics that included civil libertarians in Congress and efficiency experts in the Office of Management and Budget (OMB).

The growing disagreement between Congress and the Executive Branch over federal dp procurement policy comes at a time when several big buys are in the pipeline. According to one estimate, the agencies are planning to acquire more than \$500 million worth of computer systems, almost all of them involving data communications, during FY '76, which began the first of last month. The Veterans Administration, Internal Revenue Service, HEW, Justice Dept., Customs Service, and Dept. of Transportation are among the agencies involved. In virtually every case, the procurement consists of an interim upgrade. Some of these buys—notably the VA and HEW systems—already have been criticized in Congress.

A key source on Capitol Hill doubts that the criticism can continue in its present form. "We just don't have the time or staff to monitor and follow through on every procurement which looks fishy," he said, adding "there's got to be a better way." One possibility, he said, is to "impose a moratorium on all system procurements for a stated period," although he quickly added this would be impractical.

The likeliest result, it seems to us, is that upcoming procurements will be subjected to continuing criticism from Congress, continued reanalysis and modification, and continued stretch-

outs—possibly lasting even longer than those which have already occurred. More procurements are likely to be cancelled after the bids are in, and there will almost certainly be more shouting matches between Congress and the Executive Branch over procurement policy.

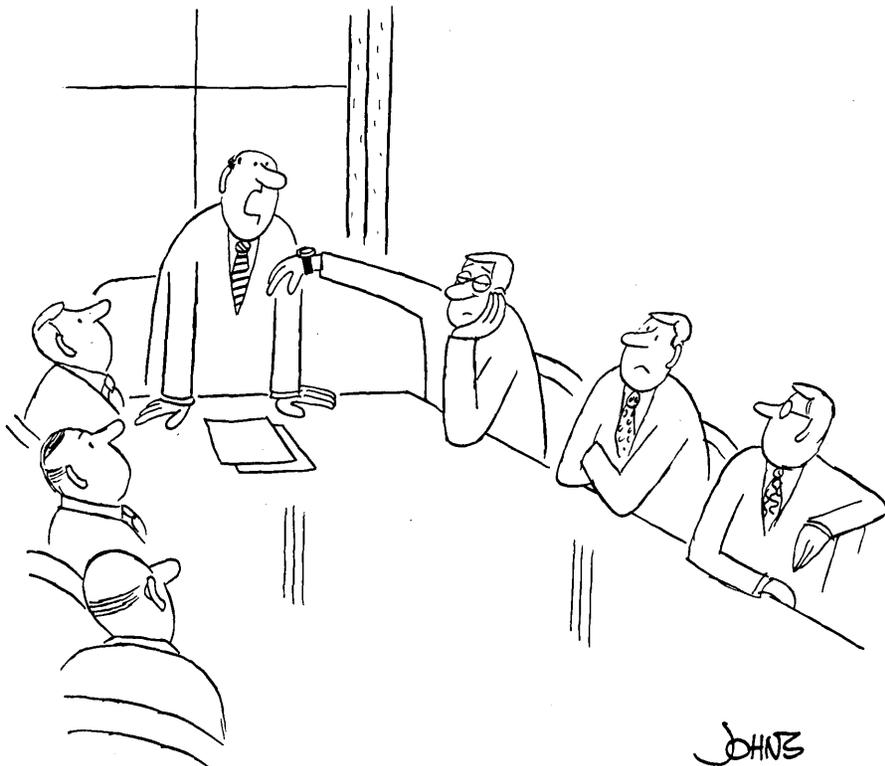
—Phil Hirsch

Interconnection: IBM Sides With Ma Bell

International Business Machines Corp. is siding with the telephone company in its opposition to federal certification of "foreign attachments" to the interstate dial-up network.

Meanwhile, the Justice Dept. has said, in effect, that the Federal Communications Commission should get off the dime and adopt a certification program by next Jan. 1—one that would cover telephones and PBX's as well as data terminals and other ancillary equipment.

The Justice Dept. was among the organizations commenting on the certification scheme proposed recently by the FCC's Joint Board and on a somewhat similar plan already adopted for intrastate use in California (June, p. 121). A basic purpose of these comments is to help the commission decide whether to adopt a certification program allowing independently-made terminals to be connected directly to the interstate dial-up network. When that decision will be made is unknown, but some informed sources believe it's likely this fall.



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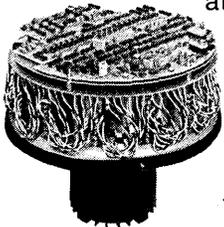
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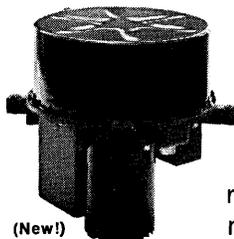
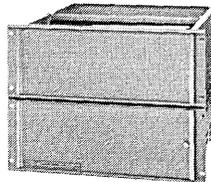
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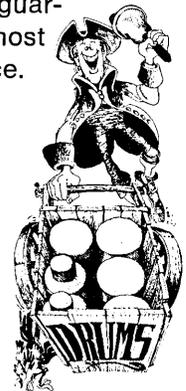
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The Justice Dept.'s recommendation to start certifying within the near future, and include telephone equipment in the program, was seconded by Rep. Torbert H. MacDonald, an influential member of the House Commerce Committee and chairman of its communications subcommittee.

AT&T, to no one's great surprise, took a diametrically opposite position. It contended that certification will lead to "deterioration of all customer services . . . additional costs which must be borne ultimately by all customers," and damage to the network as well as increased physical risk to telephone company personnel.

Offers alternative

AT&T added that both the joint board's proposal and the "California Plan" would be costly and cumbersome to administer. As an alternative, the phone company offered to expand its authorized protective connecting module (APCM) program to encompass independently-made data communications equipment and "certain other devices." At present, the APCM program is limited to telephone answering devices.

The APCM essentially is a device built into an independently-made terminal by the manufacturer. It's based on a phone company design and, although fabricated by the terminal supplier, AT&T exercises detailed control over every step in the process through "appropriate quality assurance and quality control procedures enforced independently of the manufacturer."

It may be significant that IBM's agreement with AT&T that the FCC should not adopt a certification program was the second time within recent months that the two giants have seen eye-to-eye on controversial issues. AT&T, despite its well-known aversion to competition in the communications industry, has told the FCC that it doesn't oppose IBM's plans to go into the satellite business.

Government regulation?

Apparently, IBM believes certification ultimately will lead to government regulation of dp terminal manufacturers and force disclosure of proprietary information. In its comment to the FCC, the company argued that advances in electronics will make it more and more difficult for the certifying authority to decide what has to be registered, and the logical result will be registration/certification of the entire unit. IBM said a better alternative would be for the FCC to adopt an interconnection program based on AT&T's APCM.

Highlights from the other comments:

The Electronic Industries Assn. (EIA) maintained that telephones and PBX's should be certifiable along with ancillary devices, but opposed a provision of the joint board plan under which carrier-provided terminal equipment would have to be qualified, as well as independently-provided gear. However, the association added that the carriers should be required to meet the same technical criteria as the independents.

The Independent Data Communications Manufacturers Assn. (IDCMA) insisted that all carrier-provided terminal devices should be certified, along with those made by the independents. This would assure that the technical specs are soundly based, said the association, and prevent the carriers from gaining a marketing advantage by being able to offer new equipment faster than the independents. IDCMA added that the certification program should also require carrier-provided equipment to be connected through the same standard plugs, jacks, or other arrangements specified for the competition, and independents should be permitted to manufacture protective couplers like the ones now supplied by the carriers. This would give users of

Bell's data access arrangement (DAA) who don't want to change their present installation architecture an alternate source of supply, and would do the same for future users of non-certified equipment since, presumably, Bell will insist on interconnecting those devices to the dial-up network only through protective couplers.

The Computer and Business Equipment Manufacturers Assn. (CBEMA) suggested a number of administrative and technical changes to the joint board plan, but strongly endorsed it in general. The association recommended adding telephones and PBXs to the list of certifiable devices and said the California Plan was significantly less acceptable because it excludes carrier-provided equipment, and requires the manufacturer to use an outside engineer.

—P.H.

Protocols Would be Translated On-Line

Digital Equipment Corp. is developing an on-line "link control code translator," a microprocessor that would enable its PDP minicomputers to communicate directly with terminals that use any of several line protocols. The company hopes to announce it within a year.

Complex communications software, a resident in the main processor or its front end, is now needed to operate net-

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news in perspective

works containing different types or makes of terminals—regardless of who supplies the system. And a great deal of coding is necessary. The start of text, end of text and other end-to-end message controls required by a user's existing terminals must be translated into a format acceptable to the other equipment. A similar conversion job must be done on the rest of the communications control envelope surrounding the text—for example, the codes that specify header field lengths, terminal id's, error

control, polling, and message accounting procedures.

Digital Equipment's microprocessor would reduce this work substantially, according to sources familiar with the development. It also would transfer protocol-handling functions to the I/O interface, thus freeing memory and processing capability in the mainframe or front-end for other jobs.

Digital Equipment at present is addressing only the problem of translating link control protocols. The higher-

level codes which provide end-to-end message control are not included. It's quite possible, though, that a more sophisticated microprocessor could be developed to handle this part of the problem as well.

Multi translation

The new microprocessor, consisting of one or more integrated circuit boards, ultimately could be capable of translating DDCMP, the company's new link control scheme, into any of the formats announced by others. These would include IBM's SDLC; Burroughs' BDLC; HDLC, the proposed international standard link control code; ADCCP, a U.S. version of the international scheme; and SNAP, the link control protocol adopted by the Trans-Canada Telephone System on its new Datapac network. The microprocessor also would be able to convert headers coded in any of these formats into DEC's own DDCMP.

The same circuitry will be used for all conversions involving DDCMP and another code, but different instruction sets will be cranked into the microprocessor to accommodate the peculiarities of each protocol. Initially, the device will service a single line and it may be offered as a follow-on to the DV-11 communications pre-processor that DEC announced last spring.

Same direction

Burroughs seems to be moving in this same basic direction. Late in June the company announced the B776, a communications processor that features an I/O microprocessor devoted exclusively to communications control functions. Users still must define their networks manually, and translate the resulting code into a Burroughs-compatible format using the company's Network Definition Language (NDL). But the new "data communications processor" (DCP), like the one DEC is working on, takes over functions previously assigned to the cpu, thereby permitting more efficient use of the main system.

Up to two DCP's, each capable of servicing 16 lines, can be attached to a B776. They transmit and receive messages coded in BDLC, the Burroughs line control code.

Burroughs has explained that its new code was "designed in close coordination with national and international organizations working to establish standards for bit-oriented line control procedures." It says that although these standards are still pending, "the modular structure of BDLC will allow Burroughs to maintain compatibility with the bit-oriented line control procedures, conforming to national and international standards, employed by other manufacturers of communications equipment."

—P.H.

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Feds Soon Must Buy a Standard Cobol Compiler—Or Must They?

A prominent advocate of federal computer standards thinks there's a behind-the-scenes effort underway to scuttle a recent ruling of the way agencies may buy COBOL compilers.

The question is raised by Norman J. Ream in a letter to Dr. Ruth Davis, director of the Institute for Computer Sciences and Technology at the National Bureau of Standards. Ream suggests that Dr. Davis is one of the villains. The other is the Computer and Business Equipment Manufacturers Assn. (CBEMA), specifically its executive vice president, Vico Henriques.

Ream was the first director of the Institute. He now is a political activist in California (August '74, p. 101) and a consultant on standards activity to the Computer Industry Assn. He accuses Davis of accepting the CBEMA position on a long-delayed, much-debated proposal to require validation of all COBOL compilers acquired by federal agencies.

Validation would determine whether the compiler met the federal COBOL standard, thus facilitating transfer and sharing of COBOL programs and related jobs among different brands of computer systems, and also making it easier for users to migrate from one brand to another. All of these benefits, however, require rejection of non-standard compilers that fail the validation test.

Meaningless exercise

CBEMA is willing to accept validation, but it wants each using federal agency to be the final arbiter of whether a compiler is acquired. Ream says this latter provision would make the whole validation exercise meaningless since dp users—particularly those in the federal government—have a well-known willingness to accept the technical pronouncements of their suppliers as ultimate wisdom.

In his letter to Davis this summer, Ream accused her of accepting and promoting CBEMA's position on the validation proposal without considering other views. His main complaint was that she has asked the General Services Administration—the government's purchasing administrator—to incorporate the CBEMA position into federal procurement regulations.

He says Davis wrote to GSA last April 18 and said that: "Federal agencies should be allowed to continue to specify how they will evaluate the responsiveness of the compiler to the RFP requirements." She then suggested a draft regulation embodying this approach.

The last line of the draft, as quoted by Ream, reads: "Responsiveness of

the proposed COBOL compiler to the requirements of this solicitation will be determined in accordance with the criteria defined elsewhere in this solicitation." Since the "solicitation" is the RFP prepared by the agency procuring the compiler, this language would enable that agency to determine, independently of the validation, whether the supplier's product should be accepted.

In his letter to Davis, Ream said

"your proposed change, as you are aware, follows the exact proposals of CBEMA and for all practical purposes would totally negate the necessity of having a federal COBOL standard. In preparing and proposing such a recommendation, you are taking several steps backward while at the same time, to the uninformed you would appear to be fostering advancement. The failure to have a validated COBOL standard compiler has . . . cost the federal government . . . tens of millions of dollars and you . . . are proposing to continue to foster that condition."

Dr. Davis says that Ream's quote from her letter to the GSA's Sidney

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Weinstein, who then was assistant commissioner for agency assistance, planning and policy, is accurate. But she says his conclusion isn't.

She explained in an interview with DATAMATION that a new federal COBOL standard, which became effective Aug. 5, requires all COBOL compilers acquired by federal agencies to comply with the 1974 version of the language as approved by the American National Standards Institute (ANSI) in May of last year—X3.23-1974. This compliance provision becomes fully operational 18 months from Aug. 5. During that 18-month "transition period," compilers implementing the previous (1968) COBOL standard can be acquired if updated versions aren't available.

Davis said that NBS intends to insist on strict adherence to this provision. To be in compliance, the compiler will have to pass the validation test, she added. The only way an agency can sidestep this requirement is by applying for a waiver to the NBS. And she emphasized that "the onus will be on the agency" to justify an exemption.

During the 18 months preceding the full implementation of the compliance provision, agencies will be "en-

couraged" to acquire compilers that conform to the 1974 ANSI standard. If unable to do that, the agencies will be asked to obtain compilers that implement the 1968 standard as far as possible. "We are attempting to be more permissive regarding waivers from the 1968 standard because we regard them as temporary expedients which will be superseded within a relatively short time by new versions compatible with the '74 standard," Davis explained. "It would waste agency and industry resources if we insisted on total compliance with the 1968 standard."

NBS is working with GSA to incorporate all of these ideas into the final draft of the regulation which Ream alluded to in his complaint. This document will be published as an amendment to GSA's federal property management regulation (FPMR) 101-32.1305. Davis expects GSA to promulgate it "shortly."

Asked to explain the seeming conflict between her present attitude and the one expressed in her April letter to GSA, Davis said the letter "was part of a discussion that began many months ago and is still continuing. Early in that discussion, before April, we stressed the need for treating compliance with the

1968 standard differently from compliance with the 1974 standard, and so Mr. Weinstein was well aware that my proposed language applied only to compilers implementing the former standard, rather than the latter."

Question of legality

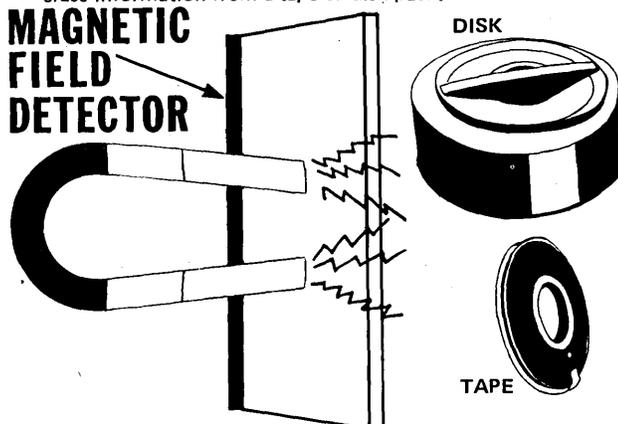
CBEMA's Mr. Henriques insists that it is "probably illegal" for GSA and NBS to deny users the final say on whether they can acquire the COBOL compilers they feel they need. He cites the Brooks (Rep. Jack Brooks of Texas) bill concerning federal procurement of computer products. He says that that legislation explicitly bars such interference with a user's definition of his own system requirements.

Henriques says the 1974 COBOL standard contains many implementor-defined functions. But the validation test routines require a specific implementation for most if not all of them. Thus, the compiler offered by a vendor must satisfy "arbitrary specifications which can't possibly be best for all users," Henriques explains.

"The result is a special product that's uneconomic and inefficient compared to commercial compilers. The extra development costs are passed on not only to government users but to private users, and we're getting complaints from both groups on this point."

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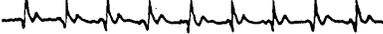
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He notes that compiler suppliers have been consulted throughout development of the federal validation test, and also that the NBS/GSA plan includes an interagency "interpretation committee" set up specifically to hear the suppliers' complaints. But "it hasn't been possible, and never will be, to resolve all the differences regarding implementor-defined functions to everyone's satisfaction, which is why those sections were written that way in the first place. It would be far better for the feds to acquire commercial compilers and use the existing mechanisms—ANSI's X3J4 subcommittee and Codasyl—to bring about changes in the language and the standard cooperatively with industry."

"Oversold" concept

The main justification for acquiring identical COBOL compilers—that it makes programs and programmers more portable—has been "greatly oversold," Henriques adds. Payroll programs are supposedly the most portable software of all, yet he contends it's impossible to set up a common processing routine for all federal agencies, and even within individual agencies, be-

cause laws and administrative regulations require different calculation methods. "So where is the saving?" Henriques asks.

The CBEMA official, who was at NBS when the validation tests were being developed a few years ago, insists they were never intended to be the basis for a "pass-fail" test. That idea originated with GSA, he adds. Because of the standard's vagueness in a number of key areas, however, and the fact that the language is "volatile," it is "inappropriate to use such a simplistic approach." The government's major concern, he says, should be to reduce the overall costs of the system being acquired. If a non-standard compiler is part of the lowest-priced system bid, and the manufacturer can't make changes to pass the test, "the result of insisting on strict compliance will be to increase not reduce costs."

Henriques says validation tests "have a place in the procurement process, provided they are not used to determine absolutely whether a particular bid is accepted." The better approach, he argues, would be to develop a rating scheme capable of grading a compiler

after it was tested, to show the relative importance of any deviations uncovered.

He believes that despite the apparently-unambiguous language NBS and GSA are planning to incorporate into the upcoming federal property management regulation, the administrative procedures will allow for "a certain amount of interpretation" by all parties, including the using agency, and permit acceptance of compilers containing "some deviations."

He may be right. The new federal COBOL standard says "a waiver may be granted . . . provided it can be clearly demonstrated that there are appreciable and continuing performance or cost advantages to be gained, or that extenuating circumstances are such that the overall interests of the federal government are served . . ." The standard adds that when an agency needs "special capabilities" that can't be implemented by a compiler conforming to the new standard, it must apply for a waiver before including these capabilities in a procurement specification. However, the standard clearly indicates the waiver will be allowed if the agency can demonstrate that the special capabilities will produce "an appreciable and continuing performance or cost advantage."

Davis, when asked about NBS waiver policy, said each request will be evalu-

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CIRCLE 9 ON READER CARD

September, 1975

ated on a case-by-case basis. No evaluation criteria will be published because "there's no way of putting them into words." She added that agencies probably will be given an opportunity, before soliciting bids, to seek waivers covering those portions of the standard they don't consider essential to their requirements. Whether NBS or GSA will make any independent effort to verify that such functions really *are* nonessential "hasn't yet been decided."

Another important unknown is the effect of this approach on Rep. Jack Brooks, chairman of the House Government Operations Committee. The Brooks committee oversees the activities of both NBS and GSA.

Last month, in letters to Davis and to GSA Administrator Arthur E. Sampson, Brooks questioned whether a using agency should be allowed to determine "the extent to which a compiler to be procured by it need meet the federal COBOL standard." Such an arrangement, he added, "might be detrimental to the economical and efficient procurement and use of adp equipment and software in the federal government. Lack of uniformity in COBOL compilers has in the past, and could in the future, conceivably cost the public untold millions of dollars . . ."

—P.H.

Government Procurement

Service Firms Oppose GSA Discount Plans

A big government teleprocessing services buy—worth an estimated \$50-60 million in business during its first year and even more after that—was to have been put out for bid in August by the General Services Administration. And a big battle was brewing over the terms and conditions of the procurement.

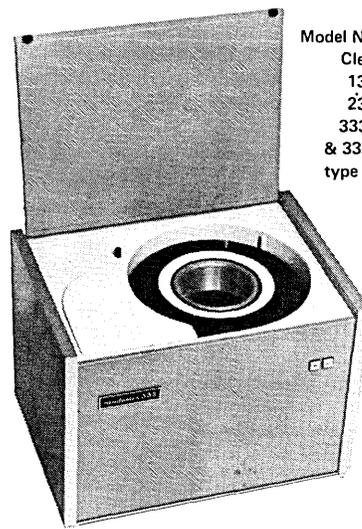
The services industry is unhappy because GSA plans to insist on liquidated damages, to solicit bids from service bureaus operated by universities and other non-profit organizations, and to forbid major changes in a supplier's offering once he has won a contract, unless the government gives its approval in advance. Biggest disagreement is over GSA's intention to use "discount benchmarking."

This consists essentially of determining the biggest discount offered by a supplier whose bid is representative, then insisting that every other supplier, to get a contract, must offer an equivalent reduction.

Two industry trade associations contend that this is unfair. The Association of Data Processing Service Organizations (ADAPSO) said in a letter to GSA commissioner Theodore Puckorius, chief architect of the procurement, that

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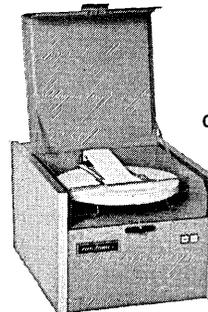
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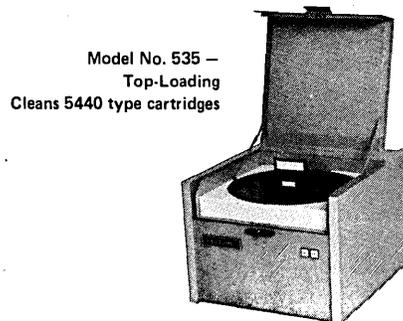
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CIRCLE 113 ON READER CARD

news in perspective

"no reasonable discount schedule offered in good faith should be subject to further negotiation."

The National Council of Technical Service Industries (NCTSI) has told GSA that "any requirement for a discount as a pre-condition of receiving a contract is unwise (because it) ignores the complexity and competitiveness of the industry . . . All good faith offers that technically qualify should be awarded contracts."

A GSA source insists that discount benchmarking is the fairest way for the government to obtain the benefits of volume purchases. "In a procurement like this, where each bidder's offering usually differs significantly from all the others—in terms of the software offered, the turnaround time provided, terminal support, and shift availability, for example—it's obviously unfair to award on the basis of lowest unit cost. On the other hand, a large volume of

new business should reduce costs by approximately the same ratio for all these bidders regardless of how big or small they are, or what other differences exist in their offerings."

"We'll Go To Congress"

NCTSI's executive Director, Edward C. Leeson, says that if GSA insists on discount benchmarks, "we'll go to Congress." His association, headquartered in Washington, has 16 corporate members, including Control Data, Programming Research, Lockheed, SDC, Boeing, and Computer Sciences Corp.

Ever since 1973, CSC has been the "supplier of first resort" to federal agencies needing outside machine time. Earlier this year, GSA announced plans to replace this arrangement with an open-ended teleprocessing contract under which any responsible supplier who could meet specified technical requirements at a sufficiently-discounted price would be given the same preferential treatment accorded CSC.

Each firm receiving a contract from this new procurement would be included in a list of approved suppliers. Whenever a federal agency had a requirement for outside support, it would have to order from one of these firms. Only if the agency couldn't satisfy its requirement by dealing with a listed firm would it be able to order from an unlisted supplier. GSA estimated that by 1978, listed firms would be supplying 80% of the federal government's requirement for outside services.

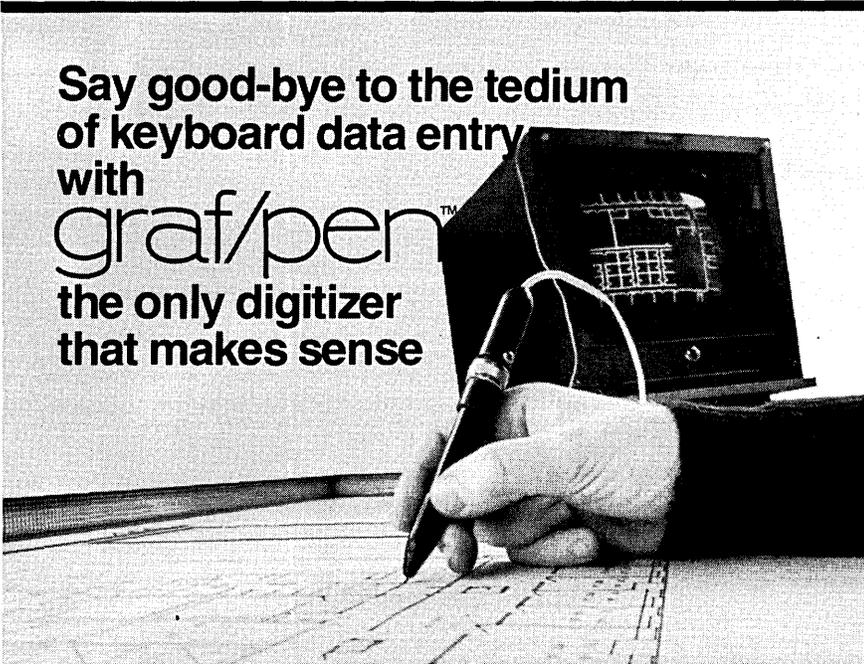
New deal for Infonet

CSC meanwhile negotiated a new agreement with GSA, under which the feds continue to obtain its Infonet service at bargain basement rates, and the company—until the end of the year at least—remains the supplier of first resort. After the date, this arrangement will continue on a month-to-month basis until 30 days after the first order is placed under the new multi-vendor teleprocessing services contract. Thus, the longer that award is delayed, the more CSC benefits.

Even assuming the present disagreement over discount benchmarking and related matters is settled quickly, there is some question whether the other suppliers will get as much business as GSA has indicated.

Most federal agencies employing Infonet are using CSC's proprietary software, and would find it expensive to shift to another source. In FY '75, when ended last June 30, the company collected about \$19.5 million for Infonet-based services—i.e. about 25% of what the feds spent on outside machine time. And until the end of this year, or whenever CSC's present arrangement terminates, the company will be in a position to increase this share.

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News in Perspective **BENCHMARKS . . .**

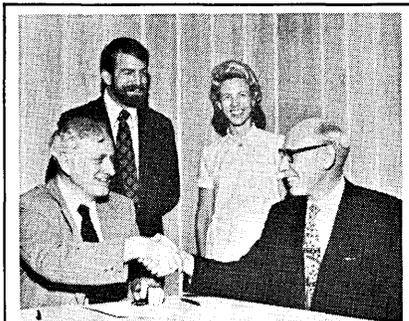
Vindicated: Photophysics, Inc., Mountain View, Calif. printer manufacturer which had been reduced to "four people in a holding pattern" in the year and five months it fought in court against patent infringement and theft of trade secrets charges brought against it by Varian Associates, was vindicated by Judge Samuel Conti of the U.S. District Court in San Francisco. Varian had charged infringement of four patents. Judge Conti ruled that Photophysics did not infringe on three of them and that the fourth was invalid. He also ruled that the Mountain View firm had not used Varian trade secrets, and that the statute of limitations for such violations had already expired prior to Varian initiating its complaint. Now Photophysics is out looking for money so it can get going again. President Dallas Talley estimates this will take about \$500,000. "We'd like to be acquired by somebody, maybe."

Datran Expanding: Datran last month said it will add 12 new cities to the 18 it already provides with data communications services. New markets to be added during the second half of 1975 are Atlanta, Denver, Hartford, Milwaukee and Phoenix. By mid-1976, Cincinnati, Indianapolis, Miami, Minneapolis, New Orleans, Portland and Seattle will be brought on line. Datran currently services mid-continent customers in Dallas, Houston, Oklahoma City, Tulsa, Kansas City, St. Louis and Chicago. Its network was expanded to the West Coast last February with the addition of Los Angeles and San Francisco. In June the network was expanded to the East with the addition of Detroit, Cleveland, New York City, Boston, Philadelphia, Baltimore, Washington, D. C., Columbus and Pittsburgh.

\$10 Million for Datran: Wyly Corp. has secured the \$10 million it said it needed to keep its Data Transmission Corp. (Datran) subsidiary operating through the end of the year. The money was loaned by Walter Haefner Holding AG, bringing the Swiss investment company's total investment in Wyly to \$40 million. It said the newest \$10 million loan is secured by a lien, subject to the rights of other creditors, on the assets of Wyly's University Computing Co. subsidiary. The company also has engaged investment bankers to pursue the sale of its Gulf insurance Co. subsidiary.

After End Users: Traditionally oem Computer Automation, Inc. took a second step into the end user market with acquisition of a systems software package and the formation of a commercial

systems division. The first step was in mid-1974 when CAI formed an industrial systems division to offer systems built around its Capable Tester, a computer based logic tester (July '74, p. 131). The newly acquired software package, designed to take advantage of the company's MegaByter, a minicomputer capable of addressing up to one million bytes of memory, will put the Irvine, Calif., company in the small business computer market. President David Methvin said the package was acquired from "foreign interests." Ivan D. Socher was named general manager of the new commercial division which will market systems using the package. Socher formerly was managing director and chief executive officer of Computer Advances Pty., Ltd., of Johannesburg, South Africa.



TESTING AGREEMENT: The Institute for Certification of Computer Professionals (ICCP) and The Psychological Corp. have signed a long-term agreement under which the corporation will provide psychometric consultation and services and administrative support for ICCP's testing programs, particularly the Certificate in Data Processing (CDP) program. Finalizing the agreement are (left to right) John K. Swearingen, president of ICCP; Fred H. Harris, vice president, ICCP; Sallyann Henry, assistant director, professional examinations division, The Psychological Corp.; and Wimburn L. Wallace, vice president of The Psychological Corp. and director of professional examinations division.

Burroughs to buy Redactron: Burroughs accelerated its entry into the word processing market with an agreement in principle to acquire Redactron Corp., a Hauppauge, N.Y., maker of automatic typewriters and other word processing-related devices (April, p. 128). Burroughs earlier this year acquired Graphic Sciences, Inc., a manufacturer of facsimile machines. These systems generally are related to the word processing field. The Redactron acquisition will involve an exchange of shares in which Burroughs will pay an equivalent of \$9 million.

System/3 Life Expectancy: A survey conducted by Decision Data Computer Corp., Horsham, Pa., showed that current users of System/3 intend to keep

the system for an additional 4.5 years. Frank McPherson, Decision Data vp, marketing, said the survey was done to provide a guide to marketing direction for new products beyond those for card data preparation. Decision Data sells card data recorders to S/3 users. The company interviewed 2,700 users in its survey. "If the affirmative intention of these users is fulfilled," McPherson said, "System/3 could have more life remaining than many of the newer 'small' systems introduced during the past five years."

Evaluation Needed: The General Accounting Office has charged, in a report to Congress, that federal grantees aren't evaluating their dp needs adequately, and aren't exploiting opportunities to cut costs—such as system-sharing and use of independently-made peripherals. A GAO study, which encompassed state and local government grantees as well as private agencies, resulted in a recommendation that the General Services Administration adopt new rules capable of closing these loopholes. GSA also should "adopt follow-up procedures" to ensure the rules are followed, GAO said.

Reprieve for Execunet: A federal appeals court has agreed to allow MCI's new "Execunet" service to continue until it decides whether the offering is a private line service—as claimed by MCI—or a switched, long-distance dial-up service—as claimed by AT&T and the Federal Communications Commission's common carrier bureau. MCI isn't authorized to provide dial-up service. Execunet allows an MCI customer, using any telephone, to call a local number, input his billing code, and then be connected to a distant exchange over MCI facilities. From the latter point, he rides an AT&T local exchange circuit to the called party's phone. The Execunet rate is based on a per-minute charge, a connection charge, and a monthly minimum. Although primarily a voice service, it also can be used to transmit data between acoustically-coupled and/or hard-wired terminals.

Congressmen and Data Processing: The House of Representatives has increased the amount that a Congressman can spend on computer services from \$250 per month to \$1,000. The money can be spent on terminal rental and/or commercial data base services like the New York Times Information Bank. So far, "some" members have contracted for services and "about two dozen" have acquired terminals, a spokesman said. Total membership of the House is 435. The terminals must be selected from an approved list that now includes four manufacturers—Anderson-Jacobson, Bunker Ramo, Hazeltine, and Trendata. IBM may be added shortly. *

LOOK AHEAD

(Continued from page 18)

and store speed of 1.2 microseconds and a 900 nanosecond logic and arithmetic instruction speed.

Although the \$925 computer will be announced later this month, the company already has shipped about 100 since last November to military and some commercial systems suppliers. The cpu will address up to 32K words of memory, but can be adapted to address up to 64K, says Don Winstead, head of the 25-person division formed in early August.

SHARE'S OLDTIMERS SHOW UP FOR ANNIVERSARY

The 45th meeting of SHARE in New York's Hilton hotel last August also was the huge IBM user organization's 20th anniversary meeting. And it drew many of the oldtimers who gathered in groups to bemoan the way the organization has changed in two decades. "SHARE has become an organization of docile bit-pickers," was the wistful comment of one oldtimer who recalled the clout the users once held in specifying IBM's designs.

Joked one IBMer of the keynote speech by John F. Akers, president of IBM's dp division: "The theme could be summed up this way: 'Ask not what IBM can do for you. Ask what IBM can do to you.'" Adding to the good-natured irreverence was a group of up-the-creek OS users who paraded through the lobby and grand ballroom carrying a canoe paddle and wearing lapel buttons reading, "MVS is a virtual four-letter word." (If the newcomers were intrigued by the antics of their seniors, it didn't show. A session featuring talks by oldtimers attracted only the oldtimers.)

The organization, whose next meeting is in San Francisco in February, obviously was impressed over its accomplishments with a woman as president: It elected two women to next year's executive board. Succeeding Martin Marietta's Shirley F. Prutch as president, is Edward J. Farrell, of W. R. Grace & Co. Mary D. Lasky, Johns Hopkins Applied Physics Lab, was elected vice president, Bettye M. Odneal, Univ. of Texas, treasurer, and Charles Siegel, U. S. Fidelity & Guaranty, secretary. Bruce Rosenblatt, Standard Oil of Calif., and Leo F. Zimmerman, E. I. DuPont, were elected to the board.

RUMORS AND RAW RANDOM DATA

Spur Products, Santa Monica, Calif., hopes to begin offering a 1403-like line printer before next January 1 at a price of \$10,000--a third of the present IBM 1403 price. Spur's president Ray Lorenz, who has been developing 1403 interfaces for non-IBM gear (August, p. 18) says the printer will hook directly to the IBM 2821 controller and would be attractive to users whose 2821 runs more than one 1403...Control Data's newest floppy disc drive offering will be a double density version of its 9400 3.2 megabit subsystem...IDMS, the Codasyl-approved data base management system developed by B. F. Goodrich and marketed by Cullinane Corp. continues to proliferate. The product is now offered by the U.K.'s ICL for its 2900 New Range series, and DEC soon will offer IDMS with its 11/45 and 11/70 machines...DEC plans to enter the word processing market using one of its minis in a shared processor type of system that would, among other things, attack typing pools. The minicomputer giant is stuggling with plans to market the product... Sign of the times: IBM hired "clairvoyant" Jean Dixon as a speaker in Washington recently. Some wags said she might predict the outcome of the IBM-Justice Dept. antitrust case which returns to trial this month after a two-month recess.

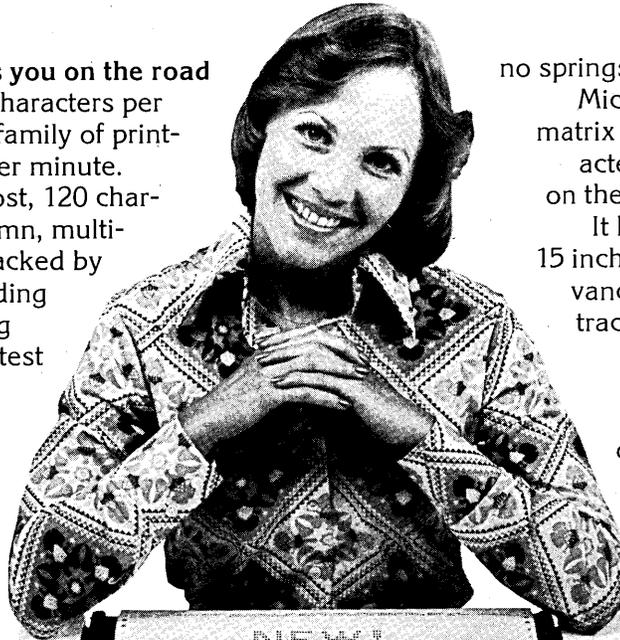
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detachable keyboards—a typewriter-style keyboard with numeric pad, or a keypunch-style keyboard with or without the numeric pad. Some other options are asynchronous communications, check digit verification/generation, a second cassette, and a hard copy printer.

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hardware

Off-line

"Electronic Calculators and Data Analysis: A Consumer's Report On The SR-51, HP-21, HP-55, and HP-65" is the title of an article destined to appear in the November 1975 issue of American Journal Of Political Science (!) For readers interested in the use of electronic calculators for data and statistical analysis, the "road test," authored by Edward R. Tufte of Princeton Univ., points out both the strengths and weaknesses of the Texas Instruments and Hewlett-Packard machines.

Speaking of calculators, the HP-65 was used during the recent Apollo/Soyuz rendezvous in space to calculate two critical mid-course correction maneuvers. The programmable unit was also used as the backup for Apollo's on-board computer for the final maneuvers prior to rendezvous and docking. The HP-65 is not the first Hewlett-Packard calculator to orbit the earth; that honor is held by the venerable HP-35, which has just been "retired" from H-P's product line.

Attention media suppliers! Anybody out there have magnetic tape cassettes compatible with the Burroughs L-8400? This machine is similar to a ledger card unit but uses continuous forms. If you can supply cassette tape for this model, please contact Mr. Don Voltmer, president of Aspen Computer Service, Inc., Box 10550, Aspen, Colorado, or call (303) 925-5544.

With legal requirements for keeping copies of all tty, Telex, TWX, RCA Globecom, ITT, and Western Union messages by calling and receiving stations around the world for at least three years, ABC (American Broadcasting Companies, Inc.) was becoming inundated with paper tape at its NYC headquarters. It recently solved the problem with the installation of a minicomputer driven system called TELECONTROLLER developed by Action Communications Systems, Dallas, Texas. Messages are now sent and received automatically on the system; the number of misdirected/lost messages is substantially down; and all messages are automatically recorded on magnetic tape. "We're saving money 24 hours a day, and that's what my management likes to hear," says Chester K. Bellairs, ABC's Director of Corporate Communications.

Terminal Monitor

This product seems like a clever application of a microprocessor. It's a terminal monitor that uses an optical coupler system for attachment to any



type of terminal equipped with an "input inhibited" or "keyboard lock" indicator. The monitor keeps track of average response time, minimum and maximum response time, and the

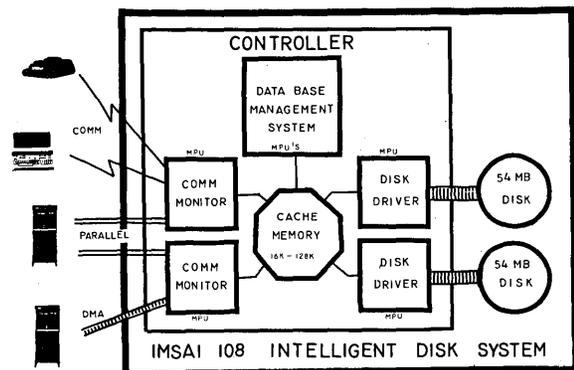
number of transactions for the terminal. The numbers are displayed at the push of a button, which can be located either externally or inside the device so that it cannot be inadvertently reset. The price is \$950. Availability varies as the supply of microprocessors does, says the builder, but is generally 60 days. QUESTRONICS, INC., Salt Lake City, Utah.

FOR DATA CIRCLE 246 ON READER CARD

Phone Call Transfer

The "Phone-Call-Transfer" goes the paging system or beeper we've all seen maintenance personnel wear one better: actual incoming calls can be rerouted by secretaries or anyone else around your phone to any other phone you desire as long as your phone has two or more lines attached to it. The advantages are obvious: long distance calls can be transferred easily, saving call back charges, and the unit can even be used to set up conference calls. The unit is color matched to your

product spotlight



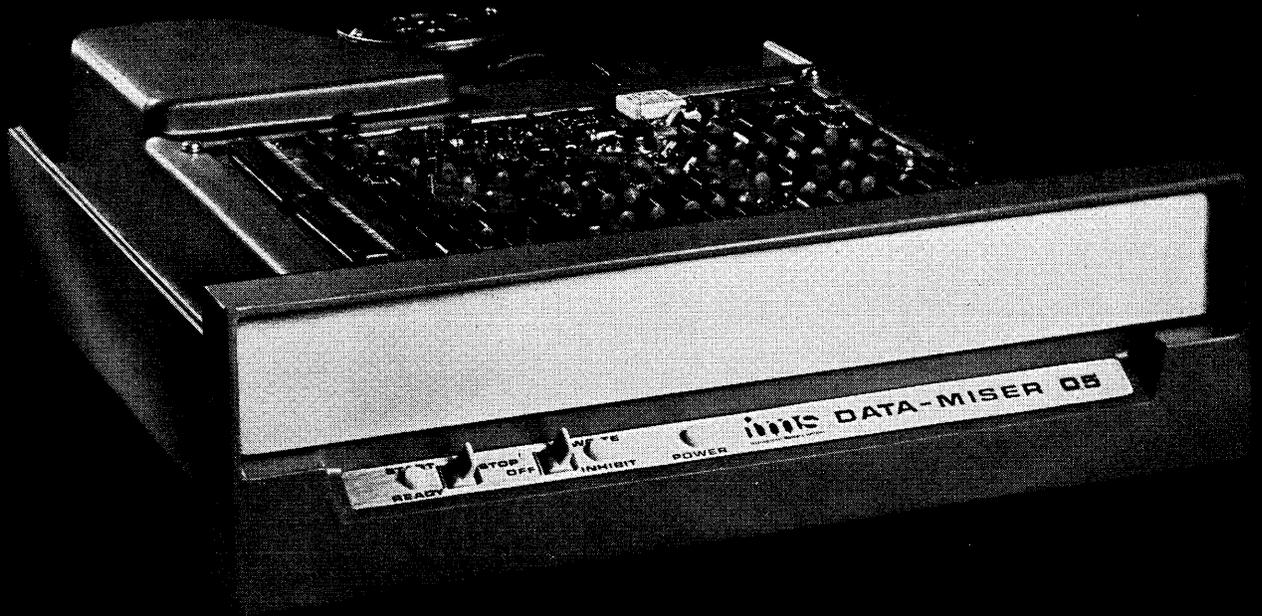
Intelligent Disc Storage

The IMSAI 108 Intelligent Disc System may turn out to be one of the most significant products introduced in years, altering the manner in which computing is done on computer systems. Using IBM 3336-type disc packs, the key to the 108 is its controller. Some controller! It contains from 16-128K bytes of 450 nsec cache memory—sufficient to hold a data base management system, and five cooperating microprocessors that perform the data base operations in firmware. As additional applications are implemented on the 108, additional microprocessors can be simply "dropped into" the 108 to adjust performance to desired levels. In most cases, only host commands and specified data fields need be passed between the host cpu and the 108's

controller, with all indexing, searching, and deblocking operations performed on the disc side. If properly taken advantage of, these capabilities could enormously improve the performance of a given computer system. The 108 can be connected to multiple cpu's and/or terminals by RS232C, I/O bus parallel interfaces, or by direct memory access. Another potential market for the 108 is appended to IBM 3705 communications controllers; indeed, some users have already approached the three year old firm to develop such a system. Surprisingly, the IMSAI 108 is not expensive. Single-spindle configurations start at \$29,500. No trial units are as yet in the field, but units can be made available within 90 days ARO says the manufacturer. IMS ASSOCIATES, INC., San Leandro, Calif.

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hardware

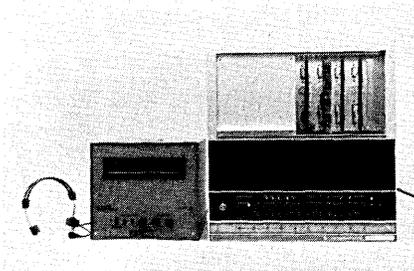
phone and sells for \$50, or three for \$135. The unit has an input-output jack and the manufacturer can furnish a recorder/player for an additional \$25 (or three for \$60.) THE PHONE-SENTRY CORP., Livingston, N.J.
FOR DATA CIRCLE 247 ON READER CARD

Type/Print Upgrading

You're interested in the exciting typing/printing units with speeds from 30 up to 120 cps, but don't want to go to all the trouble of converting your hardware and software that supports your current 15-cps set-up? The Daniel 4200 data controller/converter might be all you need to effect the change. It plugs in between the cpu and the new printer you have your eye on. Up to 10 printers can be handled by one 4200, with prices starting at \$1,600. The only restriction on using the 4200 is that both the computer system and the terminal must understand tilt/rotate or other similar codes. The 4200 only understands standard asynchronous ASCII—which is most of the world. DANIEL SERVICES, INC., Houston, Texas
FOR DATA CIRCLE 248 ON READER CARD

Voice Recognition

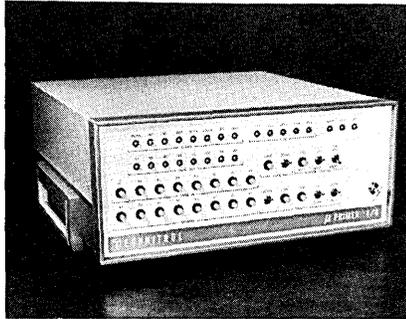
The VDETS 1000 is probably the most unusual tty-replacement machine ever offered, for it supplants "digital" input (in this case meaning the fingers) in favor of voice input. Spoken utterances are converted to machine readable code, offering whole new ranges of applications. The input can be in the form of words or short phrases and the output is standard ASCII code. The minimum system has a 75 word vocabulary, expandable past



200 words if required. Syntax structure is provided to match the vocabulary and organization to a variety of common tasks (for example, BASIC or FORTRAN programming languages, tty or tty keyboard or digits, and a general purpose syntax.) Special syntax structures can be added to match special applications. The VDETS operates with up to four simultaneous speakers. Prices start at \$15K. SCOPE ELECTRONICS INC., Reston, Va.
FOR DATA CIRCLE 249 ON READER CARD

Microprocessor Trainer

The microprocessor phenomenon has reached the point that a "hands on" training aid has been developed to help engineers master the workings of the ubiquitous devices. It's called the μ Primer 4/8, a self-contained unit consisting of the microprocessor, memory circuits for program and data storage, a front panel with controls and indicators to address and display the memory contents and cpu condition, and all necessary power supplies. The unit is



available for any 4- and 8-bit microprocessor on the market and can execute all instructions in the manufacturers' instruction sets, including arithmetic operations, logic manipulations, accumulator rotations, register to register transfers, conditional and unconditional jumps, etc. The μ Primer 4/8 is priced at \$2K, which includes chips from the microprocessor the engineer has chosen to work with. TECHNITROL, INC., Philadelphia, Pa.
FOR DATA CIRCLE 251 ON READER CARD

Elevated Floor Lifter

LIFTER-BRAC is the name of this floor lifter tool holder, which is intended to be mounted near an installation's fire extinguisher so that personnel will always know where the lifter is. It's priced at \$16.95. Complete with double-cup floor lifter the price is \$32.90. J. R. LUKEMAN & ASSOCIATES, Oklahoma City, Okla.
FOR DATA CIRCLE 250 ON READER CARD

Supercomputers

CDC has expanded the size of what it used to call the "small core memory" on its larger CYBER 76 line, and even changed the technology to semiconductor, so it's now called the "small semiconductor memory." The memory operates like a cache, featuring 110/165 nsec read/write cycle times, respectively, which takes better advantage of the cpu's very high speed. The SSM is the primary work area for the processor and provides residency for the SCOPE 2 operating system and for the dynamic allocation of user jobs in process. Users will now be able to do more simultaneous multiprogramming functions completely within the small memory section. Two of the CYBER 76

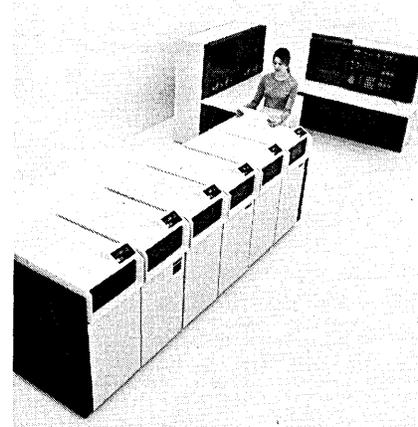
systems combine 64K words of the high-speed store with either 256 or 512K 60-bit words, while the new top of the line, the 76-142 uses 128K of semiconductor with 512K of core. This system is priced at \$7,519,000, or \$152,076 for a three-year lease. The maintenance charge of \$21,919 is more than the rental on many medium scale systems.

Also announced was the 7639/819 disc subsystem to complement CYBER 76s, with each 819 drive having a capacity of 413 million characters. Up to three single-controller, two-drive systems can be supported under the SCOPE operating system, yielding a capacity of 2.4 billion 6-bit characters. The average access time is 50 msec, and the transfer rate is 6.2 million cps. The controller/drive subsystem sells for \$180K or rents for \$4,720/month on a three-year lease. CONTROL DATA CORP., Minneapolis, Minn.
FOR DATA CIRCLE 254 ON READER CARD

Disc Storage

There's a new king-of-the-mountain for IBM users to consider in selecting disc storage systems. Actually, there are two new units, both extensions of the 3340 (Winchester) product. Both new subsystems, the 3350 and the 3344 operate with 370 135-165 models equipped with either of the two virtual memory operating systems.

The 3350 is an impressive device. Each module contains two spindles, each capable of storing approximately 317 megabytes of data—more than



50% more than IBM's previous record holder, the 3330-11. The average seek time is 25 msec, compared to 30 msec on the 3330. Users can even mix strings of new 3350s, old 3330s, and recent 3340s off the same control unit for flexible configurations.

The 3344 is an extension of the 3340 with the same performance characteristics, but with four times the capacity—280 megabytes. Both the 3344 and the 3350 are available in models containing approximately one megabyte of fixed-head storage per

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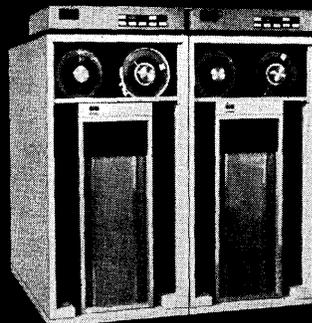
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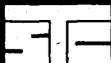
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hardware

spindle for tasks requiring high-speed access to such important data as indexes or job queues. Where the initial Winchester drive featured removable packs, both the 3344 and 3350 feature non-removable media and are obviously intended for high-performance, on-line, and data base applications. The first 3350 in the string is the A2, priced at \$62,500 or \$1,704/month rental. Subsequent drives (model B2s) are \$49,500, and \$1,351 rental. The same price/rental applies to 3344 B2 models which use the 3340 controller. Both disc systems will be available during the first half of next year. IBM CORP., White Plains, N.Y.

FOR DATA CIRCLE 252 ON READER CARD

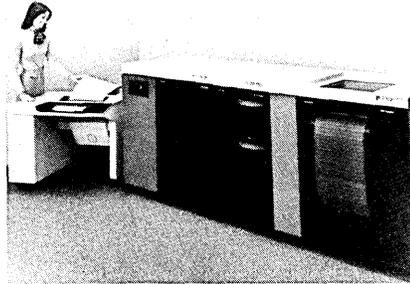
High-speed Printer

The Series 200/XL can print up to 132 characters on standard 8½-inch wide paper, using 7x9 dot-matrix electrostatic technology. The series is available as a KSR (keyboard send/receive) or read-only printer, with selectable speeds of 7.5, 10, 15, 30, 60, 120, or 240 cps. Character sets go all the way up to a full 96-character upper/lower case repertoire. Prices start at \$2,045. SCOPE DATA INC., Orlando, Fla.

FOR DATA CIRCLE 256 ON READER CARD

Communications Processor

The B 776 almost looks like too much machine for communication network control, data collection, line and terminal data concentration, and store and forward message switching. Of course, another way of looking at it is that it may never get overloaded performing these functions. Maybe security is worth overkill. The device is based on Burroughs' B 700 series of micro-



programmed small-scale computer systems. It can communicate not only with other Burroughs gear, but also with other manufacturers' systems. A significant part of the hardware is the ability to have two separately functioning data communications processors operating concurrently. Each processor can handle up to 16 data lines in various transmission speeds and modes. All programming for the B 776 is done in high level languages. User

programs run in 8-64K of memory, with an additional 32K bytes standard to hold the communications control programs. Set up for a data concentrator environment, the B 776 sells for \$68K. Rental and lease plans are also offered. BURROUGHS CORP., Detroit, Mich.

FOR DATA CIRCLE 253 ON READER CARD

PDP-12 Add-on Memory

The model 8 is a self-contained, plug-compatible memory system that can be installed on DEC's PDP-12 cpu, increasing its capacity by 24K words. No hardware or software modifications are required. The 24K unit is priced at \$5,200. FABRI-TEK, INC., Minneapolis, Minn.

FOR DATA CIRCLE 258 ON READER CARD

Hospital System

McDonnell Douglas Automation is getting very big in the hospital shared computer services sector—in fact it claims to be the nation's leading supplier. It has just installed a data collection system at the Lake View Memorial Hospital in Danville, Ill., the second of three phases that will take it to a total communication and information system (a financial control system was the first component of the system, and a hospital patient card module is the third member).



Based on an in-house minicomputer, the systems feature crt terminals and printers located in admitting, nursing stations and major service departments (radiology, laboratory, pharmacy, etc.) to improve communications. The intent is to eliminate common errors related to many routine activities, such as patient admissions, outpatient registrations, order entry and charge collection. Hospital personnel are prompted by the screens to enter complete and correct entries. The system works out to something between 85¢ and \$1.40 per patient day depending on hospital size, which seems worth the money. MCDONNELL DOUGLAS AUTOMATION CO., St. Louis, Mo.

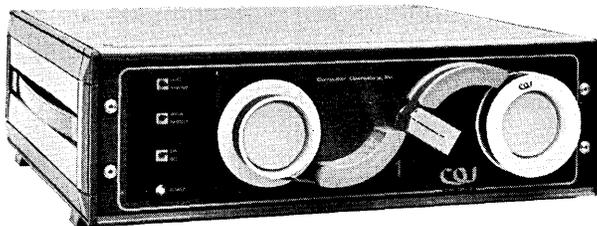
FOR DATA CIRCLE 255 ON READER CARD

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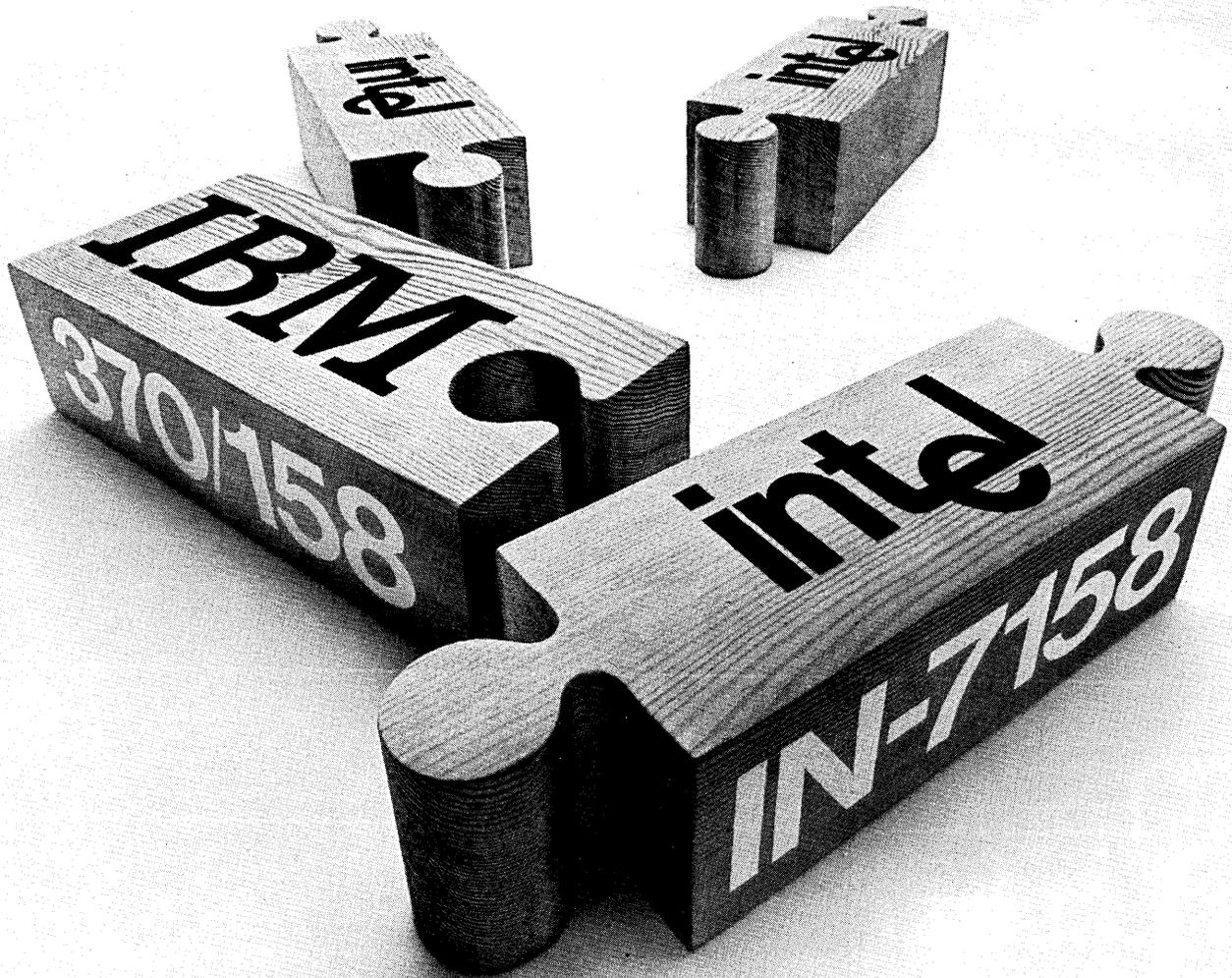
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CIRCLE 93 ON READER CARD



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For IBM 370/158 users, there's the Intel IN-7158. This system is built with Intel 4K RAMs making it the most reliable system available today and capable of

expansion to 8 megabytes in a single frame. That's twice as much as is available from anyone else. Memory can be expanded in 1/2 megabyte increments up to 4 megabytes and in 1 megabyte increments from 4 to 8 megabytes.

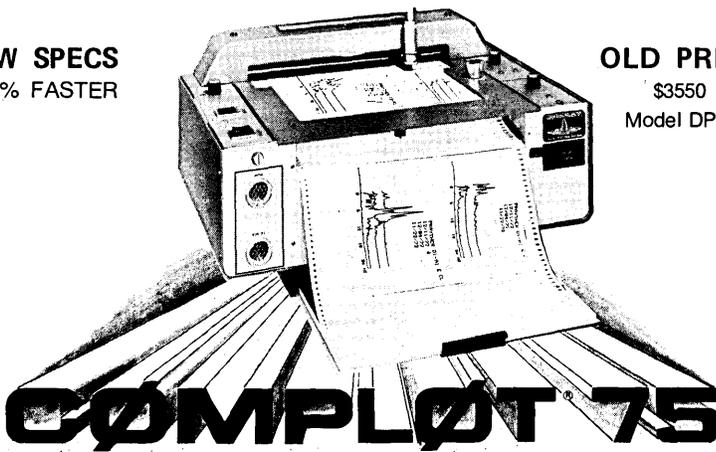
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CIRCLE 103 ON READER CARD

hardware

liant! The "Brilliant Bee" is a desk top unit complete with a 16-bit general-purpose mini inside it, expandable from 4-64K in 16K modules. Also featured are an alphanumeric keyboard, real-time clock, serial asynchronous interface, paper tape reader interface, firmware boot strap, and automatic program loading capability. When suitably outfitted, the "Brilliant Bee"



can be applied to applications such as printer graphics, 16-channel analog/digital conversion, use as a control console for a larger computer, buffer terminator, or driver for additional displays. The list price of \$5,945 is before oem discounting schedules are applied. BEEHIVE TERMINALS, Salt Lake City, Utah.

FOR DATA CIRCLE 257 ON READER CARD

PDP-11 Addressing

The Extended Addressing Option for the Digital Equipment Corp. PDP-11 minicomputer allows main memory to be expanded from the standard 28K words all the way up to 124K. Two versions are available; one for PDP-11/05 and 11/10 models contained on a single circuit card; and a PDP-11/15 and 11/20 unit that requires two cards (one module). Both plug directly into the PDP-11; the installation is said to be easy. The units are priced at \$600 when purchased with any size add-on core memory system from this manufacturer. FABRI-TEK INC., Minneapolis, Minn.

FOR DATA CIRCLE 260 ON READER CARD

Optical Mark Reader

The Sentry 7020 is primarily offered to schools for the purpose of reducing large volumes of data that can be expressed on optical mark reading input sheets. This includes tests, but can also encompass attendance records, registration, schedules, surveys, etc. The 7020 contains a 16-bit mini with 8K memory, a tty for interaction, a cassette drive unit for programming, an

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hardware

output tape unit, a document transport/stacker and optionally a line printer. The read speed is 7000 sheets/hour and has capabilities for scoring both sides of a sheet simultaneously, provisions for handling true/false or multiple choice questions, and can allow multiple correct answers to questions, if desired. Sixteen levels of discrimination are used to differentiate



between valid marks and a smudge or erasure. The 7020 sells for \$98,880 or can be rented for as little as \$1,375/month on a five-year lease, including maintenance. A slower model (3000 sheets/hour) is also available.

NATIONAL COMPUTER SYSTEMS, Minneapolis, Minn.
FOR DATA CIRCLE 259 ON READER CARD

Disc Media

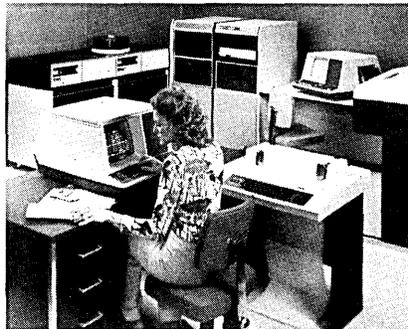
Together with Memorex, BASF, 3M, and others, CDC is offering an alternative source for IBM 3340 data modules. Both the 35 and 70 megabyte versions are offered: \$1,495 and \$1,995, respectively, or \$47-54 and \$67-75/month on one-, two-, or three-year lease contracts. CONTROL DATA CORP., Minneapolis, Minn.

FOR DATA CIRCLE 262 ON READER CARD

Small-scale Systems

Three disc-based small-scale systems based on DEC's 16-bit PDP-11 mini-computer have been announced, dubbed the Datasystem 350 series. The models 352, 354, and 356 range in price from \$20-70K depending on the mass storage system selected. Each system, whether standalone or in a network organization, can support up to four hardcopy or crt terminals, and all the systems feature true time-sharing, it's claimed. Processors are expandable from 32-56K characters. Mass storage includes a minimum of two flexible disc drives providing 512K characters of on-line storage to the model 352; two cartridge drives supplying 4.8 mil-

lion characters for the 354; and two 20 million character discs for the 356. This system can be expanded to over 160 million characters of on-line stor-



age if desired. An IBM 2780 communications protocol package is also offered. DIGITAL EQUIPMENT CORP., Maynard, Mass.

FOR DATA CIRCLE 263 ON READER CARD

Communications System

The Sycor 440 is an extension of this manufacturer's line of terminal applications systems that qualifies them for use as key-to-disc, remote batch entry, and even standalone computer system duty. Concurrent with data entry and inquiry/response applications, the 440 offers background processing including rje, file maintenance (editing, sorting, updating and file transfer), report generation and multi-terminal printer sup-



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port to allow each of up to eight displays to interleave data blocks to one printer while data is being entered. The



440 is software and communications-compatible with the company's 340 and 350 intelligent terminals and can be used to receive and transmit data to standalone or other 440 systems. The system can also communicate with mainframes, emulating IBM 2770, 2780, or 3780 protocols. An eight keyboard system is priced at \$894/month on a three year lease and sells for \$38,660. A four keyboard configuration sells for \$29,090 and \$677/month on the same contract. Lease prices include five million characters of disc storage (10 million is an option), cas-

sette storage, communications, and maintenance. SYCOR, INC., Ann Arbor, Mich.

FOR DATA CIRCLE 264 ON READER CARD

Hospital System

Based on the HP 2100 small-scale system, the 5600A Patient Data Management System can handle a number of useful chores around the hospital in impressive fashion. It is capable of monitoring and collecting data from 32 patients simultaneously while maintaining records of up to 99 patients, helping to reduce paperwork in a medical institution. Among the data collected are vital signs and laboratory test results. Staff notes, fluid balance results, medication records, acid base and cardiac output calculations and



other data can also be recorded. The status of each patient's vital

signs can be recalled easily for display at any one of a possible 16 terminals simply by entering the patient's code. Information can be displayed in the form of plotted trends for specified time periods, or in report form. Users can write their own application programs on-line while the system carries out its normal activities. Basic systems start at \$84,500. HEWLETT-PACKARD CO., Medical Electronics Div., Waltham, Mass.

FOR DATA CIRCLE 261 ON READER CARD *

Said a young robot, "Who's queasy?
The mixing of liquors is easy!

Just take a racy
nip of the AC,
and then a big drag of the DC!"

A man who had been a gourmet
used to plug in his robot and say,
"Now try not to bolt
your vintage of volt,
but sip it to taste the bouquet."

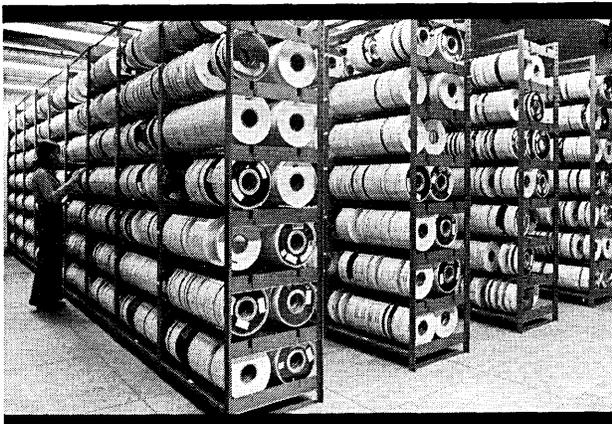
A robot who spoke to perfection,
took up a speech class by election,
and made easy A's
on the memory phase,
but flunked out on vocal inflection.

—Gloria Maxson

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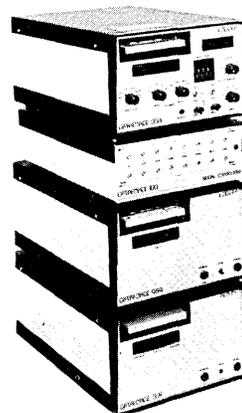
CIRCLE 88 ON READER CARD

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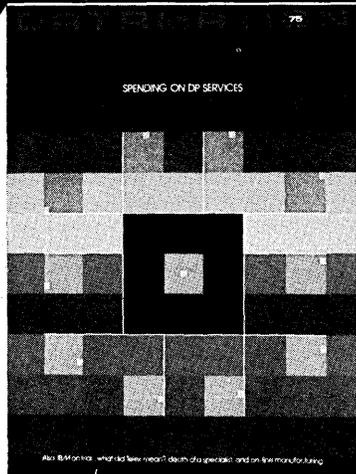
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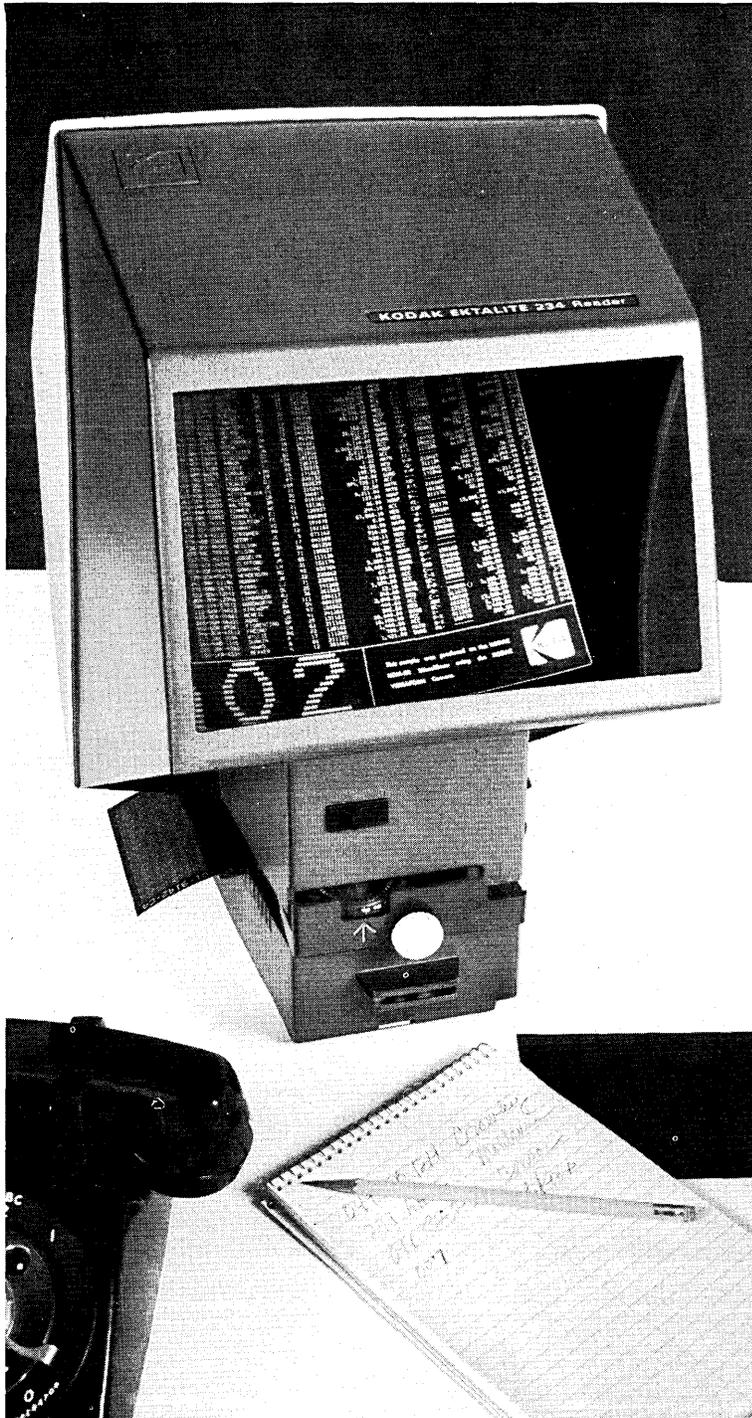
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software & services

Updates

A systems and software firm marketing a COBOL compiler for Interdata computers has announced its intention to become a clearing house for independently written software for that manufacturer's 16- and 32-bit computers. Diversified Data Systems, Inc., Tucson, Ariz., a six-year old firm has volunteered for the task. The idea behind the plan is that there is a sizable amount of good software available for the machines, but the relatively small developers can't afford the marketing costs for the low cost packages. DDS will now handle the advertising, mailing, licensing, etc., for firms wishing to have its products sold.

As part of its plans to start pushing its ADABAS data base management system to IBM 360 and 370 DOS users, Software AG has cut the price of the package by one-third from the OS price—down to \$80K from \$120K. The OS version has been well accepted in the U.S. (ADABAS originally came from Germany) but not a single DOS sale has been made by the Reston, Va. based firm.

Computers will certainly be used in the future to design more efficient buildings and equipment. Under a grant from the National Science Foundation, Battelle's Columbus Laboratories is compiling a comprehensive bibliography of available computer programs in the general areas of heating, refrigeration, air conditioning, and ventilation. If your firm has one you think should be listed, contact Christopher Crall, project leader, at Battelle Columbus Labs, 505 King Avenue, Columbus, Ohio, 43201, (614) 424-6424.

Digital Equipment Corp. has just recently announced a fully supported version of APL for its DECsystem-10 family of medium-scale computers. Three versions are offered: a basic system, an extended system, and a double-precision extended system. The double-precision extended version of APL-10 operates only on the KI-10 and KL-10 central processors and allows 18 decimal digits of precision. Prices range from \$10K for the starter system, and \$19,500 and \$22,500 for the other two systems, respectively. DEC recently acquired APL-10's creator, APL Software Systems, Inc.

Interdata Software

This new software house has fallen in love with Interdata's 32-bit product line, touting the stupendous performance almost as much as its builder. The firm hopes that its set of system software products will open up the end user market for the machine. Just completed are a multi-user executive, an output spooling package, and a disc sort. MUEXEC allows both local and remote terminals to log onto the system, submit jobs for execution, edit files, etc. It's priced at \$3,500. The spooler, SPOOL1, controls output to line printers, magnetic tape units, etc. and is priced at \$500. A virtual memory enhancement to the Interdata operating system is near completion which will allow 250 job tasks to have as much as one megabyte of disc-based memory concurrently. The price will be around \$5K. An IBM assembler to Interdata assembler language conversion package called BALCAL is also due out soon. Since the packages were developed for a specific purpose (particularly the multi-user exec), the first few buyers will get a price break to help "wring out" the monitor for general-purpose usage. The new vendor is at least candid! HENNING & COMPANY, East Hartford, Conn.

FOR DATA CIRCLE 236 ON READER CARD

Cobol Structuring

MODFILE is yet another software package offered for structuring high-level language computer programs (in this case COBOL) in order to improve maintainability, reliability, and therefore performance. The difference with this one is that it was developed in India and has sold very well in south-

east Asia for use on ICL, Univac, NCR, Honeywell, Burroughs, and IBM equipment including the System/3. MODFILE is limited to sequential and indexed sequential file processing—which is maybe 90% of all file organizations. From one to six sequential files are simultaneously handled, as are from one to 10 control levels. The claims of 25% programmer productivity increases would seem realistic and consistent with early findings regarding structuring techniques, and might even be very conservative. At \$975 for source code and documentation, MODFILE might be a steal. The first package has been sold in the States. DIVERSIFIED ENGINEERING, INC., Richmond, Va.

FOR DATA CIRCLE 237 ON READER CARD

Teleprocessing Interface

The Terminal Application Processing System runs as an application program under a system's communications monitor, permitting users to remain flexible in their choice of data base systems, terminals, and communications equipment. The module consists of an applications generator, program monitor, on-line simulator, recovery driver and data utility. Using these tools, the user can make up for any differences in various manufacturers' equipment merely by changing coding sequences instead of having to change equipment. The on-line portion of TAPS is composed of 18 COBOL modules all of which can be resident in a maximum of 48K bytes of storage. Users can at their option use higher level languages, such as COBOL or PL/1 to develop applications. TAPS is currently operable under DOS, OS, and VS versions of IBM's CICS, and OS and VS versions

software spotlight

IMS Control

About to embark upon the development of a control/utilization/accounting package for IBM's IMS data base system, Boole & Babbage found one developed by a small Arlington, Va., firm called Morino Associates that it felt was as comprehensive as possible, and bought the rights to the program, called CONTROL/IMS. The package has already gone into seven installations since it went on the market March 17 of this year.

What CONTROL/IMS does is provide a better handle on who is using IMS, and how—how much time is being spent within IMS by specific users, how much system resource is being tied up, etc. This data is posted to the standard system transaction log tape for subsequent report program analysis by CONTROL/IMS. At \$14,500, CONTROL/IMS would probably pay for itself within a year by taking advantage of its accounting features alone, with its system control and forecasting features a "freebie" bonus. The price includes one year of maintenance and training. The price for multiple-cpu installations is \$17K. BOOLE & BABBAGE INC., Sunnysvale, Calif.

FOR DATA CIRCLE 235 ON READER CARD

Introducing

ASI/INQUIRY

The IMS DB/DC QUERY LANGUAGE



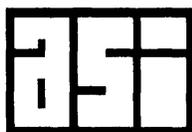
ASI/INQUIRY is an IMS DB/DC interactive query language that operates completely as a Message Processing Program. The design of ASI/INQUIRY is such that the *structure of the data base is totally transparent to the user*. Moreover, one need not have any familiarity with DL/1 segment logic or the complexities of multi-pathing. Extremely rapid response 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.

A number of seminars on ASI/INQUIRY will be held in major U. S. cities in the near future. Watch for announcement of the seminar schedule, and plan to attend the one near you. However, if you want to start answering "What if . . ." immediately, call or write today for further information.



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The use of the MARK IV® System for implementation of their data processing applications produced these savings and other bonuses.

MARK IV Systems are used by some of the largest industrial firms – both domestic and international – yet most of the 900 MARK IV users in 39 countries have staffs of 50 persons or less, and they are at least twice as productive as staffs using Cobol or PL/1. Users say that no other system offers the power, flexibility, and simplicity of the MARK IV System. Let some of our users tell you about MARK IV.



OWENS-ILLINOIS

Financial Systems
Manager John Kennedy,
of Owens-Illinois, Inc. in
Toledo, Ohio, reports that

“We needed to have a faster methodology.

The MARK IV System has cut in half our estimates for programming requirements – in both time and money. We have also added the MARK IV/Accounts Payable product to our operation. And MARK IV is every bit as economical as Cobol in execution.”

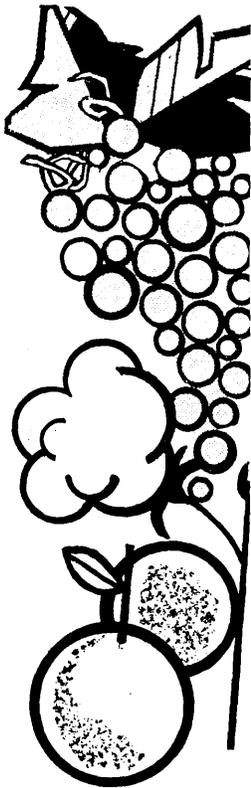
David Christenson,
Data Processing Manager,
Buckbee-Mears
Company of St. Paul,
Minnesota, says:

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“MARK IV is our standard implementation language. We are in the process of rewriting 400 Cobol jobs in MARK IV, and, in the process, adding enhancements and a data base capability to the design.

“The MARK IV programs run more than 15 percent faster than the Cobol jobs they replace.” Christenson adds, “Our four MARK IV programmer/analysts can do the work of 8 to 10 Cobol programmers.”

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Tulare County in California ranks third as the most prosperous agricultural county in the United States. Marv Kelly, Assistant Director of Data Processing listed three ways in which MARK IV justified its purchase price. "MARK IV serves as a language which does not require hours of coding; it enables us to handle file maintenance, give quick response and to get multiple reports from one pass of a file; and provided the means for us to maintain our staff of 5 programmers for almost 3 years and still handle an increased workload."

Kelly reports that "Ninety-five percent of all new programming in the County is in MARK IV and programming times are 50 percent less (at least) than Assembler, our old language. The Tulare County data processing department handles all of the work for the tax collector, tax assessor, personnel, payroll, welfare, budgets and 65 school districts."

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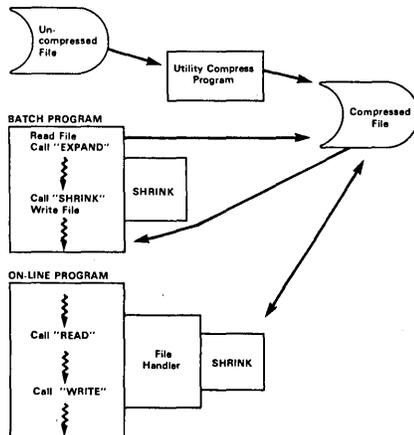
of TCAM. It's claimed that the product can be readily converted to run under any communications monitor within approximately 30 days. TAPS is available for \$25K or \$750/month. DECISION STRATEGY CORP., New York, N.Y.

FOR DATA CIRCLE 238 ON READER CARD

Data Compression

No, SHRINK is not a patient billing program for psychiatrists—but it could conceivably keep your dp or data base manager from having to visit one! The product is designed to compress and expand disc storage records in order to make better use of available resources. The program operates on IBM 360 and 370 equipment and requires 8K bytes of memory, plus a variable (small) amount per file. Benchmarks have indicated that SHRINK requires about one cpu second per 100,000 bytes of compressed data on a System 370/158, and that average files have been compressed 50-75%. It's also claimed that any data can be shrunk, but that familiarity with the data can increase the compression ratio. Object decks averaged

54%, while packed and alphanumeric files averaged 69-70% in the benchmarks. The package sells for \$10K for the first cpu and \$2,500 for each additional mainframe. The batch version is



available now and an on-line version will be out in a few months. PROGRAMMING DIV., GTE INFORMATION SYSTEMS, New York, N.Y.

FOR DATA CIRCLE 239 ON READER CARD

Material Requirements Planning

Many manufacturers have already taken advantage of IBM's MRP program to help make production decisions and manage inventory levels, so this package is probably for those budding manufacturers about to implement such a system. This one is an ANSI

COBOL version of MRP (instead of BAL) that should be easier to implement and maintain. It's claimed that the batch MRP package can be implemented in 30 days or less, depending on the data base management system chosen to assist it, in contrast to six or eight man-months to implement the BAL version because it does not contain the reports required of a fully developed application program. If you select IBM's Information Management System (IMS), you'll need 200K of memory, or 110K for operation under the Chain File Management System (CFMS). The price is \$30K for the IMS version, \$20K for CFMS usage. Processing of MRP under CFMS is also provided on the developer's nationwide computing network. MCDONNELL DOUGLAS AUTOMATION CO., St. Louis, Mo.

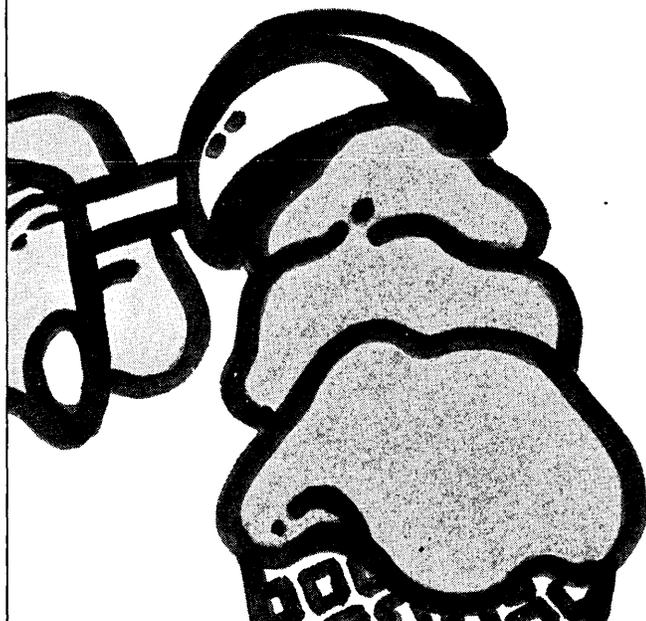
FOR DATA CIRCLE 240 ON READER CARD

Minicomputer Data Base

This data base system is one of the very few offered this collection of mini users: the Digital Scientific META-4; General Automation 18/30, Computer Hardware Inc. 2130, and the system the 2130 usually displaces, the IBM 1130. The package seems complete enough, featuring hierarchical data structures, inverted indices, support for 16 different record types, etc. DRS Version II can be operated in batch mode,

Here's a nice (free) added extra:

Our latest enhancement...now the EDP-AUDITOR system comes with a greatly expanded library of audit routines.



How do you improve one of the best known and most widely used audit packages ever marketed?

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Last year, you didn't have Bruning's OP10 microfiche duplicator. This year you do. The OP10 is portable, compact, easy to operate, and delivers up to 200 microfiche an hour. With the quality of most high price duplicators. That alone makes the new OP10 the most exciting low-volume copier on the market.

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interactively through the system console, or on a remote terminal in a dedicated or time-sharing environment. Data bases on small configurations can approach 100 megabytes. The minimum memory requirement is 8K 16-bit words, with 16K needed for non-hierarchical systems, and 32K required for hierarchical organization. Also included in the latest DRS release are several new commands, a data base analyzer, a programmer interface, ex-

panded peripheral device support, and a data base dump/restore utility that can create IBM-compatible files. Prices start at \$2,300 with lease and rental plans offered. A.R.A.P., Princeton, N.J.
FOR DATA CIRCLE 241 ON READER CARD

Mini Virtual Memory

This enterprising vendor has taken Data General's FORTRAN IV run time library and cut it up into 256-word "pages" so that they can easily be stored on a disc file. A least-recently-used demand paging algorithm is then used to decide which pages should be resident in real memory at a given time. Once the package has been installed, the user activates the feature by

modifying the array declarations of the "paged" arrays and inserting one call to a paging initialization routine. The developers point out that there are some slight restrictions on the FORTRAN programs handled by this package, but in practice they are unlikely to inconvenience users—and besides, it sure beats overlays! For \$500 you get the package, installation instructions, and one year of maintenance. The program runs with the RDOS operating system and could be made available for other monitors. SNYDER ASSOCIATES, INC., West Lafayette, Ind.

FOR DATA CIRCLE 242 ON READER CARD

Structured BAL Macros

If your shop has decided to go the structured programming route to enhance maintainability and self-documentation attributes, there's no need to adhere to high-level languages only. A collection of macros has been developed for the IBM Basic Assembler Language (BAL) levels F and H assembler called SP-75. The package includes DOWHILE, DOEND, IFTHEN, ELSE, and IFEND macros and a documentation booklet. The predicates in the DOWHILE and IFTHEN macros relate signed full-word integers using IBM extended mnemonic codes. Individual relations are combined by AND-OR logic. It's claimed that any program can be expressed using combinations of these fundamental structures and other branchless assembly code. The price is \$450 with a one-year warranty. STRUCTURED SOFTWARE, INC., Columbia, Md.

FOR DATA CIRCLE 243 ON READER CARD

Survey Analysis

The Survey Tally Program (STP) is a kind of report generator optimized to handle information gathered from questionnaire-type forms. The user supplies a card image file of questionnaire responses and selects subsets of the data for analysis based on fields contained on every card. Next, valid answer types are defined, as are any arithmetic operations to be performed on the answer, such as expressing it as a percentage of another answer on the card. Answers are reported as percent occurrences, medians, averages, mid-range points, or decile points. Answers are identified by question and data subset. The package has been used for four years in a service mode and is just now being sold outright. The price is \$4,500 for the 8K FORTRAN package. On-site installation and testing are offered. Also available is a design specification for the package, giving users sufficient detail so that a proprietary system could be developed in any suitable language. This offering is priced at \$350. AMPERSAND CORP., York, Pa.

FOR DATA CIRCLE 244 ON READER CARD ❁

We don't
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good
minds
starve.



These exceptional software design opportunities will satisfy the most demanding appetite!

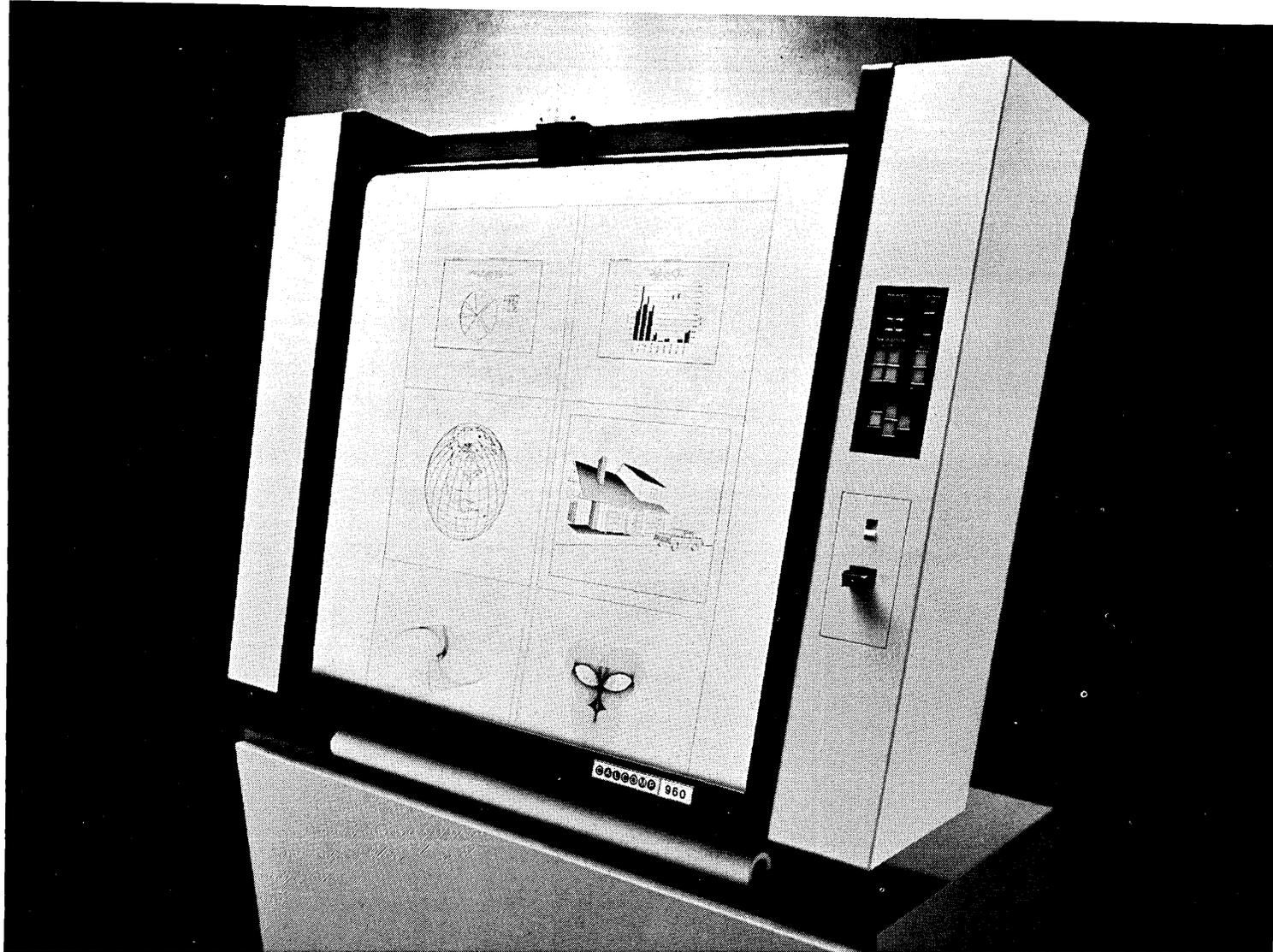
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Some artists work faster standing up.

We taught the computer to draw. And from the beginning, we've demanded ever-increasing accuracy—to the point where today, our plotters can draw things that the human would not even attempt.

But in the computer world, time is money. So our *artists* have to perform with remarkable speed.

Last year, we ran an ad where we said that our giant 745 Flatbed Plotter could draw faster than ink flows.

Now we're introducing the 960 Plotter.

It has the fastest *throughput* in the industry.

How fast is fast?

The 960 can draw at a rate up to 30 inches per second.

And from a dead start, it can accelerate to that speed after traveling only 3/10 of an inch.

Less noise. Less space.

The new 960 is extraordinarily quiet. And because it's a vertical plotter, it takes up a lot less space.

Remember, CalComp taught the computer to draw, and our plotter marketing

facilities are unmatched throughout the world.

See our new artist at work. Call or write California Computer Products, Inc., DA-M9-75, 2411 West La Palma Avenue, Anaheim, California 92801. Telephone (714) 821-2011.



CALCOMP

Hello, IBM.

ADDS introduces the first truly low cost CRT terminal for the IBM user.

We've been waiting a long time to say this:

Hello, IBM!

There, we finally said it.

You see, IBM (we almost feel like we should call you "sir") Applied Digital Data Systems (that's us) now has a terminal for IBM users. Wait'll you see it.

It's called the 980A. And, it's packed with the features that helped ADDS carve a reputation in the Teletype[®] compatible market. Sharp, readable screen with upper and lower case character display. Line as well as character insert/delete. Not to mention blinking, formatting, and patented graphics.

Compatibility?

The 980A looks just like a 3270 to the telecommunications access method (BTAM, TCAM, etc.) and to such real time monitors as CICS. It can even operate on the same phone line as 3270's.

However, since your 3270's don't have blinking, lower case, graphics (or most other special 980A features, we might add), applications software developed to support the 3270 won't support our 980A. So we don't think we'll be replacing many of your 3270's.

But, the IBM user can develop new applications around the 980A. And the reason we think he should (here's where you get

nervous again) is quite simple. The 980A offers unmatched features at an extremely low cost. Namely, \$3200.00 to purchase, \$90.00* a month to lease.

And all of our units are serviced by NCR.

That's pretty much why we think if our shoe fits, the IBM user's going to wear it.

Because even though you're very, very good, IBM, there's always room for a little improvement.

Sir.

Hello, ADDS.

I may have a new application for your 980A.
Please send additional information.

Name _____

Company _____

Address _____

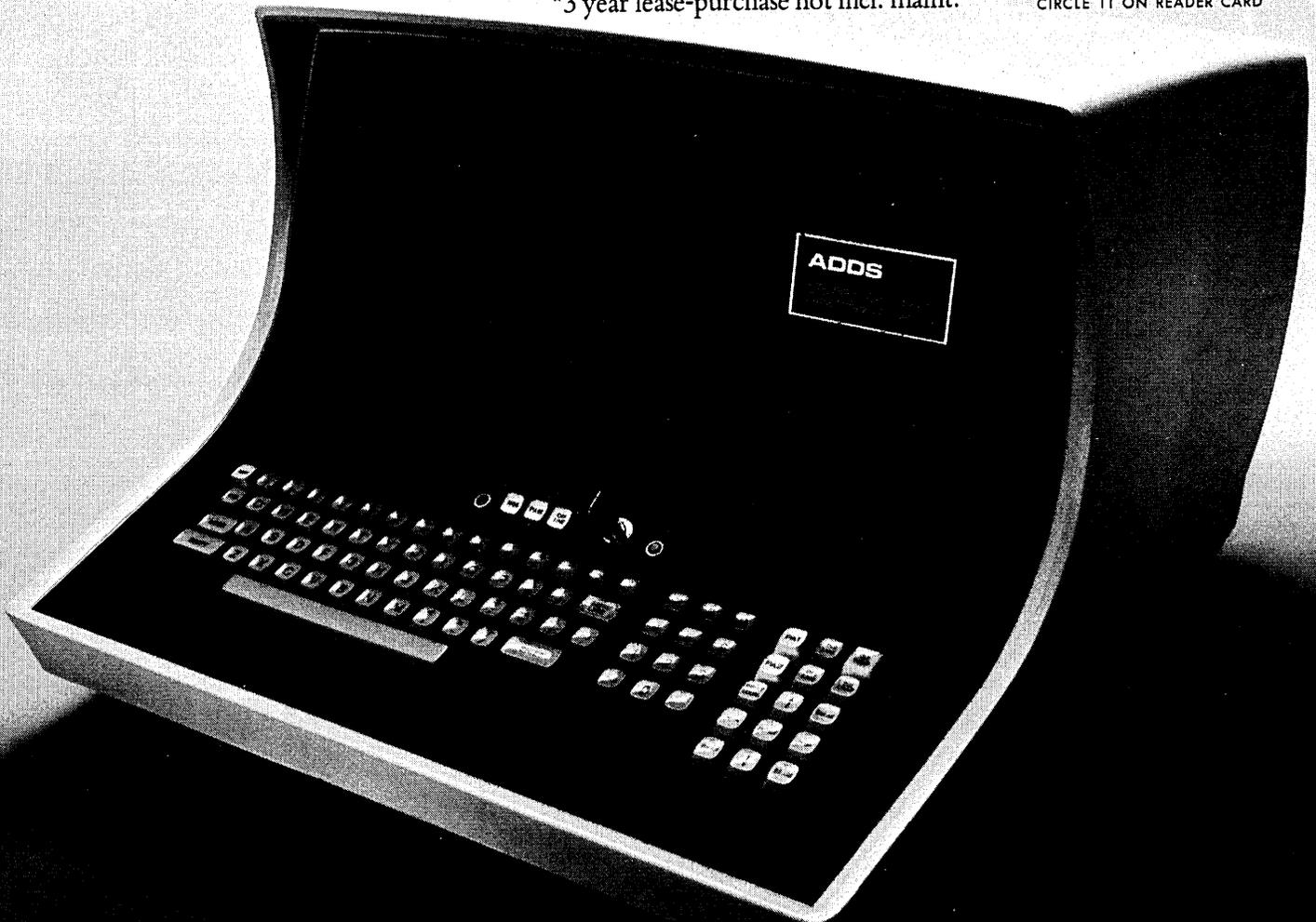
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Applied Digital Data Systems Inc.
100 Marcus Boulevard, Hauppauge, N.Y. 11787

ADDS

*3 year lease-purchase not incl. maint.

CIRCLE 11 ON READER CARD



source data

listed—though all without pricing. HEWLETT-PACKARD CO., Palo Alto, Calif.

FOR COPY CIRCLE 228 ON READER CARD

Automated Forms Processing

A new 28-page brochure describes the C-L/Boewe line of over 20 forms handling systems that perform various combinations of forms handling functions under computer control to provide finished output—in some cases ready for mailing. Included in the functions are decollating, bursting/cutting, margin trimming, center cutting, collating, stacking, stapling into books, folding, insertion of additional material, envelope stuffing/zip sorting, and postage affixing. Over 25,000 such machines are said to be in use around the world. COMPUTER-LINK CORP., Burlington, Mass.

FOR COPY CIRCLE 229 ON READER CARD

Word Processing

This manufacturer, like most others, sees a bright future ahead for word processing, but warns that the acceptance of the concept will hinge to a great degree on the answer to the question "when will I get my report?" Accordingly, a six-page article reprint en-

titled "The Next Step—The Word Processing Printer?" discusses the limitations of power typing, high copying and collating costs, and the special problems posed by long document production, recordkeeping, and data communications. VERSATEC, Santa Clara, Calif.

FOR COPY CIRCLE 232 ON READER CARD

Data Handling

Advances both in software and hardware to solve problems in data handling is the theme of a 20-page booklet



titled *Data Handling in the '70s*. The manufacturer's 32-bit medium-scale computer is described, with supporting articles exploring data handling in such

diverse applications as: energy management; weather data gathered via satellites for ships at sea; electronic editing for metropolitan newspapers; intelligent remote batch terminals operating in duplex mode; and optimizing the Navy's computerized avionics testing network with a two-level language approach. HARRIS CORP., Cleveland, Ohio.

FOR COPY CIRCLE 231 ON READER CARD

courses

Yourdon Courses

A number of courses in a number of cities is scheduled for the fall. A five-day structured design programming workshop is scheduled for Toronto (Sept. 8-12), Washington, D.C. (Oct. 20-24), Edmonton (Nov. 3-7), and New York (Dec. 8-12). Other courses, such as structured analysis, structured testing, how to manage structured programming, and data base management, are to be held in such cities as Miami, Montreal, Boston, Ottawa, Chicago, San Francisco, and others. Prices range from one-day courses at \$150 to five-day courses at \$600. YOURDON INC., 1133 Avenue of the Americas, New York, N.Y. 10036.

Microprocessor Seminars

Three-day seminars on microprocessors, especially organized for digital logic designers, are scheduled for 11 cities, among which are Dallas and Boston in September; Chicago and Washington, D.C., in October; Cleveland, Palo Alto, and Long Island City in November; and Philadelphia and Denver in December. Cramer Electronics, a distributor, is the sponsor. Price: \$395. MICROCOMPUTER TECHNIQUE, INC., 11227 Handlebar Rd., Reston, Va. 22091.

User Oriented Systems

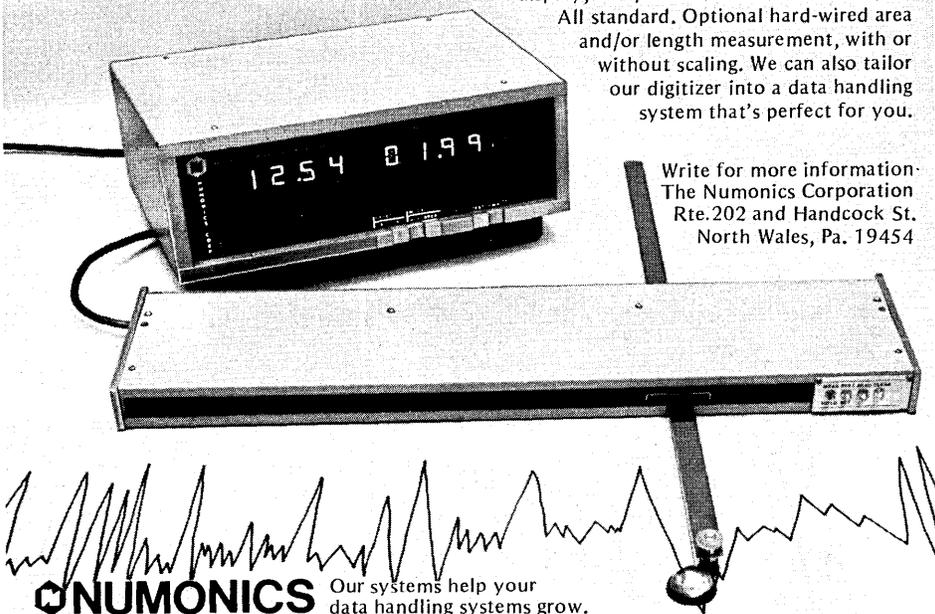
An audio-cassette training package aimed at dp managers and system analysts, *Developing User Oriented Systems*, consists of two hour long cassette tapes; a workbook containing visuals, reference materials, and forms; and a flow-chart template. Authored by Dennis A. Fletcher, the course covers understanding important steps in developing effective computer systems, defining primary system requirements with users, developing creative solutions through alternative analysis, and establishing necessary documentation. Price: \$95, (\$159.50 for the executive package which includes a Panasonic player/recorder and a briefcase). INFO 3, 3250 Wilshire Blvd., Los Angeles, Calif. 90010.

When it comes to graphics: don't fake it! digitize!

The Numonics Digitizer makes it easy to turn strip charts, templates, graphs, even aerial photographs into good straight numbers. The Numonics Digitizer is desk size but big enough to offer a 24" x 24" work area. Economical, but with useful features like 0.010" resolution, a big display, and parallel BCD-buffered output.

All standard. Optional hard-wired area and/or length measurement, with or without scaling. We can also tailor our digitizer into a data handling system that's perfect for you.

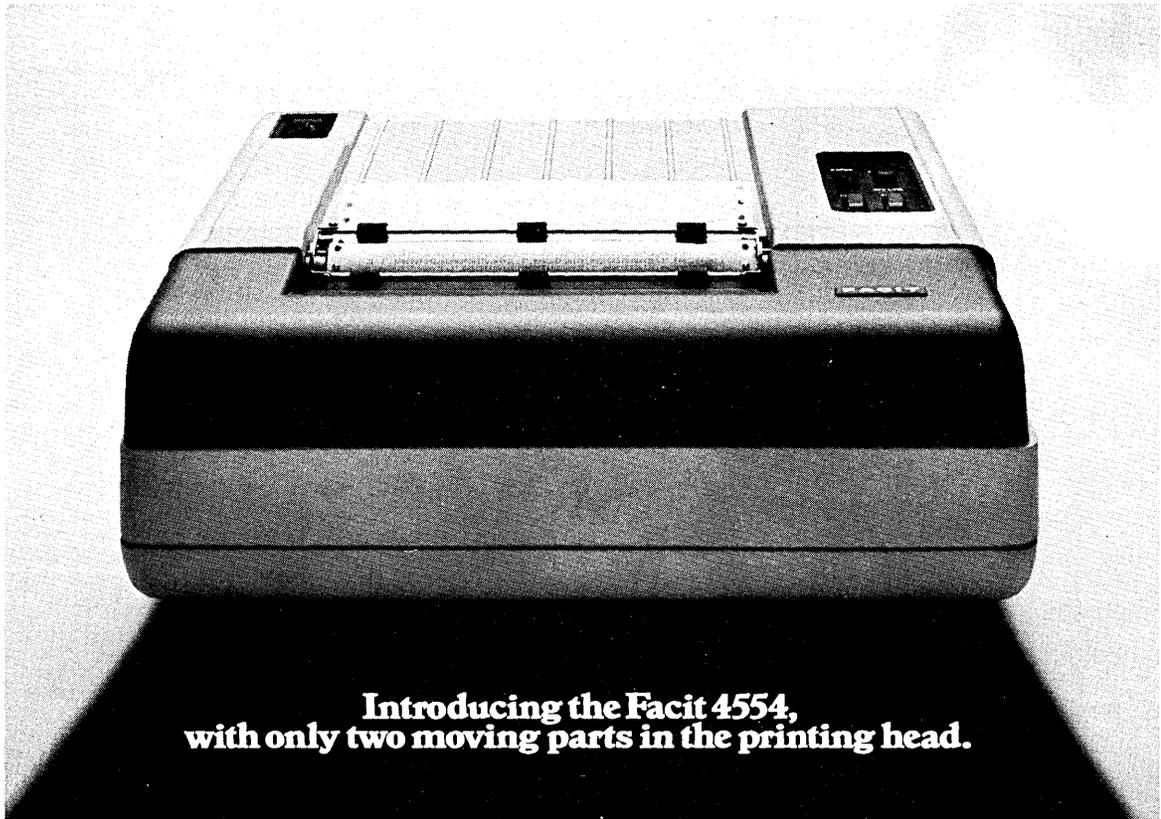
Write for more information:
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North Wales, Pa. 19454



NUMONICS Our systems help your data handling systems grow.

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Through a miracle of modern technology, Facit can now offer you less for your money.



**Introducing the Facit 4554,
with only two moving parts in the printing head.**

The rationale: fewer parts moving around means fewer parts wearing out.

But we didn't stop there.

We also gave considerable thought as to how well our page printer should produce a print-out.

So, unlike most page printers, our 4554 uses a character by character (asynchronous) print-out and an automatic ribbon

control to give you big, easy-to-read characters at 6 or 60 characters per second.

And whether you need one, two or even three copies, your print-out will always come out crystal clear.

Our 4554 is even less trouble to hook up than most page printers. That's because we give you several interface versions. Among them are: The Facit SPI interface for bit parallel data transfer, and the EIA, RS 232C.

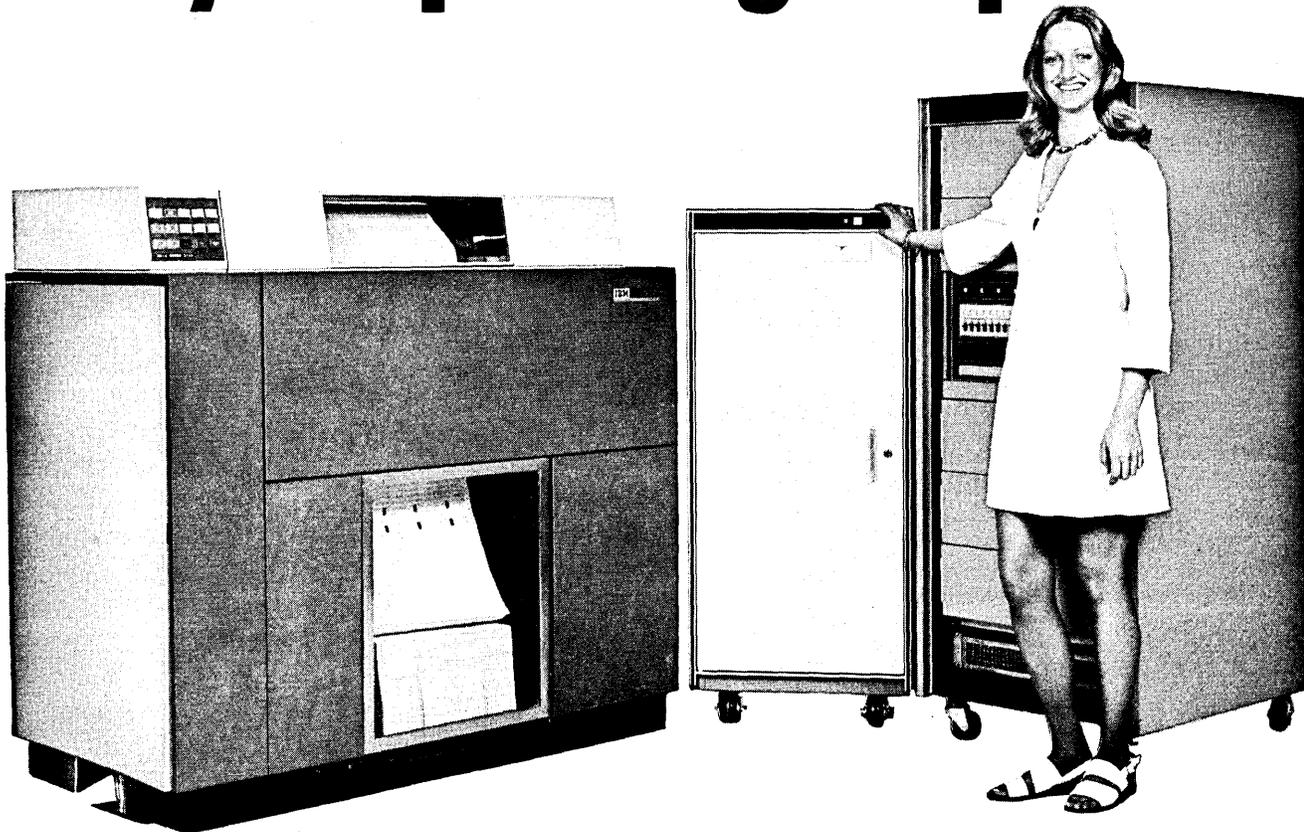
All things considered, the Facit 4554 page printer is one of those rare instances where less for your money is really more for your money.

Facit-OEM Division,
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06830.

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Dedicated to Efficiency

In Canada: Facit-OEM Division,

Here's an easy way to improve your printing output.



If the quality of your printed output does not reflect the quality of your organization, or, if your throughput is less than it could be because your printers are down too often, Grumman has a low cost, easy-to-apply answer: just hook up an IBM printer to your system with our printer controller.

Our printer controller interfaces an IBM 1403 model -2, -3, or -N1 to a variety of computers (Burroughs, CDC, Data General, DEC, Digital Scientific/IBM 1130, Univac, Xerox, and others on request). The IBM 1403 printer has compiled an unsurpassed record for print quality and reliability in thousands of installations. Now you can have the same benefits without having an IBM computer. And at less cost than the IBM user, because our

Grumman printer controller costs less than IBM's.

Are you considering a change in your system, such as an upgrade, or a change in manufacturer? You may find that for the same or less money you can improve your print quality and throughput with the IBM 1403 and Grumman printer controller, instead of the printer your computer vendor supplies.

For multi-vendor installations we can add a switch to your controller to allow you to connect the IBM 1403 to either of two different computers.

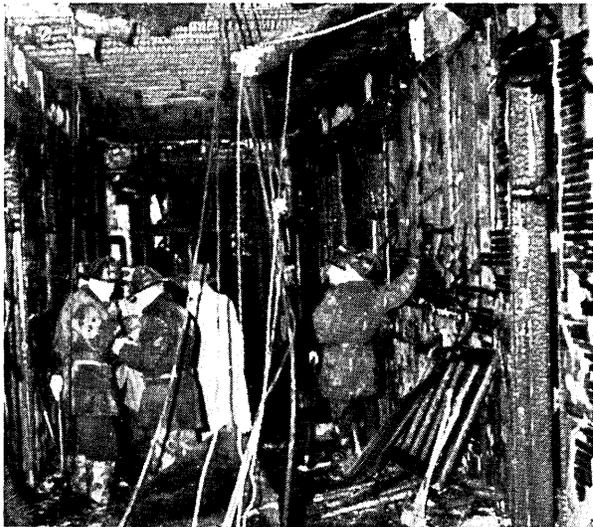
You can rent, lease or buy both the printer and controller. For full information, call or write Joe McDonough, Grumman Data Systems Corporation, 45 Crossways Park Drive, Woodbury, New York 11797. (516) 575-3034.

Grumman Data Systems

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Fenwal Fights Fire with Halon

The Fenwal Fire Suppression System does both. Because it uses Halon 1301. A chemical you may have seen demonstrated on TV. When released as a vapor by a



Fenwal system, Halon literally snuffs out flames. Faster than water. Faster than CO₂.

Faster than anything yet developed. And dry — no wet mess to clean up.

Safe for Even Delicate Things

What's just as important, Halon 1301, unlike water and CO₂, won't damage whatever it is you're trying to protect.

Sensitive equipment. Sensitive material. Sensitive anything. And it won't harm people.

Putting a Damper on Downtime

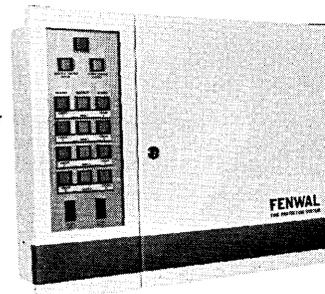
This all adds up to two very important advantages you don't get with other fire protection methods: 1. A Fenwal system gives you the fastest jump on the flames because you don't have to evacuate the area before it's released.

2. *You can go right back to work. There's no clean-up. No water damage. No extensive business interruption.*

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We believe our Halon Fire Suppression Systems are the solution to a lot of serious fire problems.

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To view "The Fireaters" just call us at (617) 881-2000. Or write Fenwal Incorporated, Ashland, Massachusetts 01721. A Division of Walter Kidde & Company, Incorporated.

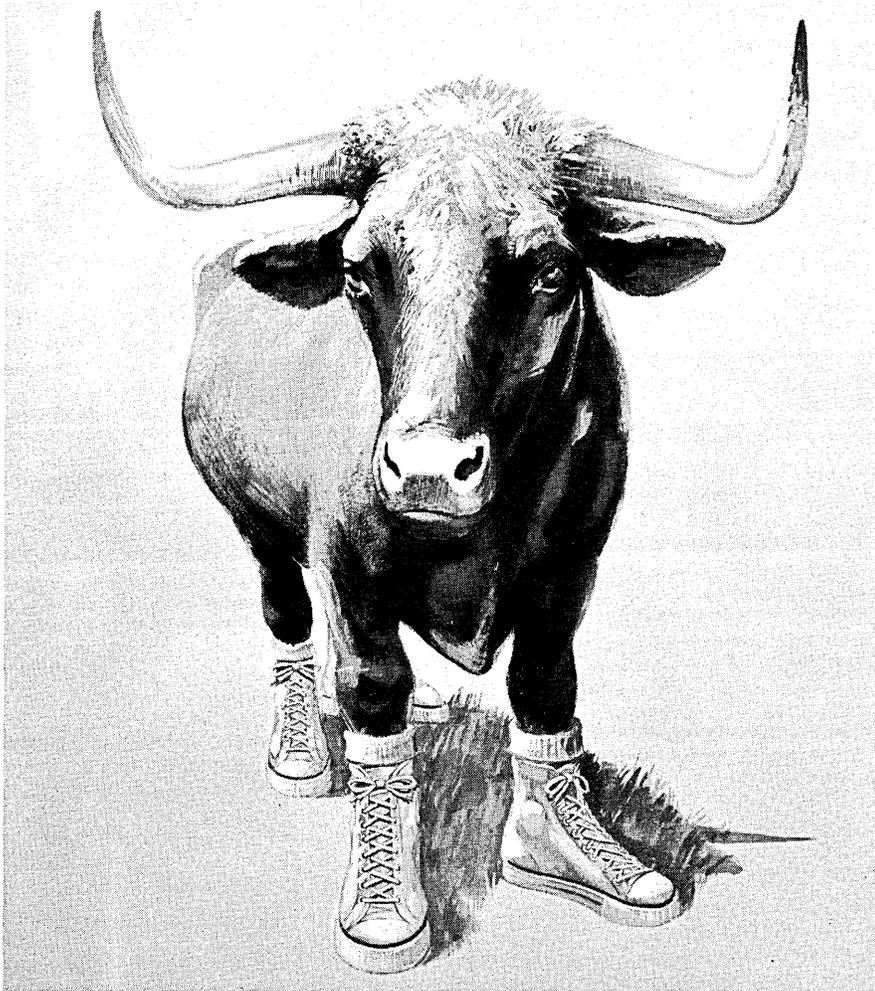
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Computer Networks

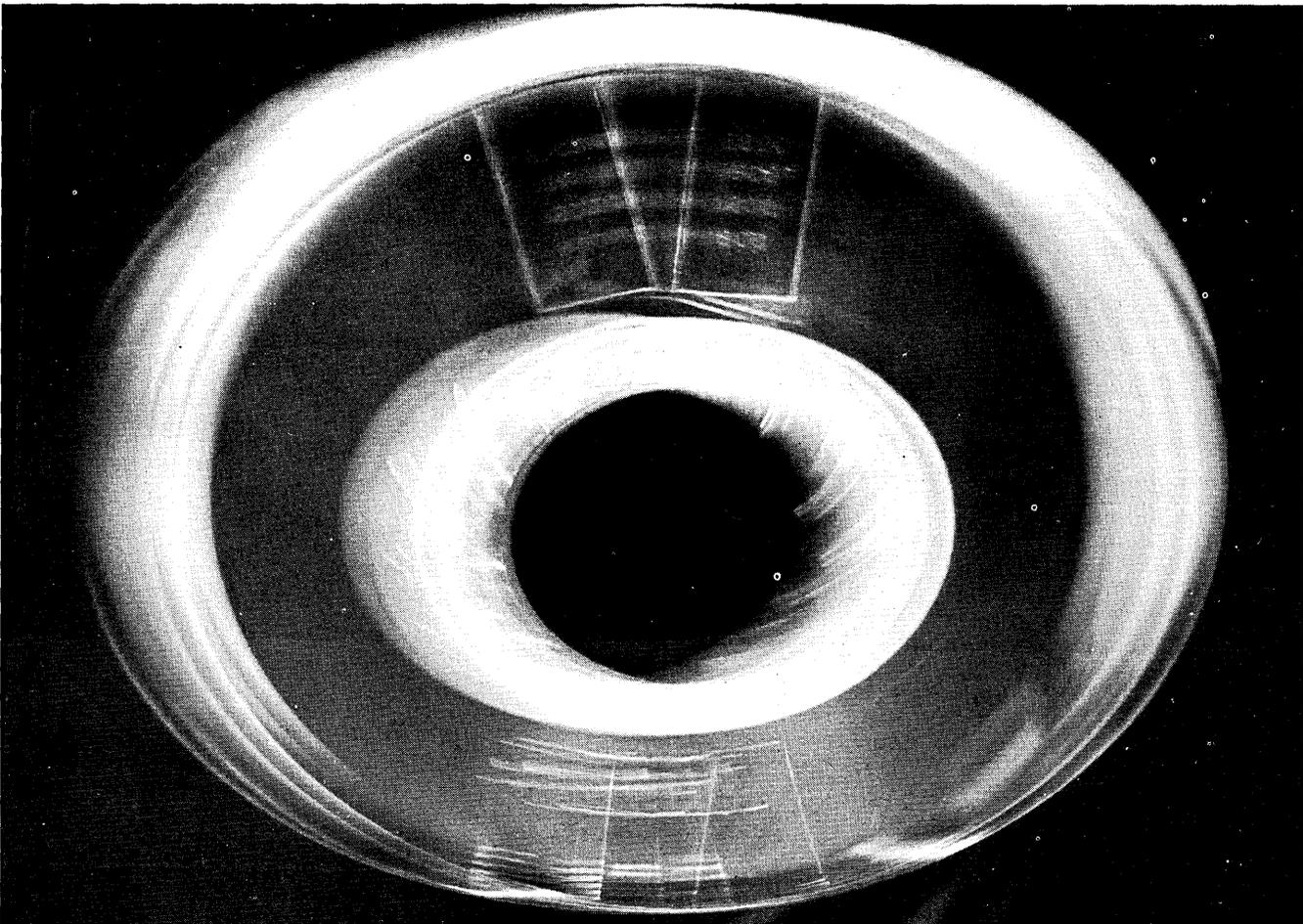
Computer Networks, a journal to be published six times a year, will cover all forms of distributed computation and information systems. With emphasis on the practical aspects of networking, articles sought will cover design, implementation, and operation of networks, as well as associated non-technological issues in the social, legal, economic, and management areas. The first issue is scheduled for late this year. Individual subscription: \$25/yr.; institutional subscription: \$50/yr. NORTH-HOLLAND PUBLISHING CO., 52 Vanderbilt Ave., New York, N.Y. 10017.

Theoretical Computer Science

The first volume of *Theoretical Computer Science*, a journal "that while remaining mathematical and abstract in spirit . . . derives its motivation from the problems of practical computation," consists of four issues in one. The journal will cover theories of automata and formal languages, as well as areas like the formal semantics of programming languages and the study of algorithms. The editor is M. Nivat of Paris. Subscription: \$43.95. NORTH HOLLAND PUBLISHING CO., P. O. Box 211, Amsterdam, The Netherlands.

Point-Of-Sale News

An information service, "Datapro Surveys Point-Of-Sale," reports on currently available POS systems and equipment. Categories include functions, equipment, applications, the market, selection of equipment, integrated systems, and POS manufacturers. For 12 monthly issues in loose-leaf format plus unrestricted use of Datapro's "dial-up inquiry service," the subscription rate is \$230. DATAPRO RESEARCH CORP., 1805 Underwood Blvd., Delran, N.J. 08075. *



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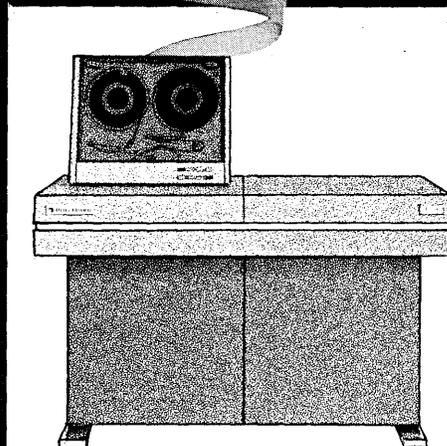
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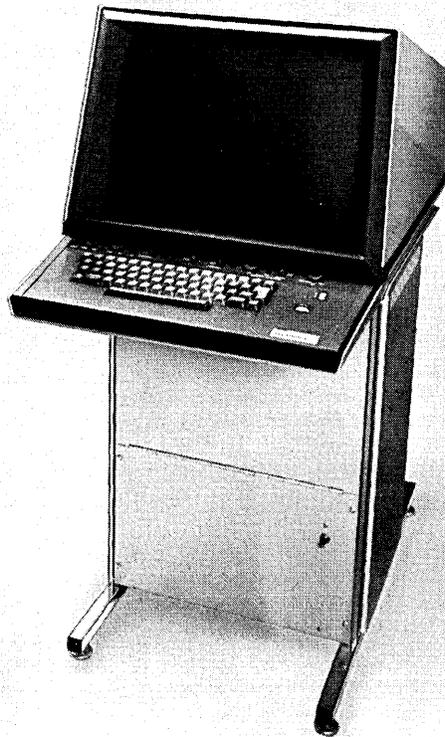
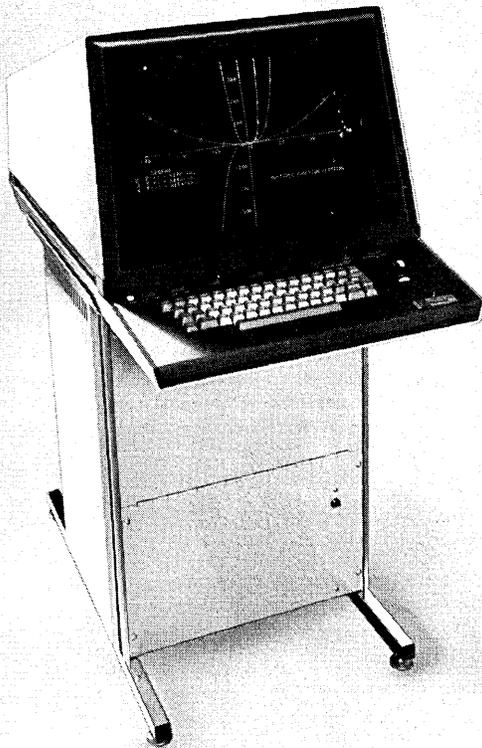
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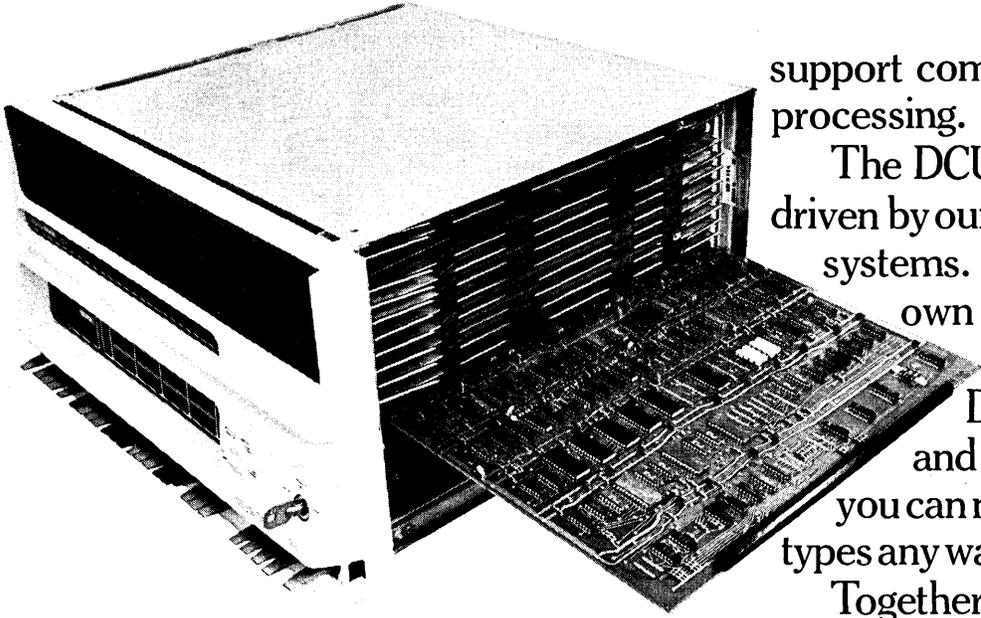
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The DCU is programmable and driven by our real-time operating systems. So you can define your own protocols.

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And when you need more speed and more lines, you won't have to throw out anything. You can add on to what you already have.

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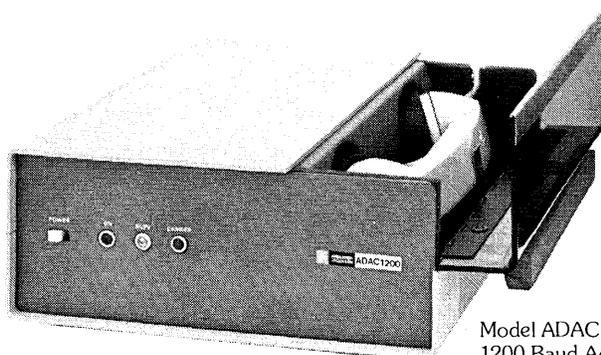
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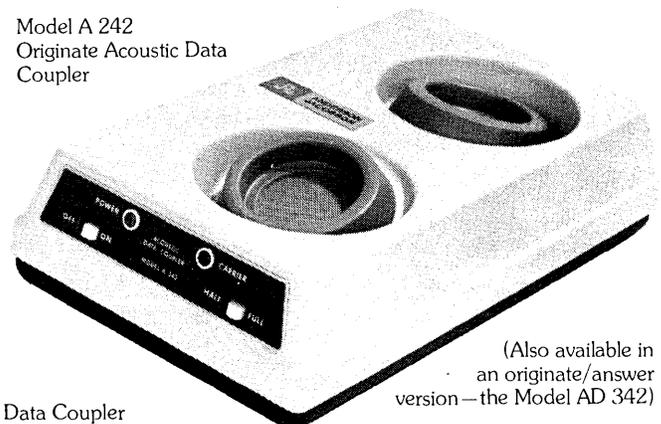
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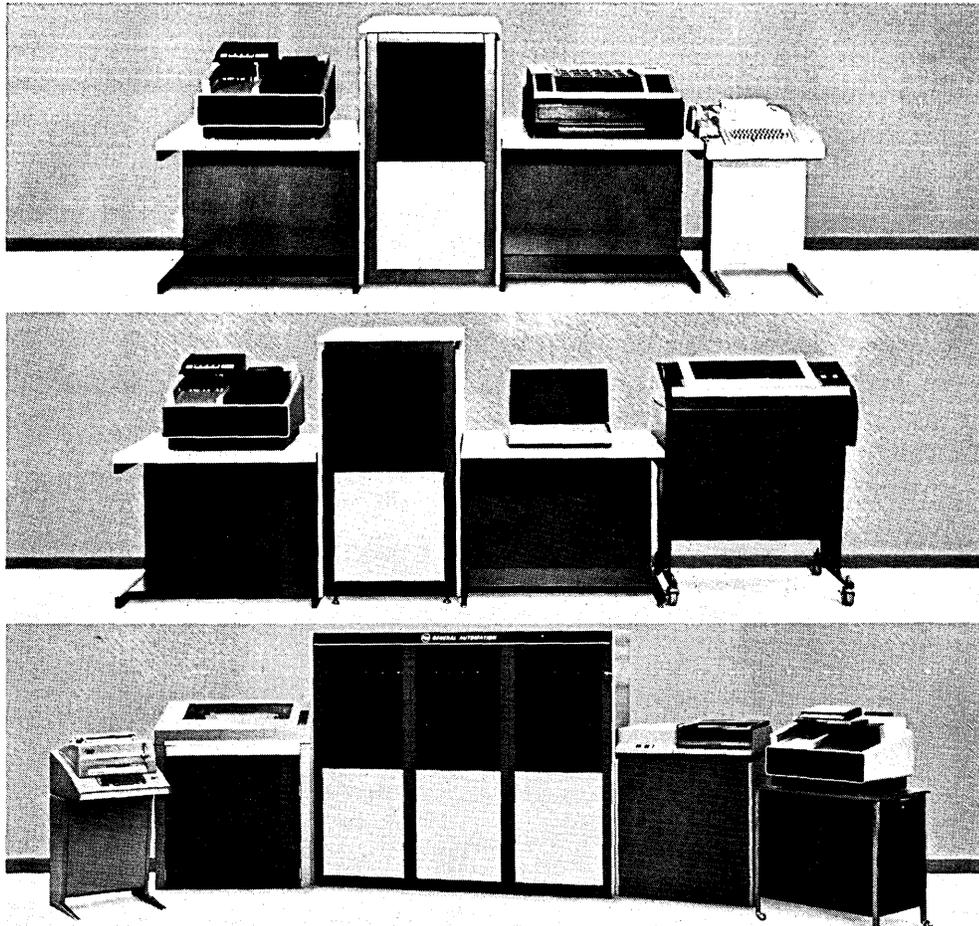
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Our DUMB TERMINAL also offers you room for

*1920 Characters is an option available at additional cost.

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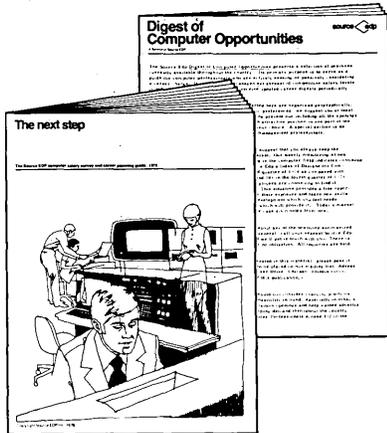
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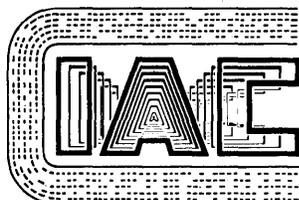
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the forum

EFT And The Prospects For Individual Privacy

"The mischiefs of the various experiments which had been made were now fresh in the public mind, and had excited the disgust of all the respectable part of America. . . . Paper money can in no case be necessary. Give the government credit, and other resources will offer. The (currency) power may do harm, never good."

*Oliver Ellsworth
Debates in the Federal Convention
August 16, 1787*

Despite the protests of Ellsworth and others, the proponents of currency quite obviously got their way at the Federal Convention. However, nearly 200 years later, arguments for eliminating paper money and similar substitutes for gold, though for different reasons, are enjoying renewed interest—enough interest in fact to warrant a two-year National Commission on Electronic Funds Transfer (EFT), established last October.

The commission is expected to "conduct a thorough study and investigation and recommend appropriate administrative action and legislation necessary in connection with the possible development of public or private electronic funds transfer systems." One important area already earmarked for consideration by the commission is "the need to afford maximum user and consumer rights to privacy and confidentiality."

The fact that "privacy" is on the EFT Commission's agenda is not particularly surprising. The broad-scale substitution of electronic impulses for our traditional means of monetary exchange will result in an extensive flow of digitized information. And part of that flow will be the financial transactions of people. Given the sophisticated technologies necessary to manage it and the type of information involved, there are sound reasons to suspect EFT will have some degree of impact, *perforce*, upon an individual's informational privacy.

However, the suspicion of a threat to privacy plainly should not substitute for understanding the nature and extent of the threat. Yet I sense from discussions with many people, in both government and industry, a feeling that the privacy implications of the long term development of EFT are no different than the implications of existing personal recordkeeping systems. On the contrary, I think there are substantial differences which deserve more attention than a token nod.

The current environment

The records in information systems that today are perceived as a threat to individual privacy are maintained by organizations primarily for making determinations about people: eligibility for benefits, suitability for employment, compliance with tax obligations, propensity for crime,

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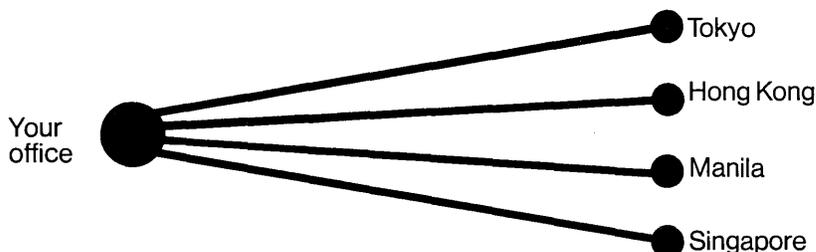
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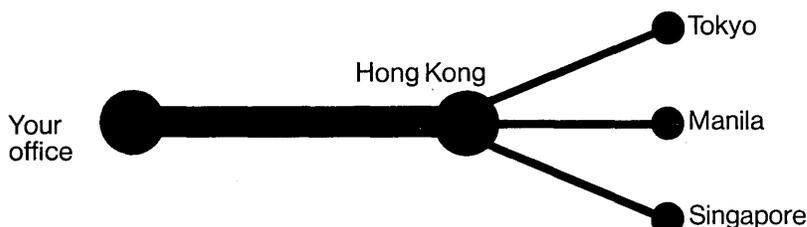
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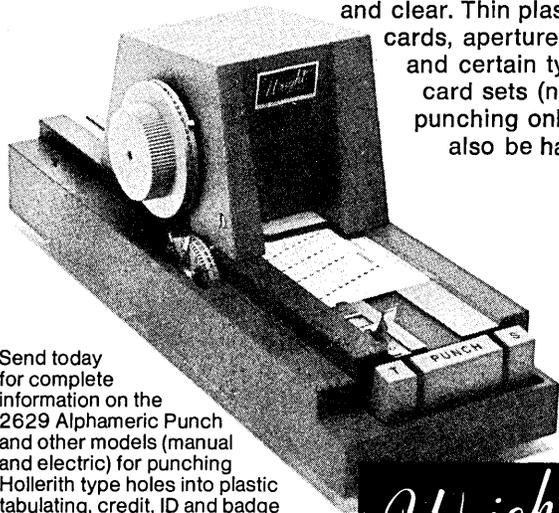
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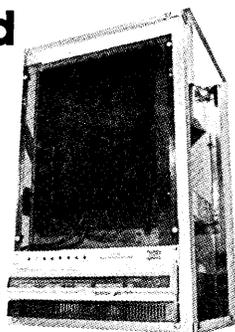
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credit worthiness, etc. Organizations, in other words, are considered to maintain records for specific understood purposes. For government agencies, the information collected about people is supposed to be directly related to the agency's mission.

As a consequence of this postulated relation between records and organization, an important assumption is that the organization is responsible and accountable for the handling of its records. Legislation like the "Fair Credit Reporting Act of 1970" and the "Privacy Act of 1974" actually make certain organizations liable for misuse of an individual's record and accountable to the individual.

Moreover, the legislative history of the Privacy Act underscores the fact that a major perceived threat to an individual's informational privacy in such systems of records is the collection of data by an organization for one purpose and then the sharing of the information with a second organization for another purpose. This practice of sharing or "dissemination" is believed to weaken materially an individual's ability to hold an organization accountable for the flow of identifiable information about himself.

The EFT environment

In a future, fully integrated EFT environment, responsibility for personal information and accountability to an individual, who is the subject of an identifiable record, may be difficult to pinpoint. The recorded information about an individual will represent transactions and, therefore, sharing of information among organizations will be the norm, not the exception.

For example, if an individual who lives in Washington travels to San Francisco and purchases something in a department store, by his action he creates a record. Who is responsible for this record? The department store? The local bank serving the department store? The individual's bank in Washington? The owner of the EFT network connecting the banks? All of them, or perhaps, none of them?

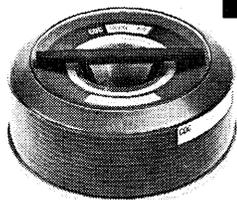
In addition to the major problem of fixing responsibility and maintaining accountability, potential secondary uses of an EFT information flow may be troublesome. To help envision such secondary uses consider first the operational aspects of EFT transactions which make a secondary use not only possible but also appealing. At the moment a transaction is recorded by a point-of-sale terminal, information would presumably be captured in a form directly usable without the intermediate steps associated with, for example, credit cards. Add to this the frequency of financial transactions, and the resulting routine flow of information would be a "real-time" record of events which would parallel closely a major portion of an individual's experiences. Therefore, these "electronic footprints" could certainly be helpful for locating and tracking individuals for a variety of purposes, which implies its potential for surveillance and social control should not be dismissed lightly. And it is these secondary uses which perhaps represent a more substantial threat to individual privacy in an EFT environment.

Although the present state of EFT development is fragmented, it should not be too difficult to project the potential for abuse of a national, fully integrated EFT system. Recall the recent revelations by AT&T that millions of telephone conversations were monitored to catch a few thousand "phone freaks." Or consider the recent testimony of William J. Cotter, chief postal inspector, who defended the mail surveillance conducted by the Postal Service "for the Agriculture Dept., Navy, and dozens of other government departments on the grounds they are law enforcement agencies."

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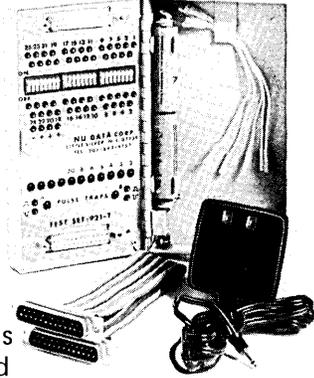
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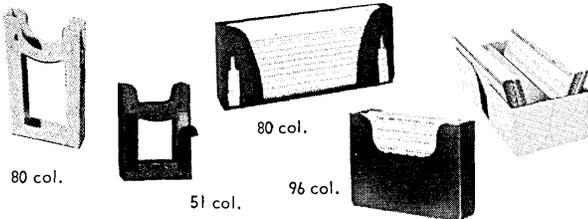
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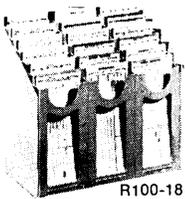
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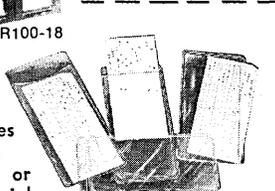


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to feed on an EFT information flow. Take for example the Parent Locator Service of HEW which is required by law after July 1 to begin using the record-keeping systems of the Social Security Administration and the IRS for tracking down fathers who do not meet their alimony and child support obligations. And speaking of IRS, consider EFT in light of the Supreme Court's recent decision in *U.S. v. Bisceglia*, which affirmed that the Internal Revenue Service has authority under Internal Revenue Code Sections 7601 and 7602 to issue a "John Doe" summons to a bank or other depository in an effort to discover the identity of a person whose bank transactions suggest possible tax liability.

In the dissenting opinion of *Bisceglia*, Justice Stewart, joined by Justice Douglas, observed the following:

"Every day the economy generates thousands of sales, loans, gifts, purchases, leases, deposits, mergers, wills and the like which—because of their size or complexity—suggest the possibility of tax problems for somebody. Our economy is "tax relevant" in almost every detail. Accordingly, if a summons could issue for any material conceivably relevant to "taxation"—that is, relevant to the general duties of the IRS—the service could use the summons as a broad research device. The service could use that power methodically to force disclosure of whole categories of transactions and closely monitor the operations of myriad segments of the economy on the theory that the information thereby accumulated might facilitate the assessment and collection of some kind of federal tax from somebody."

Unfortunately, Justices Stewart and Douglas were the minority in this decision. The prevailing view of the Court, expressed by Chief Justice Burger, was the following:

"Of necessity, the investigative authority so provided is not limited to situations in which there is probable cause in the traditional sense, to believe that a violation of the tax laws exists. . . . The purpose of the statutes is not to accuse, but to inquire. Although such investigations unquestionably involve some invasion of privacy, they are essential to our self-reporting system, and the alternatives could well involve far less agreeable invasions in house, business and records."

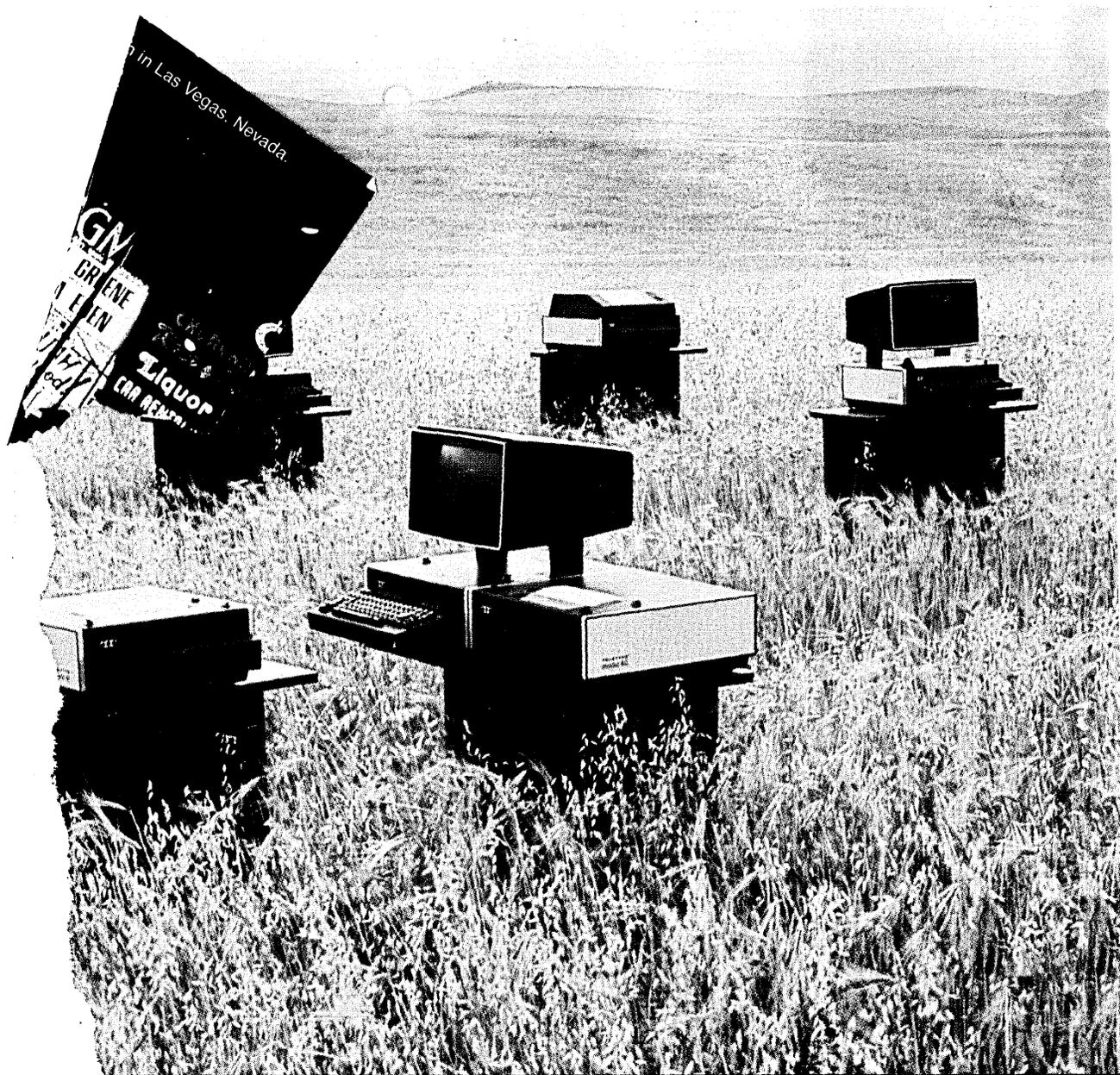
While I defer to constitutional authorities for a definitive view on the soundness of this opinion, frankly it strikes me as a poor rubric for preserving individual rights to privacy in any society, particularly one which is wired for an extensive electronic flow of financial information.

One must conclude that the emerging EFT environment may indeed pose a real threat to individual privacy, though not simply because sophisticated technologies and personal information are involved. In sum, the real threat lies (1) in the potential erosion of organizational responsibility and accountability to the individual, and (2) in the potential secondary uses of the EFT information flow.

Today we are rightly concerned with the promiscuous practices of bureaucratic organizations and the problems of placing clear limits on their use of personal information. EFT represents a rare opportunity to consider the social significance of a major innovation *before* it becomes commonplace. The National Commission on Electronic Funds Transfer has the charter to open this issue up for exhaustive study and public debate. Let's hope they use it!

—Christopher E. Heller

Mr. Heller is program manager of the Office of Telecommunications Policy and is responsible for privacy and security projects. (The views he states in this forum are his own and not the U.S. Government's or OTP's.)



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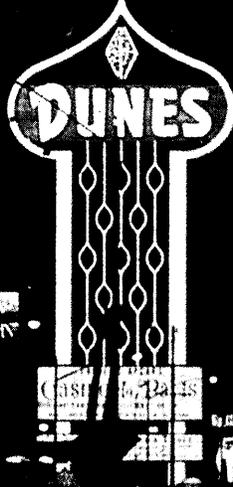
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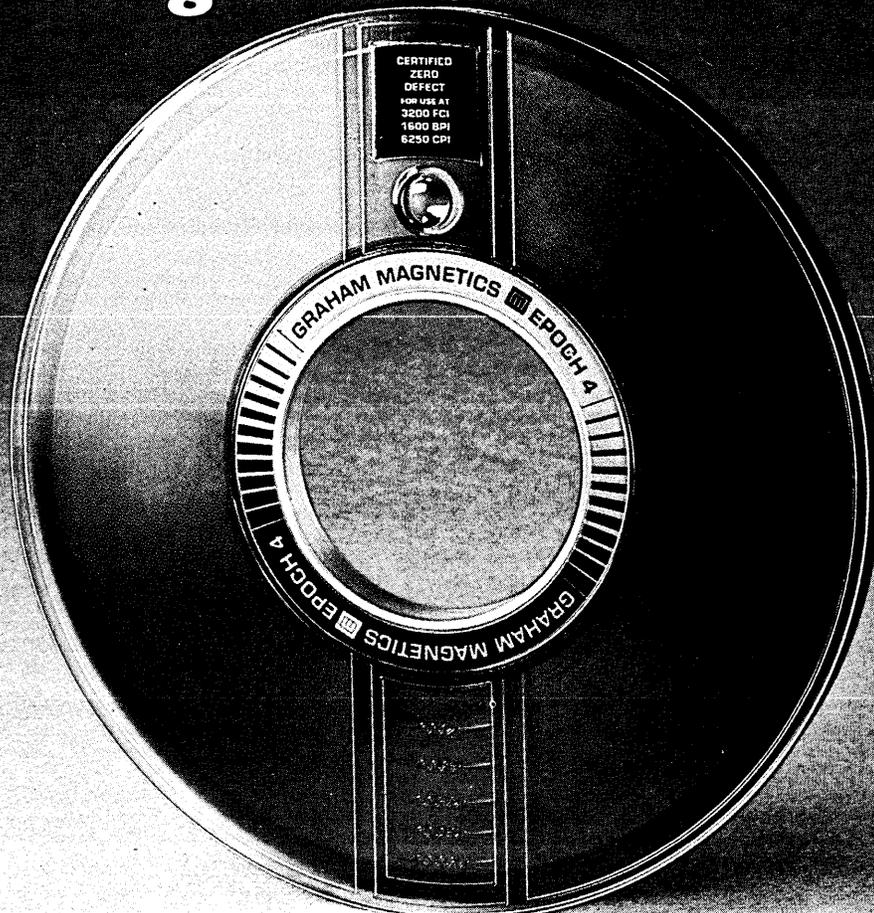


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